GEI Consultants Canada

Environmental Impact Study

Rand Estate Redevelopment

Niagara on-the-Lake, Ontario

Submitted to:
Two Sisters Resorts Corp.
122 Romina Drive
Concord, ON L4K 4Z7

Submitted by:
GEI Consultants Canada Ltd.
1266 South Service Road, Unit C3-1
Stoney Creek, ON L8E 5R9
905.643.6688

April 15, 2026
Project No. 2600786

Noel Boucher
Senior Ecologist/Project Manager

Sean K. Male
Vice President, Natural Heritage Practice Lead

Table of Contents

Appendices

1. Introduction

GEI Consultants Canada Ltd. (GEI) was retained by Two Sisters Resorts Corp. to complete an Environmental Impact Study (EIS) to support the proposed redevelopment of the properties located at 144, 176 and 200 John Street East and 588 Charlotte Street in the Town of Niagara-on-the-Lake (Town), Ontario (**Figure 1**, **Appendix A**). These four properties are collectively referred to as the Subject Lands.

The Subject Lands are generally bound by John Street East and the private property at 210 John Street East to the north, Charlotte Street and privately held properties to the west, the Town-owned Heritage Trail to the south and privately held lands owned by Two Sisters Resorts Corp. (winery/vineyards) to the east.

The Subject Lands are predominantly located within the Town's Urban Area boundary, although a portion of the 200 John Street East property is located outside the Urban Area. The Subject Lands are also located within the Greenbelt Plan area; the portion within the Urban Area boundary is a Settlement Area under the Greenbelt Plan, while the remainder of the Subject Lands (consisting of a portion of the 200 John Street East property) are located within the Protected Countryside, as shown on **Figure 2** (**Appendix A**), which is also designated part of the Niagara Peninsula Tender Fruit and Grape Area under the Greenbelt Plan. The portion of the Subject Lands within the Protected Countryside/Niagara Peninsula Tender Fruit and Grape Area is identified as part of the Greenbelt Plan Natural Heritage System (NHS). The proposed development will be located on the portion of the Subject Lands located within the Urban Area. No development or site alteration is proposed within the Greenbelt Plan NHS.

The four properties comprising the Subject Lands have previously been used for residential purposes. However, the 176 and 200 John Street East and 588 Charlotte Street properties are currently vacant; a tenant resides within the Devonian House on the 144 John Street East property. The properties generally consist of residual residential buildings, watercourse (including One Mile Creek and its tributary) and maintained (mowed) open space on the 200 John Street East and 588 Charlotte Street properties and manicured lawn with relatively abundant treed areas on the 144 and 176 John Street East properties.

Two Sisters Resorts Corp. is proposing to redevelop the Subject Lands into a hotel and condominium complex. The hotel and associated amenities will be located on the 144 and 176 John Street East properties, while the condominiums (consisting of five, three-storey buildings) will be located on the 200 John Street East and 588 Charlotte Street properties. The development will also require servicing (water, sanitary, stormwater management), grading and driveway upgrades and construction. The proposed redevelopment is being assessed as a single, comprehensive development and will require amendments to the Town's Official Plan and Zoning By-law.

1.1. Background

GEI has previously undertaken comprehensive ecological and related environmental studies for the 200 John Street East and 588 Charlotte Street properties as part of a previous application for residential development of that portion of the Subject Lands. This work included the preparation of an EIS (Savanta, 2020), an EIS Addendum (GEI, 2022) and EIS Technical Brief (GEI, 2024). The proposed residential development advanced through an Ontario Land Tribunal (OLT) proceeding (under OLT Case Numbers

OLT-22-003603 and OLT-23-000494) with the OLT decision issued on October 11, 2024. The current development is different than previously assessed within these documents, although the ecological information remains relevant and is used and referred to in this EIS for the currently proposed development on the Subject Lands.

GEI previously completed ecological investigations on the 144 and 176 John Street properties in 2017 and 2022 and this information has been referenced where appropriate in this current EIS for the proposed development of the Subject Lands. The current EIS is required to support the application for the comprehensive development of all four properties on the Subject Lands.

1.2. Purpose of the Report

An EIS is required to assess the potential impacts of the proposed development on the natural features and associated functions on the Subject Lands. This work considers applicable provincial and municipal requirements and policies including reference to the natural heritage policies of the Province of Ontario's Provincial Planning Statement (PPS; MMAH 2024), associated provincial implementation guidance contained in the Natural Heritage Reference Manual (NHRM; MNR 2010), the Greenbelt Plan (MMAH 2017), the Niagara Official Plan (NOP; 2022), the Town Official Plan (Town OP; 2017) and the regulation and policies of the Niagara Peninsula Conservation Authority (NPCA).

The study components included:

- A review of existing natural heritage background information, policies and legislation applicable to the Subject Lands in its regional context;
- A field assessment of the natural heritage features on and immediately adjacent to the Subject Lands (where access was available) 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 whether any of the existing natural heritage features within the Subject Lands meet the test of 'significance' as identified by the PPS and/or as components of the NOP or Town OP Natural Heritage Systems or as features regulated by the NPCA;
- A description of the proposed undertaking and development proposal;
- Identification and discussion of the potential impacts that could occur to the natural features as a result of the proposed development;
- Recommendations for mitigation to avoid or minimize impacts; and
- Opportunities for the enhancement or restoration of natural features.

1.3. EIS Study Area Considerations

This EIS has been undertaken to assess the potential impacts on the proposed development on natural features on and adjacent to the Subject Lands. The EIS Study Area includes:

- Lands subject to development and/or site alteration as part of development of the Subject Lands (i.e., the "Proposed Development Area");
- The extent of the Subject Lands;
- Lands within 120 m of the Proposed Development Area; and
- The broader general landscape surrounding the Subject Lands.

The portion of the Subject Lands proposed for development and/or site alteration (i.e., the Proposed Development Area) represents the area where development related activities could have a direct impact on natural features. This part of the EIS Study area is limited to the area subject to alteration for the proposed development, including any permanent structures or infrastructure or permanent site alteration such as grading or areas that will be temporarily disturbed to facilitate construction. For the purposes of this EIS, the Proposed Development Area has been identified as encompassing the portion of the Subject Lands within the Town's Urban Area; however, as per the Site Plan and servicing and grading plans, development or site alteration are not proposed throughout the entire area.

The second component of the EIS Study Area is the extent of the Subject Lands. This area, which encompasses the extent of the four properties, was generally subject to on-the-ground assessment through the completion of various ecological investigations as outlined in this EIS and investigations and assessments completed by other consultants working on behalf of Two Sisters Resort Corp. As noted in **Section 1.1**, the Subject Lands include areas within and outside of the Town's Urban Area. Development is limited to the portions of the Subject Lands within the Urban Area.

The third component of the EIS Study Area is the area within 120 m from the Proposed Development Area on the Subject Lands. This 120 m area encompasses private and public lands within 120 m (including the portion of the Subject Lands outside the Proposed Development Area). The PPS and NOP both identify "adjacent lands" as being the lands adjacent to natural heritage features where the potential impacts associated with development and/or site alteration need to be assessed. As per the PPS and ROP requirements, the "adjacent lands" are technically measured from the limit of the natural heritage feature. With respect to the PPS, the required width of the adjacent lands next to various types of natural heritage features and areas are identified in Table 4-2 (Provincial Recommendations for Adjacent Lands Widths for PPS Policy 2.1.6) in the NHRM (MNR 2010). These "adjacent land" widths are generally 120 m for the natural features and areas identified in Section 4 of the PPS, except for Significant Earth Science Areas of Natural and Scientific Interest (ANSI), which have an adjacent lands width of 50 m. With respect to the NOP (2022), the width of "adjacent lands" for Natural Heritage Features and Areas outside of the Greenbelt Plan NHS ranges from 50 m for Other Woodlands, Significant Valleylands, Significant Wildlife Habitat (SWH), Habitat of Endangered and Threatened Species and Life Sciences ANSIs to 120 m for Provincially Significant Wetlands (PSWs), Significant Coastal Wetlands and Significant Woodlands (per Table 3-1 in the NOP, 2022).

The intent of the Adjacent Lands assessment is to confirm if any part of the proposed development of the Subject Lands is located within the "adjacent lands" of any of the specified natural features and areas (as defined in the PPS) and parts of the Region's Natural Environment System and, if so, to complete the impact assessment to determine the potential for negative impacts on those features that lie outside the Proposed Development Area. The portion of the EIS Study Area identified on mapping in

this EIS as being 120 m from the Proposed Development Area was used to confirm if the proposed development was located within the "adjacent lands" of any of the surrounding natural heritage features or areas. Although the adjacent lands, as required by the PPS and ROP are measured from the limit of the feature, measuring 120 m from the Proposed Development Area boundary provides a conservative approach to confirm if any natural heritage features or areas outside the development area need to be considered in the EIS.

In addition to the area within 120 m of the Proposed Development Area, a broader Study Area has considered in this EIS to address several known natural heritage features located beyond 120 m from the Proposed Development Area, including the Paradise Grove Plain ANSI, located northeast of the Subject Lands and a woodland identified as a deer wintering area by the Ministry of Natural Resources (MNR) southwest of the Subject Lands, as depicted in **Figure 2** (**Appendix A**). Although these features are located beyond 120 m from the Proposed Development Area, they were primarily identified and considered in this EIS in the context of potential ecological linkage considerations or potential impacts as a result of induced effects due to increased human presence or traffic due to the development.

Ecological field investigations were generally completed on the Subject Lands, although the Headwater Drainage Feature Assessment (HDFA) and reptile transect surveys were also completed along the Town-owned Heritage Trail south of the Subject Lands, due to it being publicly accessible. Therefore, assessments within the 120 m area adjacent to the Proposed Development Area but outside the Subject Lands were primarily limited to desktop investigations including background review (described in **Section 3**) and desktop natural features screening (through review of aerial photography and background natural heritage data). For example, vegetation community mapping, as per the Ecological Land Classification (ELC) protocol, was based on field investigations on the Subject Lands, supplemented with aerial photography interpretation for areas within 120 m from the Proposed Development Lands.

Therefore, in summary, this EIS considers natural features within the Proposed Development Area and areas within 120 m of the Proposed Development Area, as well several natural features beyond 120 m that were identified during the background review. Field investigations were generally limited to the Subject Lands, with the exception of HDFA and reptile surveys, which extended into a portion of the 120 m lands where public access was available.

2. Natural Heritage Planning Considerations

The Subject Lands are subject to federal, provincial and municipal legislation, policies and guidelines as well as land use policies established by the NPCA. The following sections provide a summary of the relevant natural feature-related legislation, plans and guidelines that guide development on the Subject Lands.

2.1. Provincial Planning Statement (2024)

The PPS (MMAH 2024) provides direction on matters of provincial interest related to land use planning and development. It "*supports improved land use planning and management, which contributes to a more effective and efficient land use planning system*." 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 EIS addresses those policies that are specific to Natural Heritage (Section 4.1) with some reference to other policies with relevance to Natural Heritage and impact assessment considerations and areas of overlap (e.g., those related to Sewage, Water and Stormwater, section 3.6; Water, section 4.2; Natural Hazards, section 5.2).

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

- Significant wetlands;
- Significant coastal wetlands;
- Significant woodlands;
- Significant valleylands;
- SWH;
- Fish habitat;
- Habitat of Endangered and Threatened species; and
- Significant ANSIs.

The PPS states that, with respect to EcoRegion 7E, where the Subject Lands are located:

- Development and site alteration shall not be permitted in significant wetlands or significant coastal wetlands;
- 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; and

- 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. Greenbelt Plan (2017)

The Greenbelt Plan (MMA, 2017) is a Provincial Plan that was created to provide protection for the agricultural land base and the ecological and hydrological features, areas, and functions within the Greater Golden Horseshoe. The Greenbelt Plan, together with other provincial plans, builds on the PPS to establish a land use planning framework for the Greater Golden Horseshoe that supports a thriving economy, a clean and healthy environment, and social equity.

As described within Section 2 of the Greenbelt Plan, the Greenbelt Area includes lands within the Oak Ridges Moraine Area, the Niagara Escarpment Plan Area, the Parkway Belt West Plan Area, and lands designated as Protected Countryside and as Urban River Valley.

According to *Schedule 1: Greenbelt Area* and as shown in **Figure 2** (**Appendix A**), the eastern portion of the Subject Lands is designated as Protected Countryside. Per *Schedule 4: Greenbelt Natural Heritage System*, these lands are also located within the Greenbelt Plan NHS. The Greenbelt Plan NHS is not a land use designation; rather, it is an overlay on top of the Protected Countryside designation.

The Greenbelt Plan sets out policies to protect Key Natural Heritage Features (KNHFs), Key Hydrologic Features (KHFs), and Key Hydrologic Areas (KHAs).

KNHFs include the following:

- Habitat of Endangered and Threatened species;
- Fish habitat;
- Wetlands;
- Life Science ANSIs;
- Significant valleylands;
- Significant woodlands;
- SWH (including habitat of Special Concern species);
- Sand barrens, savannahs, and tallgrass prairies; and
- Alvars.

KHFs include the following:

- Permanent and intermittent streams;
- Lakes (and their littoral zones);
- Seepage areas and springs; and

- Wetlands.

KHAs include the following:

- Significant groundwater recharge areas;
- Highly Vulnerable Aquifers; and
- Significant surface water contribution areas.

Per Section 3.2.5 of the Greenbelt Plan, development and site alteration are prohibited within KNHFs, KHFs, and their associated Vegetation Protection Zones (VPZs), except for uses such as infrastructure, conservation, or flood control projects that meet the criteria set out in the plan. For proposals within 120 m of KNHFs or KHFs, a Natural Heritage Evaluation or Hydrological Evaluation must demonstrate that there will be no negative impacts on their ecological or hydrological functions and must also identify VPZs that are sufficient to protect the features and are maintained as natural, self-sustaining vegetation.

Section 3.2.5.1 of the Greenbelt Plan identifies the types of development and site alteration that are permitted in the Greenbelt NHS (subject to other policies, where relevant):

"*Development or site alteration is not permitted in key hydrologic features and key natural heritage features within the Natural Heritage System, including any associated vegetation protection zone, with the exception of:*

a. Forest, fish and wildlife management;

a. Conservation and flood and erosion control projects, but only if they have been demonstrated to be necessary in the public interest and after all alternatives have been considered; or

b. *Infrastructure, aggregate, recreational, shoreline and existing uses, as described by and subject to the policies of section 4*."

KNHFs within the Greenbelt Plan area are to be identified and delineated in accordance with the guidance provided in the *Technical Definitions and Criteria for Key Natural Heritage Features in the Natural Heritage System of the Protected Countryside Area* (MNR, 2012a). The purpose of this technical paper is to provide technical assistance in the identification and delineation of Key Natural Heritage Features in the NHS of the Protected Countryside. The technical paper also makes reference to Section 3.2.4.3 of the Greenbelt Plan (now Section 3.2.5.3 in the 2017 revised Greenbelt Plan). As per Section 3.2.5.3, "*beyond the Natural Heritage System within the Protected Countryside, key natural heritage features are not subject to the policies of section 3.2.5, but are to be defined pursuant to, and subject to the policies of, the PPS*". A similar policy applies to KHFs in Section 3.2.5.3 of the Greenbelt Plan.

The technical paper also notes that Section 3.2.4 (now Section 3.2.5) of the Greenbelt Plan applies to all KNHFs within the NHS of the Protected Countryside. The technical paper clarifies that if a KNHF straddles the boundary of the NHS, the portion of the feature located outside of the NHS is not subject to the natural feature policies of the Plan. More specifically, the technical paper reiterates that the Greenbelt Plan requires the minimum 30 m VPZ be applied in the Greenbelt Plan area only. Features outside of the Greenbelt NHS are subject to the policies of the PPS.

2.3. Niagara-on-the-Lake Official Plan (2017)

According to the Town OP dated July 17, 2017, the Subject Lands are located within the Urban Area and form part of a Community Improvement Area. As illustrated on Schedule B of the Town OP, the Subject Lands contain multiple land use designations. The northern portion of the Subject Lands is designated Established Residential, as established through a previous land use amendment, and contains lands designated Conservation in association with One Mile Creek. The southern portion of the Subject Lands is designated Low Density Residential. The area within the Greenbelt Plan area on the Subject Lands is designated as Agricultural.

The land use designations applicable to the Subject Lands impose a range of development restrictions intended to balance urban development with the protection of natural features and functions. The Conservation designation associated with One Mile Creek represents the most restrictive land use within the Subject Lands. Part 4, Section 16, Subsection 16.1 of the Town OP (2017) identifies the criteria for natural heritage features to be designated as "Conservation/Wetlands". This subsection indicates that features included within this designation include "*Provincially Significant Wetlands, flood prone and shoreline erosion areas, area of natural and scientific interest, woodlots and fish habitats*". There is no definition of "woodlot" provided in the Town OP, nor any related guidance on what woodlot features meet the requirements to be included under the Conservation land use designation.

The Town OP (2017) indicates that development and site alteration within Conservation-designated lands is generally prohibited, with limited exceptions subject to approval by the Town and the NPCA. The Town OP (2017) notes that any proposed land uses abutting these areas "*shall be sensitive to and minimize any impact on the natural environment in a Conservation designation*". Any development adjacent to these lands needs to be assessed through the EIS to demonstrate that no negative impacts will occur.

Relevant policies of the Town OP (2017) related to development on the Subject Lands include:

- Policy 16.2 identifies the following goals and objectives of the Town OP [note, only those potentially relevant to the Subject Lands are included]:
    - *to protect wetlands from incompatible activities*
    - *to encourage the retention of woodlots*
    - *to protect areas of natural and scientific interest*
    - *to delineate and regulate development on all lands having inherent physical environmental hazards such as flood susceptibility, poor drainage or other physical conditions which are a constraint to development in order to prevent loss of life and to minimize property damage and social disruption*
    - *to preserve and enhance the amenities and natural resources offered by waterways, wetlands and natural areas in the Town*
    - *to preserve and protect provincially significant wetlands in accordance with provincial policy statements*.

- Policy 16.3.1 identifies the allowable land uses within the Conservation designation areas shown on the Land Use Schedules in the Town OP. This includes main uses (e.g., floodplains, environmental protection, private parks, among others) and secondary uses (e.g., accessory buildings and structures subject to the approval of the authority having jurisdiction, yard space for any use permitted in an abutting designation, accessory buildings or structures not used for human habitation permitted in an abutting designation subject to the approval of the authority having jurisdiction).
- Policy 16.3.2 provides policies related to Provincially Significant Wetlands and development within 120 m.
- Policy 16.4(6) prohibits the alteration of a watercourse without approval of NPCA and MNRF.
- Policy 16.4(9) speaks to placement of Conservation lands in an appropriate zoning category.
- Policy 16.4(10) indicates that with respect to watercourses (other than the Niagara River), the conservation designation boundary shall be the limit of the floodplain or in the absence of a floodplain, the top of bank adjacent to the watercourse. It is noted that, where deemed necessary, an appropriate maintenance area (generally 8 m) may be required by the Town.
- Policy 16.4(10) also indicates "*where lands designated conservation are within an Urban Boundary as shown in this Plan and does not form part of any shoreline, watercourse or valley area, development may be permitted but restricted to preserve existing trees or other natural features*".

2.4. Niagara Official Plan (2022)

The NOP (2022) provides policies to identify and protect the Region's Natural Environment System, which consists of the Natural Heritage System and the Water Resources System. As of March 31, 2025, the NOP (2022) is considered to be an official plan of the local municipalities in Niagara Region, including the Town of Niagara-on-the-Lake.

Components of the Region's Natural Environment System as outlined in the NOP (2022) include:

- Provincial Natural Heritage Systems (e.g., Greenbelt Plan NHS)
    - Key Natural Heritage Features and Key Hydrologic Features in the Greenbelt Plan Area
- Natural Heritage System
    - Natural Heritage Features and Areas
        - Significant Wetlands
        - Significant Coastal Wetlands
        - Other Coastal Wetlands
        - Fish habitat
        - Significant Woodlands
        - Significant Valleylands

        - Habitat of endangered and threatened species
        - SWH
        - Provincially and Regionally Significant Earth and Life Science ANSIs
        - Other Woodlands
    - Linkages
    - Buffers
    - Supporting Features and Areas
    - Enhancement Areas
- Water Resources System
    - Key Hydrologic Areas
        - Significant groundwater recharge areas
        - Highly vulnerable aquifers
        - Significant surface water contribution areas
    - Key Hydrologic Features
        - Permanent streams
        - Intermittent streams
        - Inland lakes and their littoral zones
        - Seepage areas and springs
        - Wetlands
    - Groundwater Features
        - Recharge/discharge areas
        - Water tables
        - Aquifers and unsaturated zones
    - Surface Water Features
        - Headwater Drainage Features (HDFs)
        - Recharge/discharge areas
        - Associated riparian lands that can be defined by their soil moisture, soil type, vegetation or topographic characteristics
    - Other Hydrologic Functions

The NOP (2022) schedules and associated online Natural Environment System mapping indicate the following with respect to the Subject Lands and surrounding areas:

- Schedule B ("Regional Structure") generally depicts the Subject Lands as being part of a Delineated Built-up Area.
- Schedule C1 ("Natural Environment System Overlay and Provincial Natural Heritage Systems") depicts the Subject Lands as containing some elements of the Natural Environment System and identifies the Greenbelt Plan NHS as being located on and adjacent to the Subject Lands.
- Schedule C2 ("Natural Environment System: Individual Components and Features") depicts the Subject Lands as containing Other Woodlands (fronting John Street East). The general surrounding area contains Significant Woodlands to the northeast and south and Other Wetlands to the northeast.
    - Online Natural Environment System mapping depicts two Other Woodlands on the Subject Lands. One Other Woodland is located in the northwest corner of the 144 John Street East property, while the second Other Woodland straddles the north end of the 144/176 John Street East properties
    - Online Natural Environment System mapping depicts the Paradise Grove Plain ANSI adjacent to the Subject Lands (this layer is not evident on Schedule C1 but is assumed to be present).
    - Online Natural Environment System mapping identifies One Mile Creek as part of the Permanent & Intermittent Stream layer. The Tributary of One Mile Creek is not identified in this layer.
    - Online Natural Environment System mapping identifies three distinct "Shoreline Areas" along One Mile Creek on the Subject Lands including one around the existing crossing on 200 John Street East, one along a portion of the creek northwest of the existing Randwood Estate building and one northwest of One Mile Creek on 144 John Street East.
- Schedule C3 ("Key Hydrologic Areas Overlay") depicts the majority of the Subject Lands as being located within a Highly Vulnerable Aquifer but outside of a Significant Groundwater Recharge Area.

Section 3 of the NOP (2022) provides policies for the protection of the Natural Environment System. Policies relevant to development on the Subject Lands include:

- Policy 3.1.4.1 – "*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*"
- Policy 3.1.4.8 – "*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*"
- Policy 3.1.5 – applies to lands within the Greenbelt Plan NHS

- Policy 3.1.5.3 – "*required within the Provincial natural heritage system is a 30 metre wide vegetation protection zone adjacent to significant woodlands, wetlands, as well as permanent and intermittent streams and inland lakes*"
- Policy 3.1.5.5 – "*development and site alteration shall not be permitted in key natural heritage features that are within the Provincial natural heritage system or in any key hydrologic features outside of settlement areas…*"
- Policy 3.1.5.7.1 – "*A proposal for new development or site alteration within 120 metres of any key natural heritage feature within a Provincial natural heritage system or any key hydrologic feature outside of settlement areas will require an environmental impact study and/or hydrological evaluation that identified as vegetation protection zone…*"
- Policy 3.1.5.7.4 – "*Development or site alteration shall not be permitted in the vegetation protection zone…*"

- Policy 3.1.9 – applies to lands within the Settlement Area
  - Policy 3.1.9.6.1 – "*Development and site alteration shall not be permitted in the following natural heritage features and areas:*
    a. Provincially significant wetlands
    b. Significant coastal wetlands; and
    c. *Significant woodlands*."
  - Policy 3.1.9.6.2 – "*Development and site alteration shall not be permitted in the following natural heritage features and areas unless it has been demonstrated through the preparation of an environmental impact study that there will be no negative impacts on the natural features or their ecological functions:*
    a. Other woodlands;
    b. Significant valleylands;
    c. Significant wildlife habitat; and
    d. *Areas of natural and scientific interest.*"
  - Policy 3.1.9.8.1 – "*A proposal for new development or site alteration outside of a Provincial natural heritage system which is adjacent to a natural heritage feature or area shall require an environmental impact study and/or hydrological evaluation to determine that there will be no negative impacts on the feature, ecological function, or hydrologic function in accordance with the adjacent lands distances outlined in Table 3.1*"
  - Policy 3.1.9.10.1 – "*within settlement areas, mandatory buffers from natural heritage features and areas are required. The width of an ecologically appropriate buffer would be determined through an environmental impact study and/or hydrological evaluation at the time and application for development or site alteration is made….The width of the buffer would be based on the sensitivity of the ecological functions from the proposed development or site alteration, and the potential for impacts to the feature and ecological functions as a result of the proposed change in land use*".

- Policy 3.1.9.10.2 – "*Development or site alteration shall not be permitted in the mandatory buffer…unless it has been demonstrated through the preparation of an environmental impact study that there will be no negative impacts and the buffer will continue to provide the ecological function for which it is was intended*".

- Policy 3.1.10.1 – "*Development or site alteration shall not be permitted unless it can be demonstrated that it will not have negative impacts on:*

    a. *The quantity and quality of water in key hydrologic areas, key hydrologic features, sensitive surface water features, and sensitive ground water features;*

    b. *The hydrologic functions of key hydrologic areas, key hydrologic features, sensitive surface water features, and sensitive groundwater features;*

    c. *The interaction and linkage between key hydrologic areas, key hydrologic features, sensitive surface water features, and sensitive groundwater features and other components of the natural environment system;*

    d. *The natural hydrologic characteristics of watercourses such as base flow, form and function and headwater drainage areas;*

    e. *Natural drainage systems and shorelines areas; and*

    f. *Flooding or erosion*."

- Policy 3.1.10.4 – "*As much of the area adjacent to the shorelines of watercourses and Lakes Erie and Ontario as possible shall be maintained as a naturally vegetated shoreline where new lots are being created, where vacant lots are being developed, and when redevelopment on existing lots is proposed. Specifically:*

    a. *The vegetated shoreline should span the entire water frontage and be at least 15 metres in depth from the normal high water mark;*

    b. *Where redevelopment is proposed, the vegetated shoreline should be achieved through ecological enhancements and the regeneration of natural features to the extent feasible*".

Development and site alteration that is adjacent to a natural heritage feature shall require an EIS to determine that there will be no negative impacts on the natural features or their ecological functions in accordance with the adjacent lands' distances below:

- 120 m from a Provincially Significant Wetland;
- 120 m from a Significant Coastal Wetland;
- 120 m from a Significant Woodland;
- 50 m from Other Woodlands;
- 50 m from Significant Valleylands;
- 50 m from SWH; and
- 50 m from ANSIs.

2.5. Niagara Peninsula Conservation Authority

The NPCA administers Ontario Regulation 41/24: Prohibited Activities, Exemptions and Permits, under Section 28 of the *Conservation Authorities Act, 1990* (amended 2024). This regulation defines the areas in which NPCA may:

- 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 or pollution may be affected by the development.

NPCA implements its regulatory authority under O. Reg. 41/24 in accordance with the NPCA Policy Document: Policies for Planning and Development in the Watersheds of the Niagara Peninsula Conservation Authority (NPCA, 2024).

Pursuant to O. Reg. 41/24, any interference with or development in or on areas stated in the *Conservation Authorities Act* (e.g., hazardous lands, wetlands, river or stream valleys) requires permission from the Conservation Authority. The Conservation Authority may issue permits under Section 28.1 and may attach conditions on the permits per Section 9(1) of the Regulation.

2.6. Species Conservation Act *(2025)*

In March 2026, the *Species Conservation Act, 2025* (SCA) replaced the *Endangered Species Act, 2007* as the provincial legislation with respect to species at risk. The SCA protects all threatened, endangered and extirpated species listed on the Protected Species in Ontario List (O. Reg. 60/26). These species are legally protected from harm, and their habitats are protected from damage or destruction, as defined under the SCA.

2.7. Fisheries Act (1985)

Fisheries and Oceans Canada (DFO) administers the federal *Fisheries Act, 1985* (amended 2019), which defines fish habitat as "*spawning grounds and 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*". The *Fisheries Act* prohibits the death of fish by means other than fishing and the Harmful Alteration, Disruption, or Destruction of fish habitat (HADD). A HADD is defined by DFO 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*".

Projects or activities that have the potential to impact fish habitat should be submitted to the DFO for review through the "Request for Review" process. DFO will review the proposed development to determine whether there is potential to:

- Impact an aquatic species at risk
- Cause death of fish: or

- Result in HADD of fish habitat.

The death of fish by means other than fishing or a HADD of fish habitat can be authorized by DFO under the *Fisheries Act*. Authorizations require the preparation and submission of an application package identifying the impacts on fish and fish habitat; the avoidance, mitigation, and offsetting measures that will be implemented; and any monitoring that is proposed.

2.8. Migratory Bird Convention Act (1994)

Environment and Climate Change Canada (ECCC) administers the *Migratory Birds 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. In its application, it requires best management practices to detect and avoid disturbance to active nests during development activities. 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.

3. Data Collection Approach and Methodology

The presence/absence, significance and sensitivity of the natural features and associated functions within the EIS Study Area was assessed through a combination of desktop background information review and on-site ecological studies. The results of the background review and the methodologies used for on-site ecological studies are discussed in the following sections.

3.1. Background Information Review

The following references were reviewed for information relating to natural heritage features and area or species that may be found on or adjacent to the Subject Lands:

- MNR Geospatial Ontario geographic database and natural features mapping;
- Natural Heritage Information Centre (NHIC) database;
- Provincial wildlife atlases;
- Fisheries and Oceans Canada's (DFO) Aquatic Species at Risk Map;
- One Mile Creek Watershed Plan; and
- Information provided by the MNRF.

The results of the background review are discussed in the following sections.

3.1.1. Geospatial Ontario Natural Features Results

The MNR Geospatial Ontario database (online at King's Printer for Ontario, 2023; accessed February 2026) identified the following in relation to the Subject Lands, as depicted graphically on **Figure 2** (**Appendix A**):

- The Subject Lands are located within the Greenbelt Plan area. The majority of the Subject Lands are located within the Greenbelt Towns and Villages designation, while the eastern portion is located in the Greenbelt Specialty Crop Area with the Greenbelt NHS overlay applied;
- The mapping identifies a number of woodlands on the Subject Lands including areas in the north, east and south portions and areas within and beyond 120 m from the Proposed Development Area (note: this mapping appears out of date relative to current conditions on the Subject Lands, as discussed in **Section 4**);
- One Mile Creek is identified as running through portions of the 144, 176 and 200 John Street East properties;
- A tributary of One Mile creek is identified as running along the western property boundary of portions of 144 John Street East and 588 Charlotte Street;
- The Paradise Grove Plain Regionally Significant Life Science ANSI is identified as being located north of John Street East approximately 215 m from the Subject Lands (at its closest point);

- An unevaluated wetland is identified as being located north of John Street East approximately 210 m from the Subject Lands (at its closest point);
- The closest Provincially Significant Wetland is the Two and One Mile Creek Wetland Complex, located approximately 960 m west of the Subject Lands; and
- Ontario GeoHub (Wildlife Values Area mapping) identifies the woodland approximately 145 m southeast of the Proposed Development Area as a Deer Wintering Area (Stratum 2). This category of deer wintering habitat is considered to be peripheral habitat occupied by deer during early or late winter, or throughout the entire winter period when snow depth is less than 30 to 50 cm. The woodland associated with Paradise Grove Plain ANSI is not identified as a deer wintering area.

3.1.2. NHIC Database Results

The NHIC database (online at King's Printer for Ontario, 2023; accessed February 2026) was queried for records of provincially significant plants, vegetation communities and wildlife within square 19PH5689 which is 1 km² in size and includes the Subject Lands and areas outside the Subject Lands (within and greater than 120 m). The Subject Lands are a small component of the overall square, and therefore it is unlikely that all plant and animal species that have been documented within this data square are found on or within 120 m of the Proposed Development Area. Habitat type, availability, and size are all contributing factors in species presence and habitat use. Several species records were returned with the following species of interest noted:

- Species Listed as Endangered or Threatened on the SARO List:
  - Butternut (*Juglans cinerea*) – Endangered
  - Deerberry (*Vaccinium stamineum*) – Threatened
  - Fern-leaved Yellow False Foxglove (*Aureolaria pedicularia*) – Threatened
  - Eastern Meadowlark (*Sturnella magna*) – Threatened
  - Bobolink (*Dolichonyx oryzivorus*) - Threatened
- Species listed as being of Conservation Concern (i.e. listed as special concern on the SARO list or a S1-S3 species):
  - Southern Slender Ladies'-tresses (*Spiranthes lacera var. gracilis*) – S-Rank S1
  - Kansas Hawthorn (*Crataegus coccinioides*) - S-Rank: S2
  - Tufted Titmouse (*Baeolophus bicolor*) – S-Rank: S3
  - Rue-anemone (*Thalictrum thalictroides*) – S-Rank: S3
  - Black Gum (*Nyssa sylvatica*) – S-Rank: S3
  - Broad Beech Fern (*Phegopteris hexagonoptera*) – S-Rank: S3; Special Concern
  - Swamp Rose-mallow (*Hibiscus moscheutos*) – S-Rank: S3, Special Concern
  - Deepwater Sculpin – Great Lakes–Western St. Lawrence Populations (*Myoxocephalus thompsonii*, population 2) – S-Rank: S3?, Special Concern

- Wood Thrush (*Hylocichla mustelina*) – S-Rank: S4B, Special Concern
- Eastern Wood-pewee (*Contopus virens*) – S-Rank: S4B, Special Concern
- Snapping Turtle (*Chelydra serpentina*) – S-Rank: S4, Special Concern.

3.1.3. Ontario Breeding Bird Atlas

The Ontario Breeding Bird Atlas (OBBA; Birds Canada 2022) contains detailed information on the population and distribution status of birds in Ontario. The data are presented on 100 km^2 area squares with one square containing the Subject Lands, all areas within 120 m of the Proposed Development Area and lands beyond 120 m (17PH5689). The Subject Lands are a small component of the overall bird atlas square, and therefore it is unlikely that all bird species that have been documented within this data square are found on or within 120 m of the Proposed Development Area. Habitat type, availability, and size are all contributing factors in bird species presence and use.

A total of 88 bird species have been recorded in atlas square 17PH5689, with the following species of interest noted:

- Species listed as Endangered or threatened on the SARO list:
  - Red-headed woodpecker (*Melanerpes erythrocephalus*) – Endangered
  - Bobolink – Threatened
  - Eastern Meadowlark – Threatened
  - Bank Swallow (*Riparia riparia*) – Threatened
  - Chimney Swift (*Chaetura pelagica*) - Threatened
- Species of Conservation Concern (S1-S3 species or Special Concern on the SARO List):
  - Wood Thrush – Special Concern
  - Barn Swallow (*Hirundo rustica*) - Special Concern
  - Tufted Titmouse – S3.

3.1.4. Ontario Reptile and Amphibian Atlas

The Ontario Reptile and Amphibian Atlas (Ontario Nature 2022) provides detailed information on the population and distribution status of reptiles and amphibians in Ontario. The data are presented on 100 km^2 squares with one square (17PH58) containing the Subject Lands, all areas within 120 m of the Proposed Development Area and areas beyond 120 m. It should be noted that the Subject Lands are a small component of the overall atlas square, and therefore it is unlikely that all reptile and amphibian species previously documented within the square are found within the Subject Lands. Habitat type, availability, and size are all contributing factors in reptile and amphibian species presence and use.

A total of 16 reptile and amphibian species were recorded in atlas square 17PH58, including three turtle species, five snake species, eight frog and toad species, and seven salamander species. The following species of interest were noted:

- Species listed as Special Concern on the SARO list:
  - Northern Map Turtle (*Graptemys geographica*) – Special Concern
  - Snapping Turtle - Special Concern

There were no species that were listed as endangered or threatened on the SARO list recorded in the atlas square.

3.1.5. Aquatic Species at Risk Map

The DFO Aquatic Species at Risk Map (2025) was reviewed to identify known occurrences of aquatic SAR, including fish and mussels, within or adjacent to the Subject Lands. No aquatic species are risk occurrences were noted within One Mile Creek on the Subject Lands or adjacent areas. The nearest documented aquatic SAR habitat identified in the DFO mapping is in Lake Ontario (approximately 2 km north of the Subject Lands) which is identified as confirmed or potential habitat for Deepwater Sculpin, identified as Special Concern on Schedule 1 of the federal *Species at Risk Act* (SARA), and Shortnose Cisco (*Coregonus reighardi*), identified as Endangered on Schedule 1 of the SARA. The Niagara River shoreline, located approximately 1.1 km southeast of the Subject Lands, is identified as habitat, or potential habitat, for Grass Pickerel (*Esox americanus vermiculatus*), identified as Special Concern on Schedule 1 of SARA.

3.1.6. One Mile Creek Watershed Plan

The One Mile Creek Watershed Study (Aquafor Beech Ltd. & LURA Consultants Ltd. 2005) was prepared to guide management of the watershed. The One Mile Creek watershed is located in the Town of Niagara-On-The-Lake. The creek drains northwesterly from a highly urbanized area to the Epp Drain upstream of John Street East that diverts the majority of the headwater flows (about 30% of the drainage area) easterly to the Niagara River. Flows during major rainfall events overflow the Epp Drain and release excess discharge into One Mile Creek. Surficial geology throughout the watershed is primarily fine grained, laminated glaciolacustrine deposits. These substrates generally have low permeability and associated sites do not function as potential recharge areas.

The Subject Lands occur within Management Zone 1 (2-year flow: 1.5 m^3/s; bankfull flow 1.2 m^3/s) of the One Mile Creek Watershed. In Zone 1, the creek channel is poorly defined and altered by straightening, widening and realignment to accommodate land use changes. Existing and recommended channel dimensions to support a 2-year flow event for reaches bounded by John Street East and Charlotte Street are summarized in Tables 7.3 and 7.4, respectively, of the One Mile Creek Watershed Study (Aquafor Beech Ltd. & LURA Consultants Ltd. 2005).

3.1.7. Information Provided by Ministry of Natural Resources and Forestry

The MNRF Guelph District Information Request Form pertaining to SAR and natural heritage features on, and adjacent to, the Subject Lands was submitted on April 6, 2018 (in support of the original proposed development at 200 John Street East and 588 Charlotte Street) and a response letter was received on June 26, 2018. The response letter identified several SAR that are known to occur in the general area, including:

- Eastern Flowing Dogwood – Endangered;
- Butternut – Endangered;
- Tri-coloured Bat (*Perimyotis subflavus*) – Endangered;
- Chimney Swift – Threatened;
- Bank Swallow – Threatened;
- White Wood Aster – Threatened;
- Barn Swallow – Threatened;
- Bobolink – Threatened;
- Eastern Meadowlark – Threatened;
- Eastern Wood-Pewee – Special Concern; and
- Wood Thrush – Special Concern.

The MNRF noted that there are no provincially significant wetlands or evaluated non-provincially significant wetlands in the area of the Subject Lands.

The MNRF identified in their letter the presence of One Mile Creek and noted that Fathead Minnow (*Pimephales promelas*) have been documented in the area, although MNRF (Denyes pers. comm. 2018) later clarified that the 2004 record of Fathead Minnow was at the mouth of One Mile Creek on Lake Ontario. MNRF indicated in their letter that any in-water work in One Mile Creek should not occur between March 1 and June 30 and between September 1 and November 30 to protect critical fish life stages. However, MNRF (Denyes pers. comm. 2018) later clarified that MNRF would consider permitting in-water work within the fall window provided erosion and sedimentation controls were implemented and flows were not impeded.

The MNRF also included an overall list of species at risk known to occur in Niagara-on-the-Lake. This list has been used to screen for potential species at risk present on the Subject Lands, based on habitat types present.

3.2. Technical Methods and Field Studies

GEI completed detailed ecological field surveys and natural environment inventories on portions of the Subject Lands in 2017, 2018, 2019, 2022 and 2026. The overall field investigations included seasonal botanical inventories (summer and fall, depending on area of the Subject Lands), ELC, breeding bird surveys, breeding amphibian surveys, reptile surveys, bat and bat habitat surveys, HDFA, aquatic habitat assessment and incidental wildlife observations. Ecological field survey methods are discussed in the following sections, and **Table 1** (**Appendix B**) lists field dates and personnel engaged for each survey. Field survey station locations associated with the field studies discussed below are shown in **Figure 3** (**Appendix A**).

3.2.1. Vegetation Survey Methods

3.2.1.1. Ecological Land Classification

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 at al. 1998). Vegetation communities of at least 0.5 ha in size were mapped; where appropriate, distinct communities smaller than this would also have been mapped. The provincial status of all vegetation communities is based on NHIC (2021).

On-site ELC field investigations were completed on the Subject Lands during separate site visits, as follows:

- 200 John Street East and 588 Charlotte Street – July 9, October 17, and November 21, 2018
- 144 and 176 John Street East – August 26, 2022

During site visits, vegetation communities were classified to either vegetation type or ecosite, as appropriate, based on dominant vegetation species and other characteristics. Ecosite classifications were applied where community composition did not correspond to standard vegetation type definitions.

3.2.1.2. Botanical Inventory

A botanical inventory of planted and naturally occurring vegetation on the Subject Lands was completed to document species present. Scientific names primarily follow nomenclature from the Database of Vascular Plants of Canada (Brouillet et al. 2010+). The provincial status of all plant taxa is based on NHIC (2025) and the status of each species was also assessed for the Region of Niagara according to the List of the Vascular Plants of Ontario's Carolinian Zone Ecoregion 7E (Oldham, 2010).

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 low CC value tend to have little or no fidelity to pristine or unique natural ecosystems and can be found in a variety of natural or anthropogenic habitats. Species with a CC value of 9 or 10 are potentially sensitive as they tend to have a consistent fidelity to high-quality or unique ecosystems.

3.2.1.3. Stem Density Assessment

A stem density assessment was completed on August 26, 2022 to determine if two treed areas on the 144 and 176 John Street East properties meet the definition of "Other Woodland" as defined in the NOP (2022) and depicted in the online NOP Natural Environmental System component mapping (as discussed in **Section 2.4**). The assessment considered the treed area on 144 John Street East to be Polygon A and the treed area on 176 John Street East to be Polygon B.

As the PPS states that woodlands may be delineated according to the *Forestry Act* definition or the Province's ELC system definition for "forest", a stem density assessment was completed so supplement the ELC assessment.

The *Forestry Act* (1990) definition of woodland is based on a calculation of stem density:

"woodland" means land that satisfies at least one of the following stem densities but does not include a cultivated fruit or nut orchard or a plantation established for the purpose of producing Christmas trees.

i. 1,000 trees, of any size, per hectare,

ii. 750 trees, measuring over five cm in diameter, per hectare,

iii. 500 trees, measuring over 12 cm in diameter, per hectare, or

iv. 250 trees, measuring over 20 cm in diameter, per hectare.

The ELC for Southern Ontario (1998) defines forest as "a terrestrial vegetation community with at least 60% tree cover". These two defining criteria were applied when assessing these treed areas on the Subject Lands.

A full stem inventory was completed within Polygon A and Polygon B to characterize stem density. Due to the relatively small size and open, residential nature of these polygons, the use of circular plots was not required to obtain a representative estimate of stem density. Instead, all stems within each polygon were measured and recorded.

All live trees measuring 1.37 m tall or greater were counted and categorized based on diameter at breast height (DBH) (i.e., ≤5 cm, 6-12 cm, 13-20 cm, or >20 cm), consistent with the *Forestry Act* size classes. Data from each polygon were used to calculate stem density for each feature. Tall shrubs, such as Common Buckthorn and Sumac were excluded from this survey.

For each location, canopy cover was visually reviewed to determine if any of the features qualified as "forest" as per ELC, although characteristics other than canopy cover alone are needed before a feature can be identified as an ELC "forest".

3.2.2. Wildlife Survey Methods

3.2.2.1. Breeding Bird Surveys

Breeding bird surveys were conducted on the 200 John Street East and 588 Charlotte Street properties in 2018 following protocols set forth by the Ontario Breeding Bird Atlas (Cadman et al. 2007). Surveys were conducted between dawn and five hours after dawn with suitable wind conditions, no thick fog or precipitation. 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. The location of the four point-count stations on the Subject Lands is shown in **Figure 3** (**Appendix A**). Although no stations were located on the 144 and 176 John Street East properties, PC1 was located immediately adjacent to the 176 John Street East property and therefore documented bird observations in a portion of the property. Each point count station was surveyed for 10 minutes for birds within 100 m and outside 100 m. All species recorded on a point-count were mapped to provide specific spatial information and were observed for signs of breeding behaviour. Surveys were conducted on June 7, June 25, and July 4, 2018, satisfying the requirement to be at least 10 days apart. The third survey was conducted to determine if grassland breeding birds were present on the 200 John Street East and 588

Charlotte Street portions of the Subject Lands. Existing residential structures on the Subject Lands were also checked for the presence of Barn Swallow nests.

Both the NHIC (2025) database and the SARO list (Ontario Regulation 230/08) were reviewed to determine the current provincial status for each bird species observed on or adjacent to the Subject Lands.

3.2.2.2. Amphibian Surveys

Amphibian call count surveys for anurans (i.e., frogs and toads) were conducted at three locations on the 200 John Street East property in 2018 following the Marsh Monitoring Program (MMP) methodology (Birds Studies Canada 2009). Three stations were surveyed based on the identification of areas of pooled water prior to the first survey (as identified in **Figure 3**, **Appendix A**):

- AMC1 – targeted areas of surface water ponding within the wetland in the northeastern corner of the Subject Lands (SWD3-2)
- AMC2 – targeted an area of surface water ponding in the FOD7 on the southern boundary of the Subject Lands
- AMC3 – targeted an area of surface water ponding in the disturbed meadow on the Subject Lands.

Amphibian call count surveys are being repeated in 2026. The first round of surveys was conducted on April 9, 2026, at the stations identified above, as well as new station AMC4, located at the downstream end of One Mile Creek on the 144 John Street East property (**Figure 3**, **Appendix A**).

In accordance with the protocols, the first survey round was completed at a nighttime air temperature of 5°C or greater, the second round was completed at 10°C or greater, and the third round was completed at 15°C or greater. Surveys began half an hour before dusk and ended before midnight.

Each survey station was surveyed for three minutes and the MMP call level codes system was used to identify frog activity: Level 1 when calls are not simultaneous and calling individuals can be counted, Level 2 when some calls are simultaneous but individual calls are distinguishable and the number of individuals can be estimated, and Level 3 when calls are continuous and overlapping in a full chorus. If loud noise such as from planes or road traffic was present, the three-minute monitoring period was delayed until a quieter period. Information recorded included the date and time of each calling survey, the air temperature, wind speed, degree of cloud cover, and level of precipitation if applicable.

No potential wetland amphibian breeding habitats were determined to be present on the 588 Charlotte Street property and therefore, no survey stations were identified on that property at the time of the 2018 or 2026 surveys. No amphibian surveys were completed on the 176 John Street East property, given the generally limited availability of potential amphibian breeding habitat and the high level of general disturbance.

3.2.2.3. Reptile Surveys – Snake Transect

The 200 John Street East and 588 Charlotte Street properties and accessible adjacent lands on the Town-owned Heritage Trail were walked in 2018 to screen for potential turtle nesting areas, which could generally include features such as shores of wetlands and ponds, trails and driveways with granular substrate and farm field margins, so long as suitable substrate and sun exposure are present.

Three snake surveys were conducted in May 2018. Transect surveys were conducted along with scanning debris piles and building foundations for basking snakes. Reptile survey locations are shown in **Figure 3** (**Appendix A**).

Snake surveys were conducted on mild spring mornings (minimum 10°C) between 8:00 AM and 2:00 PM, with sunny or partly overcast conditions. A minimum temperature of 15°C was required for overcast conditions. Data recorded during snake surveys included species observed and locations (UTM coordinates), air temperature, start and end time, and weather conditions. Survey methods are based on MNR Species at Risk protocols (2012b) and Toronto Zoo snake survey protocols (Caverhill et al. 2011).

Visual and active searches for reptiles and reptile habitat were completed on the 200 John Street East and 588 Charlotte Street properties during site visits and hand searches were completed concurrent with vegetation transect surveys. Woody debris and other cover items were inspected during surveys for reptile activity.

3.2.2.4. Bat Habitat Assessment and Acoustic Surveys

Bat habitat (i.e., snag) surveys were completed on the Subject Lands to determine the density and location of suitable maternal roosting habitat trees in accordance with the MNR's Survey Protocol for Species at Risk Bats within Treed Habitats (2017). Leaf-off snag surveys were completed on the 200 John Street East and 588 Charlotte street properties on March 23, 2018, and on the 144 and 176 John Street East properties on May 16, 2019, to identify potential roosting habitat within the Subject Lands. For the purposes of this assessment, a snag is defined by the MNR as any standing, live or dead tree with a DBH greater than 10 cm, and which has cracks, crevices, hollows, cavities, and/or loose or naturally exfoliating bark.

The two wooded areas on 200 John Street East (i.e., FOD7 and SWD3-2/CUW) were surveyed using a transect approach, where transects were 5 m to 20 m apart (depending on visibility). All individual trees outside wooded areas were assessed. All trees greater than or equal to 10 cm DBH were visually inspected using binoculars to document any cavities that may or may not be present along the trunk or large branches. Each tree containing suitable cavities, or peeling bark (preferred by the Tri-coloured Bat), had the following information recorded: UTM, species, DBH, approximate height, decay class, canopy cover, total number of cavities and height information for the top three cavities.

Following completion of the snag surveys, locations for acoustic monitors were selected based on the criteria in the survey protocols to optimize monitoring effectiveness. Acoustic monitoring devices were installed and monitored at three locations on the 200 John Street East property in June 2018 and at four locations on 144 and 176 John Street East properties in June 2019 (**Figure 3**, **Appendix A**). No acoustic

survey was completed within the FOD7 based on lack of potential bat habitat trees observed during the habitat assessment.

Surveys to detect bat species within the SWD3-2/CUW were carried out in June 2018/June 2019 using Wildlife Acoustics Song Meter SM4BAT recording devices over a duration of 10 consecutive evenings. The three stations within the SWD3-2/CUW woodland were selected based on aerial interpretation, ELC vegetation community types, and ground-truthing for suitable bat micro-habitat such as clusters of ≥10 cm DBH trees with peeling bark, leaf clusters, and cavities. Survey stations on the 144/176 John Street East property were selected to provide representative coverage across the properties, given that suitable snag trees are present throughout the residential area.

Passive acoustic recorders were programmed to begin recording at sunset and to end recording at sunrise. The SM4BAT passive recorder microphones were elevated approximately 2 m above the ground to reduce background noise and echo. **Table 2** (**Appendix B**) summarizes the dates and times, and weather conditions encountered during bat acoustic surveys in 2018 and 2019.

All ultrasonic recordings were filtered to eliminate recordings with high levels of noise or 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.

Both the NHIC (2025) database and the SARO list were reviewed to determine the current provincial status for each bat species detected.

3.2.2.5. SAR Bat Structure Surveys

GEI completed a screening of buildings on the 200 John Street East and 588 Charlotte Street properties in May 2022 to identify if there were openings in the structures (e.g., holes in the roof or soffit, open/broken windows, vents, etc.) that could potentially permit bats to enter/exit and therefore use the structures for maternal or day roosting purposes. The assessment was completed in accordance with the Ministry of the Environment, Conservation and Parks (MECP) protocol entitled *Use of Buildings by Species at Risk Bats Survey Methodology* (MECP undated). The survey consisted of a visual review of all outside areas of the buildings. Buildings were also entered and reviewed from the inside where access was available, and it was deemed safe to do so (given the deteriorated condition of the buildings).

A total of eight buildings were assessed during the survey (**Figure 3**, **Appendix A**). Six of the buildings were identified as having potential bat entry/exit points. The remaining two buildings (the former main residences on the 200 John Street East and 588 Charlotte Street properties) did not have potential entry/exit points that would facilitate use of the interior of the buildings by bats.

In accordance with protocols provided by MECP (undated), five of the six buildings on the Subject Lands that had potential to be used for maternity or day roosting purposes by bats were monitored through exit surveys combined with use of acoustic monitoring equipment to identify bats to the species level (**Figure 3**, **Appendix A**). The sixth building was a small shed that was open (**Figure 3**, **Appendix A**), and the ceiling of the structure was entirely visible to the surveyors, so this building was only visually checked to confirm the absence of bats. The bat exit surveys were conducted under the guidance of a qualified

biologist with experience in bat monitoring in accordance with MECP (undated) protocols and data analysis was conducted by qualified biologists with experience in bat identification from acoustic data.

Prior to sunset, surveyors were placed around the buildings such that all possible exit points were visible to surveyors. Each surveyor was equipped with a hand-held heterodyne bat detector (Wildlife Acoustic EMT2 Pro). The hand-held heterodyne bat detectors were set between 40 to 45 kHz to pick up SAR bat species and were recording in full spectrum.

The exit surveys began at sunset and continued for 1.5 hours. Each of the six buildings was monitored twice under appropriate weather conditions (temperature above 15°C, no rain, and low wind). Exit surveys were completed on June 23 and 27 and July 7 and 12, 2022.

3.2.2.6. Incidental Wildlife Observations

Incidental observations were made during all field visits to identify mammalian species present in the study area. Observations documented would have included visual encounters and other signs such as animal tracks, scat, and presence of bones or carcasses.

3.2.3. Aquatic Survey Methods

Aquatic surveys completed on the Subject Lands included HDFA and aquatic habitat assessment. The methodologies for these surveys are discussed in the following sections.

3.2.3.1. Headwater Drainage Feature Assessment

Headwater Drainage Features (HDFs) are generally poorly defined, non-permanently flowing drainage features that may not have defined beds and banks (CVC and TRCA, 2014).

Potential HDFs on the 200 John Street East and 588 Charlotte Street properties were assessed using the Credit Valley Conservation/Toronto Region and Conservation Authority (CVC and TRCA) 2014 "*Evaluation, Classification and Management of Headwater Drainage Features Guidelines*" (herein referred to as the HDFA Guidelines). These guidelines provide a standardized means of identifying and assessing the value of HDFs and identifying long-term management recommendations to protect or maintain the important ecological or biophysical functions provided by HDFs in a developing landscape.

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 13, 2018;
- Round 2 – May 30, 2018; and
- Round 3 – September 14, 2018.

During the first site visit all areas of the 200 John Street East and 588 Charlotte Street properties were walked to identify potential HDFs during the early spring when ground cover vegetation was not at full height. Each HDF 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 OSAP protocols (Stanfield

2017), Section 4: Module 11 (Unconstrained Headwater Sampling). A photographic record of each HDF was collected during each survey event. The second and third round surveys occurred at least 48 hours after precipitation events so that drainage features would be at baseflow. The third survey (September 14, 2018) was completed outside the recommended summer (July/August) window as a result of the substantial amount of precipitation received and the difficulty in getting a period of at least 48 hours without a precipitation event. The survey completed in September was thought to still be representative of summer baseflow conditions and it was completed after 48 hours with no precipitation.

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

As will be discussed in **Section 4**, the Tributary of One Mile Creek on the Subject Lands was assessed using the protocols outlined in the HDFA Guidelines. However, through discussion with NPCA, it was agreed that this feature was a watercourse and not a HDF. The results of the HDF assessment will be discussed in this report since they provide characterization information regarding the feature, but it will be managed as a watercourse.

No HDFA was conducted on the 144 and 176 John Street East properties. However, no potential HDFs have been observed during any of the other surveys on those properties (including multiple aquatic habitat assessments, as documented in the following section).

3.2.3.2. Aquatic Habitat Assessment

The aquatic habitat assessments consisted of a visual survey of existing instream and riparian habitat conditions along and adjacent to One Mile Creek and its Tributary running through the Subject Lands. The purpose of the aquatic habitat assessment was to assess the instream and riparian habitat present that could provide direct or indirect habitat functions for aquatic biota on or downstream from the Subject Lands.

Aquatic habitat assessments were completed as follows:

- One Mile Creek
  - 144 and 176 John Street East – September 6, 2017
  - 200 John Street East – April 13, May 30 and September 4, 2018
  - 144 and 176 John Street East – August 11, 2022
- Tributary of One Mile Creek
  - 144 John Street East and 588 Charlotte Street – September 6, 2017
  - 588 Charlotte Street - April 13, May 30 and September 4, 2018
  - 144 John Street East – August 11, 2022

During the visual assessments observations of the following characteristics were noted (where present):

- Hydrology (e.g., flowing or standing water)

- General watercourse morphology (e.g., riffle, run, pools)
- Wetted width and depth (at the time of the survey)
- Bed and bank substrate
- Instream habitat (e.g., woody debris, aquatic vegetation, undercut banks)
- Presence of obstructions to fish movement (e.g., culverts, debris dams)
- Evidence of groundwater inputs (e.g., seeps or springs, iron flocculation/staining)
- Signs of erosion
- Riparian habitat conditions.

4. Biophysical Characterization

The following sections provide a general characterization of the ecological and biophysical form and function of the Subject Lands and surrounding areas within the EIS Study Area based on background information and site-specific investigations, as described in **Section 3**.

4.1. Landscape Ecology

The Subject Lands occur within the Lake Erie-Lake Ontario Ecoregion (7E), which extends from Windsor and Sarnia east to the Niagara Peninsula and Toronto, with shoreline on Lakes Huron, Erie, and Ontario. Ecoregion 7E is within the Deciduous Forest Region in the Great Lakes watershed. This is an area of mild climate where remnants of Carolinian forests can still be found and where deciduous species such as Sugar Maple (*Acer saccharum*), American Beech (*Fagus grandifolia*), and White Ash (*Fraxinus americana*) dominate, but can be found in association with coniferous species such as Eastern Hemlock (*Tsuga canadensis*) and Eastern White Pine (*Pinus strobus*). A number of locally rare species are also known to occur in the general area, including Black Gum (*Nyssa sylvatica*) and Pignut Hickory (*Carya glabra*).

Consideration of the larger ecological matrix or landscape surrounding the Subject Lands contributes to a better understanding of potential ecological functions of the features on the Subject Lands and the potential ecological linkages and connectivity between natural heritage areas in the broader EIS Study Area.

The Subject Lands straddle the border of the Niagara-on-the-Lake Urban Area. As such, the southern side and portions of the western side of the Subject Lands are bordered by single family residential communities fronting on Weatherstone Court, Christopher Street and The Promenade. Portions of the western boundary of the Subject Lands have frontage on Charlotte Street. The Town-owned Heritage Trail (which runs within a narrow treed corridor characterized as a hedgerow along a former railway line) separates residences on The Promenade from the Subject Lands. A woodland identified as deer wintering habitat by MNR is located approximately 145 m southeast of the Urban Area portion of the Subject Lands.

The Subject Lands are bound to the north by John Street East and a large single-family home property (210 John Street East). Lands north of John Street East primarily consist of open space associated with The Commons, which is owned by Parks Canada. This property contains Butler's Barracks and Fort George, two National Historic Sites of Canada. The woodlands and wetlands associated with Paradise Grove Plain ANSI are located northeast of the Subject Lands (on the north side of John Street East) on the Parks Canada property. The ANSI is located a minimum of approximately 215 m from the closest point of the Subject Lands (i.e., from the entrance to the 200 John Street East property off John Street East). Lands to the east of the Subject Lands are occupied by vineyards and several wineries. The Niagara River is located approximately 900 m east of the Subject Lands.

As shown on **Figure 2** (**Appendix A**), the Subject Lands are generally situated between the Paradise Grove Plain ANSI to the northeast and a woodland providing deer wintering habitat to the southeast. These two features represent the largest natural heritage features within the broader EIS study area,

although both are located >120 m from the Proposed Development Area on the Subject Lands. The two woodlands are located approximately 830 m apart and are separated by John Street East, agricultural/commercial lands (vineyards and a winery) and several rural residential properties fronting onto John Street East. The Greenbelt Natural Heritage System provides an approximately 400-m wide protected corridor linking the two areas. The original designation of these lands as part of the area as Greenbelt Natural Heritage System by the Province may have been to provide an ecological corridor between these larger adjacent natural features. While no wildlife movement studies have been undertaken in this area, it appears most likely that if wildlife movement is occurring between the Paradise Plain Grove ANSI and the woodland southeast of the Subject Lands, it would be large mammals such as White-tailed Deer and Coyote and possibly birds and bats moving between the two larger wooded areas. Regardless of the relatively low density of trees in the area, this route between the two woodlands appears to be the route that would be used by wildlife as it is direct and there are no structural barriers that would prompt wildlife to use an alternative route.

The potential for the Subject Lands outside the Greenbelt Plan area (particularly the 200 John Street East property extension to John Street East) to provide a wildlife movement function was also considered. The border between 200 John Street East and 210 John Street East does appear to have more tree cover relative to the eastern boundary of 200 and 210 John Street East and the adjacent Two Sisters Winery (i.e., the area located within the Greenbelt Plan area NHS), based on aerial imagery analysis. However, this area of 200 John Street East (i.e., the extension fronting on John Street East) is not expected to provide any critical wildlife linkage function under existing conditions. While no wildlife movement studies have been undertaken in this area, it is most likely that if such movement is occurring in this general area, it would be large mammals, birds and bats, with the important area of movement being between the Paradise Grove Plain ANSI and the woodland southeast of the Subject Lands (identified as deer wintering habitat by MNR).

The property boundary between 200 John Street East and 210 John Street East is located approximately 215 m southwest of the southwestern corner of the woodland associated with the Paradise Grove Plain ANSI. Therefore, to use the 200 John Street East entrance, wildlife coming from the ANSI would need to move over this distance along John Street East (or within the relatively open parkland on the north side of John Street East), in a direction away from the woodland community they may be ultimately interested in moving towards. It is unlikely that wildlife moving from the ANSI would choose to move west along John Street East or within the open parkland to the start of the hedgerow on the Subject Lands, given the existing residential uses and private property fencing along John Street East. More likely, wildlife moving towards the woodland southeast of the Subject Lands would emerge from the ANSI woodland, cross John Street East and move directly through the Two Sisters Winery property or along its property boundary, which is the most direct route between the two features. The presence of relatively more trees along the 210 and 200 John Street East property boundary is not expected to be a sufficient draw to wildlife, considering the distance, existing residential uses and private property fencing fronting John Street East along this route, relative to the most direct route between the two features. It is further likely that wildlife moving from the southeastern woodland would similarly move directly towards the ANSI woodland as opposed to following a small area of vegetation in an alternate direction.

Therefore, overall, no significant wildlife movement is expected to occur along the property boundary between 200 and 210 John Street East. Some localized movement and wildlife use may occur in the overall area given the currently rural nature of the Subject Lands and surrounding areas to the north and

east, but this area is not expected to support any critical movement functions that would not be able to occur in the Greenbelt NHS.

In addition to the potential terrestrial linkage functions provided by the Greenbelt NHS area, One Mile Creek also provides an aquatic linkage between areas upstream from the Subject Lands (principally on and upstream from the 210 John Street East property where the One Mile Creek open channel originates) to areas downstream from the Subject Lands (within the Town) and ultimately to Lake Ontario, located approximately 2.9 km north of the Subject Lands. While this aquatic corridor is not expected to facilitate fish movement on the Subject Lands, it does provide an aquatic linkage to convey flow, sediment, organic material and benthic invertebrates to downstream reaches of the creek that do support direct fish habitat. Given the high level of disturbance and barriers to movement along its route on and adjacent to the Subjects (e.g., multiple driveway crossings, fencing, John Street East and the John Street East roadside ditch portion of the watercourse), it is unlikely to function as a significant terrestrial or semi-terrestrial wildlife movement corridor.

4.2. Physiography and Topography

The Subject Lands are located in the Iroquois Plain physiographic region, which in this area of the Niagara Region, is typified by stratified clay, sand and silt deposits of glaciolacustrine origin, underlaid by deposits of silt and silt clay till (Chapman and Putnam 1984). This physiographic region encompasses the existing area around the Lake Ontario shoreline below the Niagara Escarpment that was historically occupied by the former glacial Lake Iroquois.

General topography in the Niagara-on-the-Lake area and this section of the Niagara Region is relatively flat with slight undulations. Topography on the Subject Lands is relatively flat, with a maximum relief of approximately 6 m based on topography depicted in Schaeffers (2026). The Subject Lands gently slope downwards from the southeast corner (around elevation 92 m) to the northwestern boundary at One Mile Creek (where the invert of the culvert beneath John Street is at 86 m).

4.3. Soil and Geology

Regional geology in this area generally consists of glaciolacustrine sand, silt and clay deposits, with an overburden thickness of approximately 5 to 9 m. Soils on the 200 John Street East and 588 Charlotte Street properties primarily consist of silty clay, silty clay till and sandy silt till, with some silty sand and silt (Soil Engineers Ltd. 2018). Fill (consisting of sandy silt, rock fragments and brick debris) was observed near the residence in the northern corner of the 588 Charlotte Street property (Soil Engineers Ltd. 2018).

The thickness of overburden soil deposits was found to range from 5.4 m to 9.1 m (Soil Engineers Ltd. 2018). The underlying bedrock consists of the Queenston Formation, which is dominated by shale with minor amounts of siltstone, dolostone and limestone (OGS 2005).

4.4. Groundwater

Cole Engineering (2020) completed a hydrogeological investigation on the 200 John Street East and 588 Charlotte Street properties, consisting of the installation and monitoring of four groundwater wells on the properties, including three shallow wells and one deep well. Groundwater level monitoring in the wells

was completed on four occasions between September 2018 and August 2019. Monitoring results show that groundwater levels were generally lower in the northern portion of the properties and higher in the southern portion. Groundwater levels, which ranged from 1.27 to 4.12 meters below ground surface, were typically highest in March and lowest in September. Cole Engineering (2020) interpreted the wells as being representative of the shallow groundwater table.

Regional groundwater flow is generally to the north towards Lake Ontario or to the northeast towards the Niagara River (Waterloo Hydrogeologic 2005; cited in Cole Engineering 2020). Site specific studies completed by Cole Engineering (2020) indicated that shallow groundwater flow is also generally to the northeast, which is consistent with the regional flow direction.

The vertical flow gradient at the monitoring well in the southwestern corner of the Subject Lands was determined to be neutral to downward. Hydraulic conductivity is fairly low, which is consistent with the fine-grained soils (i.e., silty sand to silty clay) observed on site (Cole Engineering 2020).

Groundwater quality sampling completed by Cole Engineering in September 2018 found one exceedance of the Provincial Water Quality Objective for total cobalt and total uranium, although all other parameters met the respective objectives.

The Subject Lands are partially located within a Highly Vulnerable Aquifer area that generally extends from East & West Line in the south to Simcoe Street to the west, the Niagara River to the east and areas north of John Street to the North (NPCA 2018; NPCA 2011). The Source Water Protection Assessment Report (NPCA 2011) identifies this area as surficial overburden aquifer with high vulnerability due to surficial sand and/or gravel deposits at the surface. Cole Engineering (2020) indicated that the Subject Lands are not located within a Wellhead Protection Area or a Significant Recharge Area. The Subject Lands are also not located within any of the Intake Protection Zones for municipal drinking water supplied identified in the Source Protection Plan (NPCA 2013).

4.5. Surface Water

4.5.1. Watercourses

4.5.1.1. <u>One Mile Creek</u>

One Mile Creek runs for approximately 415 m through the northern portions of the 144, 176 and 200 John Street East properties on the Subject Lands (**Figure 4**, **Appendix A**). Based on mapping from NPCA, this creek originates from agricultural field drainage approximately 900 m southeast of the Subject Lands and ultimately discharges to Lake Ontario after flowing through the Niagara-on-the-Lake urban area. The creek has an overall drainage area of 5.2 km^2, although approximately 1.7 km^2 has been diverted into the Epp Drain upstream from the Subject Lands.

The One Mile Creek Watershed Plan (Aquafor Beech Ltd. & LURA Consultants Ltd. 2005) notes that upstream from King Street (an area which includes the Subject Lands), the creek has poorly defined channel bed and banks and lacks valley characteristics. That Watershed Plan identifies the 1:2-year flood flow in One Mile Creek at John Street East at an estimated volume of approximately 1.5 m^3/s. Upstream from King Street (including on the Subject Lands), One Mile Creek is considered to be intermittent

(Aquafor Beech Ltd. & LURA Consultants Ltd. 2005). NPCA has defined a regional floodplain on a portion the Subject Lands (**Figure 4**, **Appendix A**).

Cole Engineering (2020) did not observe any flow within One Mile Creek where it crosses the 200 John Street East property during four monitoring events (September and November 2018, March and August 2019). Cole Engineering (2020) installed mini-piezometers on the banks of this feature to assess groundwater-surface water interactions. Downward gradients were observed in November 2018 and March 2019. An estimated upward gradient was observed in August 2019, although there was no flow at this time. Based on the monitoring results, Cole Engineering (2020) interprets that the watercourse is not perennial and does not receive groundwater discharge.

During GEI's aquatic habitat assessments, hydrology in the watercourse was as follows:

- pockets of standing water were present on September 6, 2017
- watercourse was flowing on April 13 and May 30, 2018
- watercourse was dry on August 12, 2022.

More characterization information regarding this watercourse is provided in **Section 4.5.3.1**.

4.5.1.2. Tributary of One Mile Creek

A tributary of One Mile Creek is also present on and adjacent to the western side of the Subject Lands (**Figure 4**, **Appendix A**). The tributary originates as a HDF in a series of excavated ditches along the Heritage Trail south of the Subject Lands. It runs within the ditch along the trail for a distance of approximately 425 m before entering a culvert beneath the stone wall and running onto the Subject Lands (on the 588 Charlotte Street property). After exiting the culvert, it runs through an approximately 72 m long, channelized ditch on the 588 Charlotte Street property before running through a culvert on the former driveway access into the property from Charlotte Street. After emerging from that culvert, it flows as a linear channelized feature adjacent to the backyards of the adjacent residences to the west of the Subject Lands (fronting on Weatherstone Court and Christopher Street), before flowing into One Mile Creek on 144 John Street East. The channel is highly altered, with a wood retaining wall present along both banks along most of the feature and the property chain link fence running longitudinally within the feature in some locations. The downstream most reach on the Subject Lands was flowing in early spring 2018 but was dry during the late spring and late summer assessment periods that same year. Standing water was present in the lower reaches of the feature on September 6, 2017, and it was dry on August 12, 2022.

This drainage feature is identified by NPCA as a regulated watercourse where it is present on the 588 Charlotte Street property (i.e., up to the culvert beneath the stone wall). There is no regulated floodplain associated with the Tributary of One Mile Creek on the Subject Lands.

More characterization information regarding this watercourse is provided in **Section 4.5.3.2**.

4.5.1.3. Meander Belt Assessment

A meander belt assessment was completed by GEI for One Mile Creek within the Subject Lands to assist in determining potential constraints (**Appendix C**). This assessment was comprised of a background review of available materials, reach delineation through a desktop approach, historic aerial imagery assessment, and a field rapid geomorphic assessment of existing conditions to delineate the watercourse meander belt.

A desktop geomorphic assessment identified three distinct reaches of the One Mile Creek system within the Subject Lands (depicted on **Figure 4**, **Appendix A**). The meander belt delineation was completed to define the potential lateral extent of channel migration and associated erosion hazards. Due to the limited geomorphic form and function observed in the main channel of One Mile Creek upstream from the confluence with the Tributary of One Mile Creek (referred to as Reach 1 in the assessment in **Appendix C**) and in the Tributary of One Mile Creek (referred to as Reach 2), a meander belt was not delineated for these features, and they are considered low constraint systems that primarily function to convey intermittent flow and sediment with minimal erosion risk. For One Mile Creek downstream from its confluence with the Tributary (referred to as Reach 3), which has been historically altered and does not exhibit a natural meandering planform, a hypothetical meander belt was delineated using a suite of empirical relationships based on bankfull width. Calculated meander belt widths ranged from approximately 20.9 m to 26.2 m, and an average width of 24 m was adopted. This meander belt represents the anticipated corridor within which channel adjustments may occur over time and informs the erosion hazard limit for the feature. The meander belt for this part of One Mile Creek is depicted in **Figure 4** (**Appendix A**).

4.5.2. Headwater Drainage Features

HDFs are ill-defined, non-permanently flowing drainage features that may not have defined beds and banks (CVC and TRCA, 2014). Two HDFs were identified on the 588 Charlotte Street property and two HDFs (associated with ditches along the Heritage Trail) were identified adjacent to the Subject Lands (**Figure 4**, **Appendix A**). The HDFA completed in 2018 focused on the 200 John Street and 588 Charlotte Street portions of the Subject Lands. However, based on the aquatic habitat assessments completed on multiple occasions on the 144 and 176 John Street properties, no HDFs are present on those portions of the Subject Lands.

The HDFA results and management recommendations are discussed below. A summary of the HDFA classifications and management recommendations for each reach is provided in **Table 3** (**Appendix B**).

Although the upstream end of the One Mile Creek Tributary on the 588 Charlotte Street property was originally assessed by GEI as a HDF, though discussions with NPCA, it was agreed that this reach was a regulated watercourse and should be managed as such (as opposed to being managed as a HDF).

Results

The main HDFs adjacent to the Subject Lands (referred to generally as H1) originate in ditches along the Town-owned Heritage Trail. The upper reaches (H1-S2a and H1-S2b) appear to just receive inflow via overland flow from adjacent open areas and were dry during the Round 1 assessment in early spring

2018. The ditch (H1A-S1) on the opposite side of the pedestrian trail crosses underneath the trail via a culvert and flows into the downstream end of reach H1-S1. Vegetation within the trail corridor consists of a narrow band of scrubland and cultural treed areas on both sides of the trail (generally consisting with a narrow hedgerow along the former rail corridor in the area), generally bordered by residential lawn areas. Reach H1-S1 and H1A-S1 converge before conveying flow downstream (northwards) across the Subject Lands. Where these reaches converge and flow beneath the stone wall at the Subject Lands property boundary, they transition into a regulated watercourse (the Tributary of One Mile Creek).

Reaches H1-S1 and H1A-S1 were flowing in early spring. The ditched reaches along the pedestrian trail (H1-S1 and H1-S1A) contained standing water in late spring (due to their excavated nature which promotes ponding), although the downstream reaches of the Tributary of One Mile Creek on the Subject Lands were dry at the time. All headwater drainage features were dry during the late summer visit in mid-September 2018. The feature does not contain any direct fish habitat, although it may contribute to downstream reaches of One Mile Creek known to support direct fish habitat (i.e., downstream from King Street). As a channelized ditch, the feature does not provide any terrestrial habitat function, as per the definitions in the HDFA Guideline (TRCA and CVC 2014).

Several other headwater drainage features were observed on the Subject Lands (H1B-S1 and H1C-S1). These features are present within the manicured lawn on the former 588 Charlotte Street residential property. Although they may contain water during precipitation events, they were dry during all three surveys in 2018.

Classification and Management Recommendations

Part 2 of the HDFA Guidelines 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 3** (**Appendix B**) highlights the key components of this analysis based on the three rounds of HDFA completed in 2018.

Part 3 of the HDFA Guidelines 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 HDFs on and adjacent to the Subject Lands (as identified in the final column of **Table 3**, **Appendix B**).

The resulting management recommendations were Mitigation for H1-S1 and H1A-S1 (as a result of the seasonal hydrological functions of these ditches) and No Management Required for H1B-S1 and H1C-S1 (given that no flow was observed during any of the survey periods).

4.5.3. Fish and Fish Habitat

The fish and fish habitat characteristics of One Mile Creek and its tributary are discussed in the following sections.

4.5.3.1. <u>One Mile Creek</u>

Fisheries investigations conducted in 2005 (Aquafor Beech Ltd. & LURA Consultants Ltd. 2005) did not catch any fish upstream of King Street, which is located approximately 600 m downstream from the Subject Lands. Downstream from King Street, Creek Chub (*Semotilus atromaculatus*) were captured at several locations (Aquafor Beech Ltd. & LURA Consultants Ltd. 2005), with Pumpkinseed (*Lepomis gibbosus*), White Sucker (*Catostomus commersonii*), Fathead Minnow (*Pimephales promelas*) and Threespine Stickleback (*Gasterosteus aculeatus*) being captured in Lansdowne Pond, just upstream from the mouth of the creek at Lake Ontario (Diermair et al., 2003; cited in Aquafor Beech Ltd. & LURA Consultants Ltd. 2005).

The One Mile Creek Watershed Plan (Aquafor Beech Ltd. & LURA Consultants Ltd., 2005) notes that upstream from King Street, One Mile Creek does not provide direct fish habitat, but flow contributions support downstream fish habitat. One Mile Creek has been classified by the MNRF and the Watershed Plan as Type 3 (Marginal) fisheries habitat. Type 3 watercourses are typically considered to be marginal or highly degraded, not contributing directly to fish productivity (MNR, 2000a).

The reach of One Mile Creek on the Subject Lands is highly altered due to historical residential use and ongoing management on the property. It is characterized by a relatively poorly defined channel with indistinct bed and bank features and minimal structural differentiation and morphological diversity. The downstream end of the feature is relatively wide (~4-5 m), while the majority of the bankfull channel is narrower (~ 3 m). During flow periods, the wetted width of the channel generally ranges from <1m throughout much of the reach to approximately 4-5 m at the downstream end (which appears in part to be created by the downstream culvert). Water depths during normal spring flow conditions (outside of runoff events) typically appear to average around 10 to 15 cm.

Substrate consists of a mix of fine materials and gravel with some larger cobbles. Armour stone bank protection is present at one location and scattered rip rap material is present throughout. Bank erosion is evident in some locations.

Naturalized riparian vegetation is largely absent as a result of lawn mowing up to the edge of the feature. There are trees throughout the Subject Lands that provide overhead cover, and a source of some organic material (e.g., leaves and twigs). During summer, terrestrial vegetation encroachment into the channel

was evident in some areas. Mowing of vegetation within portions of the channel where banks are low gradient was also observed during the August 2022 assessment.

A total of four driveway crossings of the watercourse (consisting of mix of concrete/stone arch culverts and corrugated steel plate culverts) are present on the Subject Lands. A portion of the watercourse also flows through an ornamental online, concrete-lined pond feature.

The reach lacks key habitat features typically associated with the presence of resident fish communities, including woody debris, undercut banks, pool and riffle sequences, overhanging vegetation, and submerged cover. As a result, habitat complexity is low, and the reach was classified as providing indirect fish habitat only.

Hydrologically, the watercourse exhibits an intermittent flow regime, with surface water primarily present during spring freshet and storm-driven runoff events. Prolonged periods of reduced flow, isolated ponding, or dry conditions occur during the summer months, further limiting habitat availability and continuity for aquatic organisms.

In addition, fish movement and downstream connectivity within this reach are constrained by culverts located downstream beneath John Street East. These structures likely impede upstream fish passage, particularly under low-flow conditions, thereby limiting habitat potential and reducing the likelihood of sustained fish use within the reach. The creek also flows within the John Street East ditch for approximately 340 m downstream from the Subject Lands, before flowing into a naturalized watercourse channel downstream from John Street East.

Overall, the reach does not appear to provide direct fish habitat but does provide some supporting indirect fish habitat functions that may assist in maintaining downstream (off-site) reaches of the creek that do support fish. This includes conveyance of intermittent flows, maintenance of water quality (through limited riparian functions), conveyance of organic materials and sediment and potentially conveyance of benthic invertebrates, which may be a source of forage for the downstream fish community.

4.5.3.2. Tributary of One Mile Creek

The tributary of One Mile Creek on the Subject Lands does not provide direct fish habitat, similar to the One Mile Creek channel downstream. The channel bed consists primarily of gravel and small cobble overlying fine materials in the reaches where the channel is bound by retaining structures, with grasses and other herbaceous vegetation throughout, sometimes in high density. Small woody debris is present in some areas along the reach and overhead cover is abundant due to the riparian shrubs and trees along much of the reach, although the upstream portion on the Subject Lands runs through a mowed lawn area.

The reaches on or adjacent to the Subject Lands may provide some limited contributing function through conveyance of ephemeral flows to downstream reaches of One Mile Creek that do provide fish habitat, but the feature is highly degraded due to historic channelization and adjacent residential development. The One Mile Creek Watershed Plan (Aquafor Beech Ltd. & LURA Consultants Ltd., 2005) notes that no data is available to assess the type of fish habitat that is present in the feature. However, given that the

One Mile Creek channel downstream is classified as Type 3 (Marginal) habitat, at most, the tributary of One Mile Creek should be considered Type 3 habitat to the southern property boundary.

4.6. Vegetation

4.6.1. Ecological Land Classification

Three ELC community types on the Subject Lands were documented and classified to vegetation type, while two were classified to ecosite [i.e., Mineral Cultural Woodland (CUW) and Fresh-Moist Lowland Deciduous Forest (FOD7)]; ecosite codes were applied where the species assemblage did not correspond to available vegetation type codes. ELC mapping of the Subject Lands is shown on **Figure 5** (**Appendix A**), and a description of each natural community type is provided in **Table 4** (**Appendix B**).

The Subject Lands are predominantly comprised of disturbed, anthropogenically influenced communities resulting from the historical residential use. The majority of the 588 Charlotte Street and 200 John Street East properties consist of mowed open space, identified as a disturbed cultural meadow in the ELC mapping. The 144 and 176 John Street East properties were identified in the ELC mapping as Residential (RES) due to their managed, landscaped nature. Mid-aged trees are present throughout these two properties, resulting in a canopy cover greater than 60% in some areas. However, the understory is largely maintained as mowed lawn and does not contain the structural characteristics of woodland or forest communities as defined by ELC.

Naturalized vegetation communities present include a Silver Maple Mineral Deciduous Swamp (SWD3-2) and contiguous disturbed cultural woodland (CUW) which contains mature trees but is regularly mowed and lacking naturalized understory structure. A small Fresh-Moist Lowland Deciduous Forest (FOD7) is present along the southern property boundary.

Adjacent areas within 120 m of the Proposed Development Area consist of agricultural lands, residential communities and rural residential lots and open space.

4.6.2. Botanical Inventory

Botanical inventories were completed on the Subject Lands during site visits in July and October 2018 at 200 John Street East and 588 Charlotte Street, and August 2022 at 144 and 176 John Street East. A total of 175 species of vascular plants were identified. Of that number, 93 (or 53%) are native and 82 (or 47%) are exotic. A full species list is included in **Table 5 (Appendix B).** The majority of the native species (84%) are ranked S5, with nine species (11%) ranked S4 and five species (5%) ranked S1-S3 (NHIC 2025). No regionally rare plants (Niagara Region) were observed, based on Oldham (2010).

Three of the species recorded within the Subject Lands had a co-efficient of conservation value of 9 or 10: Pin Oak (*Quercus palustris*), Ohio Buckeye (*Aesculus glabra*), and Pignut Hickory (*Carya glabra*). These three species are located within the RES community. Pin Oak is naturally occurring and common, while Ohio Buckeye and Pignut Hickory appear to have been planted.

4.6.2.1. Species at Risk Plants

Species at Risk have an assigned designation (e.g., endangered) based on assessments by the Committee on the Status of Species at Risk in Ontario (COSSARO). Species designated as extirpated, endangered or threatened are protected under the *Species Conservation Act, 2025*. Species listed as special concern (and their associated habitat) are not protected under the SCA.

GEI's field surveys confirmed the presence of one Species at Risk plant on the Subject Lands:

- Eastern Flowering Dogwood (*Cornus florida;* S2; Endangered). Eight trees were documented within the RES communities on 144 and 176 John Street East. However, these trees are presumed to be planted ornamentals and are not naturally occurring; therefore, they are not considered a protected SAR under the SCA (2025).

4.6.2.2. Provincially Rare Plants

The NHIC maintains a systematic inventory of all known distributions of rare native species (i.e., tracked species). Generally, the plant species included in that inventory are known from fewer than 80 populations in the province (Oldham et al., 2009).

On the Subject Lands, GEI's field surveys confirmed the presence of four provincially rare plants within the RES community on John Street East:

- Ohio Buckeye (*S1*);
- Honey Locust (*Gleditsia triacanthos; S2);*
- Red Spruce (*Picea rubens*; S3); and
- Pignut Hickory (S3).

It is important to note that Ohio Buckeye, Honey Locust, and Pignut Hickory appear to have been planted as ornamentals and are not naturally occurring.

4.6.2.3. Stem Density Assessment

A stem density assessment was undertaken for two treed areas on the Subject Lands that are currently mapped as "Other Woodlands" by Niagara Region (Polygons A and B). The goal of the evaluation was to determine if these features meet the woodland criteria as defined under the *Forestry Act* (1990). Field inventories were completed to quantify total live stems and categorize trees by diameter at breast height (DBH) classes, and results were standardized to trees per hectare for comparison against applicable thresholds.

The results of these assessments are summarized in the tables below. Based on the calculated stem densities across all size classes, neither Polygon A nor Polygon B satisfies the minimum thresholds required to be classified as woodland under the *Forestry Act* (1990), indicating that both features fall below provincially defined criteria for woodland designation based on stem density. Neither feature met criteria to be a woodland ELC type.

	Count	Trees per ha	*Forestry Act* Density Threshold
Polygon A			
Total Trees (any size)	72	133	1,000 Trees of any size, per ha
Total Trees (over 5cm DBH)	50	93	750 Trees, measuring over 5 cm in diameter at DBH, per ha
Total Trees (over 12 cm DBH)	48	89	500 Trees, measuring over 12 cm in diameter at DBH, per ha
Total Trees (Over 20cm DBH)	41	76	250 Trees, measuring over 20 cm in diameter at DBH, per ha
Size of Polygon A (ha)	0.54		
Polygon B			
Total Trees (any size)	148	132	1,000 Trees of any size, per ha
Total Trees (over 5cm DBH)	135	121	750 Trees, measuring over 5 cm in diameter at DBH, per ha
Total Trees (over 12 cm DBH)	129	115	500 Trees, measuring over 12 cm in diameter at DBH, per ha
Total Trees (Over 20cm DBH)	120	107	250 Trees, measuring over 20 cm in diameter at DBH, per ha
Size of Polygon B (ha)	1.12		

4.6.2.4. Feature Staking

4.6.2.4.1. Wetland

The SWD3-2 wetland was staked with NPCA on October 8, 2021, to define the limits of the feature on the Subject Lands. The northern boundary of the wetland is located around the property line between the Subject Lands (200 John Street East property) and the adjacent 210 John Street East property. The wetland boundary along this property line was not staked with NPCA. **Figure 5** (**Appendix A**) depicts the ELC polygon of the wetland. The boundary of the ELC polygon located on the Subject Lands is based on the wetland boundary staked with NPCA. The portion of the ELC polygon shown as being located on the adjacent 210 John Street East property is based on the limit of the dripline of the SWD3-2, as estimated from aerial photograph interpretation and on-site observations from the 200 John Street East property limit. The estimated dripline was used to define the ELC polygon limit, per the ELC manual. However, based on GEI's on-site observations, the dripline on the adjacent property overhangs a mowed lawn, which would not be considered part of the wetland community based on the Ontario Wetland Evaluation System (MNR, 2022) wetland boundary delineation protocol. This protocol defines the wetland boundary to be the furthest extent of where the vegetation community consists of at least 50% wetland plants. The estimated wetland boundary as would be delineated by OWES is approximately along the property line between 200 and 210 John Street East (as shown in **Figure 5**, **Appendix A**).

4.6.2.4.2. Cultural Woodland (CUW)

The boundary of the CUW in the Greenbelt Plan area was staked with representatives from the Region of Niagara on July 9, 2018. The ELC polygon for the CUW reflects the staked boundary on the 200 John

Street East property. The western and northern boundaries of the woodland extend onto the adjacent properties and were not staked with the Region. The ELC polygon limit in these areas reflects the estimated boundary based on aerial photograph interpretation and observations from the property line.

4.6.2.5. Cultural Woodland Assessment by the Region of Niagara

Two Sisters Resort Corp. engaged forestry staff from the Region to evaluate CUW in the Greenbelt Plan area and confirm if it meets the woodland criteria identified in the Regional Woodland Conservation By-law (No. 2020-79). GEI understands that the Region's forestry staff completed stem density assessments in the woodland on August 17 and September 30, 2021, and that the results of the assessment demonstrated that the area does not meet the woodland definition due to insufficient stem density.

4.7. Wildlife

4.7.1. Breeding Birds

Breeding bird surveys were completed on the 200 John Street East and 588 Charlotte Street properties on June 7, June 25, July 4, 2018. A total of 33 bird species were recorded within the Subject Lands during the survey period. Of this total, 10 species are confirmed, 9 are probable and 7 are possible breeders on or adjacent to the Subject Lands. The remaining seven bird species are considered non-breeders, flyovers or migrants. All species observed on the Subject Lands are listed in **Table 6** (**Appendix B**).

All of the confirmed, probable or possible breeders on the Subject Lands are provincially ranked S5/S5B (common and secure), S4/S4B (apparently common and secure) or SNA (species not native to Ontario).

One singing male Eastern Wood-Pewee (*Contopus virens*) was heard calling from the woodland in the Paradise Grove Plain ANSI northeast of the Subject Lands (on the north side of John Street East) during the Round 1 and 3 surveys. The species was not documented on the Subject Lands. Eastern Wood-Pewee is listed as Special Concern on the SARO list.

One Barn Swallow (Special Concern in Ontario) was observed at PC1 (located along the driveway from John Street East). No evidence of nesting was observed on the Subject Lands, and it appeared that this individual was foraging over the area. Barn Swallow were not observed during any of the other breeding bird survey rounds.

Chimney Swift (Threatened in Ontario) were observed foraging over the Subject Lands and adjacent lands during the Round 1 and Round 3 surveys. No suitable nesting habitat was identified on the Subject Lands, although a commercial building located approximately 700 m northwest of the Subject Lands was noted as having a large old-style chimney that could potentially provide nesting habitat for this species.

4.7.2. Amphibians

One amphibian species (American Toad, *Anaxyrus americanus*), which is ranked S5 (common and secure) was recorded during the surveys in 2018 (**Table 7**, **Appendix B**). This species was recorded calling from two locations on the Subject Lands during the first-round survey, including AMC1 (10 individuals) and AMC3 (full chorus). AMC3 was associated with isolated pooling in the disturbed meadow area on the

200 John Street East property. American Toad was recorded from one location during the second-round survey (AMC2) where two individuals were heard calling. No calling amphibians were recorded during the third-round survey in 2018.

No amphibians were heard calling at any of the four stations surveyed in April 2026.

4.7.3. Reptiles

No reptiles (snakes or turtles) were recorded within the Subject Lands during three transect surveys that were completed on May 1, May 14, and May 17 in 2018 (**Table 8**, **Appendix B**).

There was no suitable habitat for turtle nesting identified to be present within the Subject Lands. Although there was limited gravel along driveway entrances these areas were hard packed rendering them unsuitable. Additionally, the trail running adjacent to the western boundary of the Subject Lands was not suitable for nesting as there was heavy vegetation, with a thick layer of wood chips covering, finer soil substrates.

4.7.4. Bats

The bat habitat assessment, acoustic survey and structure survey results are discussed in the following sections.

Habitat Assessment Results

The results of the bat habitat assessment identified a total of 61 suitable habitat trees throughout various areas of the Subject Lands. Since the initial assessments in 2018, nine of the habitat trees on the 588 Charlotte Street and 200 John Street properties were removed, resulting in a total of 52 habitat trees on the Subject Lands (**Figure 5**, **Appendix A**). Habitat trees were located in the SWD3-2/CUW and throughout the residential areas on 144/176 John Street East properties.

Acoustic Survey Results

Acoustic monitoring surveys were completed in June 2018 (on the 200 John Street East property) and June 2019 (144 and 176 John Street East) to determine whether species at risk bats were present on the Subject Lands.

Six bat species were identified during the surveys in the SWD3-2/CUW in June 2018: Big Brown Bat *(Eptesicus fuscus),* Silver-haired Bat *(Lasionycteris noctivagans),* Hoary Bat *(Lasiurus cinereus)*, Eastern Red Bat *(Lasiurus borealis)*, Little Brown Myotis *(Myotis lucifugus)* and Small-footed Myotis (*Myotis leibii*), as summarized in **Table 9** (**Appendix B**). During the 10 evenings of acoustic surveys, a total of 6363 low frequency calls and 140 high frequency calls were recorded.

Four bat species were identified during the surveys on 144 and 176 John Street East in June 2019: Big Brown Bat, Silver-haired Bat, Hoary Bat and Eastern Red Bat. During the 10 evenings of acoustic surveys, a total of 6363 low frequency calls and 140 high frequency calls were recorded.

Silver-haired Bat, Little Brown Myotis, Eastern Small-footed Myotis, Eastern Red Bat and Hoary Bat are listed as Endangered in Ontario.

4.7.5. Bat Structure Surveys

Bat structure surveys were completed in 2022 to screen and assess structures on 200 John Street East and 588 Charlotte Street to confirm if they were being used by SAR bats. A total of eight buildings were assessed during the initial screening survey. Six of the buildings were identified as having potential bat entry/exit points. The remaining two buildings (the former main residences on the 200 John Street East and 588 Charlotte Street properties) did not have potential entry/exit points that would facilitate use of the interior of the buildings by bats.

During the entry/exit surveys, one Big Brown Bat, a common species in Ontario, was observed exiting one of the buildings on one of the surveyed evenings. No bats were observed exiting any of the other four buildings and no bats were observed in the shed that was visually assessed on two occasions.

Therefore, based on the results of this assessment, SAR bats were not using the structures on the Subject Lands for maternal or day roosting purposes during the 2022 study.

4.7.6. Ecological Linkages & Corridors

As discussed in Section 4.1, the Greenbelt Plan NHS on and adjacent to the eastern portion of the Subject Lands may provide an ecological linkage function to facilitate wildlife movements between the Paradise Grove Plain ANSI northeast of the Subject Lands and the woodland providing deer wintering habitat (as determined by MNR) southeast of the Subject Lands.

Outside the Greenbelt Plan area, the remainder of the Subject Lands are not expected to provide any critical ecological linkage corridor function, as discussed in **Section 4.1**. Some localized movement and wildlife use may occur in the overall area given the currently rural nature, but this area is not expected to support any critical movement functions that would not be able to occur in the Greenbelt NHS ecological linkage.

4.8. NPCA Regulated Areas

The following features on the Subject Lands are regulated by NPCA:

- One Mile Creek and the Tributary of One Mile Creek
- The One Mile Creek floodplain
- The meander belt at the downstream end of One Mile Creek on the 144 John Street East property
- The SWD3-2 wetland (and areas within 30 m) on the 200 John Street East property.

5. Analysis of Ecological and Natural Heritage Significance

This section assesses the presence/absence of natural features identified under the PPS (MMAH 2024), Greenbelt Plan (MMAH 2017), NOP (2022), Town OP (2017) and features regulated by NPCA.

5.1. Significant Natural Heritage Features and Areas (PPS)

Eight types of significant natural heritage features are defined in the PPS (MMAH 2024):

- Significant wetlands;
- Significant coastal wetlands;
- Significant woodlands;
- Significant valleylands;
- SWH;
- Fish habitat;
- Habitat of endangered and threatened species; and
- Significant ANSIs.

The presence or absence of these significant natural heritage features on or adjacent to the Proposed Development Area is discussed in the following subsections.

5.1.1. Significant Wetlands

There are no significant wetlands located on or within 120 m of the Proposed Development Area. The closest significant wetland is the Two and One Mile Creek Wetland Complex, which is located approximately 960 m west of the Subject Lands. The majority of the units associated with this significant wetland complex are in association with Two Mile Creek, although one unit of the complex is present at the mouth of One Mile Creek, approximately 2.9 km downstream from the Subject Lands.

There is one unevaluated wetland community on the Subject Lands, consisting of a small (0.23 ha) swamp (SWD3-2) adjoining a cultural woodland on the eastern side of the Subject Lands. The wetland is hydrologically isolated and has no discharge point, nor does it receive any inputs from groundwater, based on the results of the hydrogeological assessment (Cole Engineering 2020). The wetland only appears to receive surface water runoff from a small local drainage area, which when combined with the poorly drained soil, promotes surface water ponding for a sufficient duration to facilitate growth of wetland vegetation species.

The wetland does not discharge directly to any watercourse based on observations by GEI during the HDFA (outlined in **Section 4.5.1**). Also, given that One Mile Creek on the Subject Lands is not supported by groundwater discharge (Cole Engineering 2020) and that this wetland is located a minimum of

approximately 165 m from the watercourse, this wetland does not appear to contribute to groundwater resources that support baseflow in any watercourse. The 0.23 ha wetland does not meet the general 2 ha threshold to be evaluated under the OWES (MNR 2022). Further, the closest evaluated wetland is more than 750 m away, and therefore, this small wetland unit could not be complexed into a larger wetland (which requires a minimum separation distance of 30 m under the OWES).

However, OWES (MNRF 2022) indicates that wetlands smaller than 2 ha can still be considered for evaluation. Therefore, the value of the wetland has been considered with respect to the evaluation criteria noted in OWES (MNRF 2022). The following observations with respect to wetland function are noted:

- The wetland is situated within a high productivity zone based on growing-degree days;
- The wetland is moderately productive based on wetland type (i.e., swamp);
- The wetland is isolated and therefore would generally have lower productivity than connected wetland types;
- Biodiversity within the wetland is relatively low since it only consists of one wetland type with limited vegetation community diversity;
- The wetland is not hydrologically connected to any other waterbody or wetland and there are no known evaluated wetlands within ~750 m;
- The wetland contains no permanent open water area;
- The size of the wetland is too small for consideration as a productive wood product area and does not contain other commercially valuable product (i.e., Wild Rice, commercial baitfish, furbearer habitat);
- The wetland is not known to support any recreational activity (i.e., hunting, fishing, nature appreciation);
- The wetland is not clearly distinct within the landscape, and it is highly disturbed as a result of anthropogenic activity;
- The wetland is not used for education or research purposes;
- The wetland is located within and adjacent to a Settlement Area, but is held on private land;
- As an isolated wetland, it does provide some flood attenuation, although the catchment area and detention size within the wetland is very limited;
- The wetland provides no water quality maintenance function (given lack of surface hydrological connection to a watercourse) and is not an area of groundwater discharge;
- The wetland may provide some minimal groundwater recharge function, since it is an isolated wetland and seasonal ponding occurs within it;
- Swamp wetlands are not considered to be rare wetland types in Ecodistrict 7E-3, although wetlands are generally rare within this Ecodistrict;

- No rare species are known to specifically rely on habitat in the wetland to satisfy their life cycles (Endangered bat species were documented during acoustic surveys, but this wetland does not appear to be a critical bat habitat given the presence of several larger woodlands within 1 km);
- The wetland does not provide any SWH or fish habitat; and
- The wetland is not a coastal wetland.

Overall, the wetland exhibits limited ecological, hydrological and/or social functions that would make it a candidate for significance. Therefore, it remains an unevaluated wetland, since it has not been formally evaluated under OWES (MNRF, 2022), however, it is unlikely to be significant were it to be evaluated. This conclusion (as previously outlined in Savanta, 2020) was reviewed by NPCA as part of the development application process for the proposed development at 200 John Street East and 588 Charlotte Street. NPCA agreed that a formal evaluation of this wetland under OWES was not warranted.

5.1.2. Significant Coastal Wetlands

Within Ontario, Significant Coastal Wetlands are identified by the MNR or by their designates. Other evaluated or unevaluated coastal wetlands may be identified for conservation by the municipality or the conservation authority. Coastal wetlands are defined in the NHRM (MNR 2010) as:

- "*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*
- *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.

5.1.3. Significant Woodlands

Significant woodlands are identified by the planning authority in consideration of criteria established by the MNR. 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*."

As per the PPS, significant woodlands are to be defined using criteria established by the province (i.e., NHRM; MNR 2010, recommended criteria). Criteria for designating significant woodlands include size, shape, proximity to other woodlands or natural features, linkages, species diversity, uncommon characteristics, and economic and social value. The woodland size criterion is related to the scarcity of forest cover on the landscape as defined on a municipal basis where differences in woodland coverage among physical subunits (e.g., watersheds, biophysical regions) are considered.

Under the NOP (2022), a Significant Woodland is a woodland that is ecologically, functionally, or economically important within the planning area. To be identified as significant per the NOP (2022), a woodland must satisfy the ELC forest definition (i.e., having tree cover >60%) and meet one or more of the following threshold criteria:

- ≥ 2 hectares in size; or
- ≥ 1 hectare and meeting at least one qualifying ecological or functional criterion;
    - Naturally occurring (non-planted) tree communities;
    - Woodland restoration plantings;
    - Presence of mature trees (≥ 10 trees per hectare that are >100 years old or ≥ 50 cm DBH);
    - Located wholly or partially within 30 m of a Provincially Significant Wetland or Endangered/Threatened species habitat;
    - Overlapping or abutting permanent/intermittent streams, fish habitat, or significant valleylands.
- ≥ 0.5 hectares and meeting specified rare or sensitive ecological criteria;
    - Provincially rare treed vegetation communities ranked S1–S3 by NHIC;
    - Habitat of high conservation-value woodland plant species (S1–S3 rank or high Coefficient of Conservatism values);
    - Overlapping or abutting Significant Wildlife Habitat, Endangered/Threatened species habitat, or non-provincially significant wetlands.
- A woodland of any size is considered Significant if it overlaps or abuts (i.e., is within 20 m of):
    - A Provincially Significant Wetland; or
    - A Life Science Area of Natural and Scientific Interest (ANSI).

There are two woodland communities (as per ELC mapping) present within the Subject Lands. The first (CUW/SWD3-2) is located on the eastern boundary, partially with the Greenbelt, while the second (FOD7) is located on the southern boundary.

The FOD7 does not meet any of the criteria to be considered significant. No Endangered or Threatened species or species of concern (per the ROP definition) were observed within the woodland. The woodland is approximately 0.4 ha and does not contain any older growth or interior habitat and therefore does not meet any criteria from the NOP (2022).

The woodland on the eastern boundary is a cultural woodland (CUW) and therefore, it does not meet the definition of a woodland since it is not a “forest” under ELC. Therefore, this area does not meet the criteria to be significant woodland in the Urban Area. Further to this, as noted previously, the Region’s forestry staff completed stem density assessments in the woodland and the results of the assessment demonstrated that the area does not meet the woodland definition due to insufficient stem density.

The Greenbelt Plan KNHF criteria (MNR, 2012a) were also reviewed to determine if the CUW/SWD should be considered a significant woodland and therefore a KNHF in the Greenbelt Plan area. However, given that the treed area does not meet the forest ELC criteria or the stem density criteria, the feature is not considered to be a woodland in the Greenbelt Plan area.

There were no other woodlands identified on or within 120 m of the Proposed Development Area on the Subject Lands.

Therefore, no significant woodlands are present on or within 120 m of the Proposed Development Area.

5.1.4. Significant Valleylands

A valleyland is identified in the PPS as "*a natural area that occurs in a valley or other landform depression that has water flowing through or standing for some period of the year*". One Mile Creek on the Subject Lands does not occur within a valley (e.g., where valley walls of a minimum height of 2 m are present) and landform depressional characteristics are limited. One Mile Creek does flow for some period of the year. Given that "landform depression" is not defined in the PPS and is therefore open for interpretation, a conservative approach was taken with assessment completed to determine if One Mile Creek on the Subject Lands would meet the criteria to be a Significant Valleyland.

Significant valleylands should be defined and designated by the planning authority. Niagara Region (2022) established the following criteria for the delineation of significant valleylands:

- all streams with well-defined valley morphology (i.e., floodplains, riparian zones, meander belts and/or valley slopes) of an average width of 25 metres or more; the physical boundary is defined by the stable top of bank (as defined by the conservation authority);
- all spillways and ravines with the presence of flowing or standing water for a period of no less than two months in an average year. Such features must be greater than 50 metres in length (as defined from the point of valley formation downstream to the confluence of the valley being assessed); 25 metres in average width with a well-defined morphology (i.e., two valley walls of 15 per cent slope or greater with a minimum height of 5 metres, and valley floor), and having an overall area of 0.5 hectares or greater; or
- additional features or areas beyond the ones described above that have been identified by the Region, Local Area Municipality, or the Niagara Peninsula Conservation Authority as providing one or more of the features or functions described in the table contained in Appendix A of the Greenbelt Plan 2005 Technical Definitions and Criteria for Key Natural Heritage Features in the Natural Heritage System of the Protected Countryside Area (MNR, 2012a).

One Mile Creek on the Subject Lands was evaluated based on these criteria. The portion of the watercourse on the Subject Lands does not exhibit well-defined valley morphology with respect to a valley-type depression on the landscape and there are no valley slopes. Reach 3 (the downstream reach on the 144 John Street East property) was identified as having a meander belt with a 24-m width. Therefore, it doesn't meet the average width of 25 m. Reach 1 did not have a meander belt. The 100-year floodplain associated with One Mile Creek on the Subject Lands exceeds 25 m in width in some locations but is generally less than 25 m wide on average over the length of the watercourse. The

watercourse is not considered to be a spillway or ravine and does not have well-defined morphology. The watercourse does not contain any substantial discernable riparian vegetation that differs from the general landscaping of the residential property. This portion of the watercourse is not known to have been identified by the Town, Region or NPCA as providing one or more features or functions outlined in MNR (2012a).

Based on these characteristics, One Mile Creek on the Subject Lands does not meet the criteria to be a Significant Valleyland.

5.1.5. 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: the NHRM (MNR, 2010), the Significant Wildlife Habitat Technical Guide (MNR, 2000b), and the SWH Ecoregion Criteria Schedules (MNR, 2015). The Subject Lands are in Ecoregion 7E and were therefore assessed using the Significant Wildlife Habitat Criteria Schedules for Ecoregion 7E (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.

A detailed screening assessment of SWH types with ELC communities present on the Subject Lands was completed to support the evaluation of potential SWH. This screening is provided in **Table 10** (**Appendix B**). The results of the assessment are provided in the following sections.

5.1.5.1. Seasonal Concentration Areas

Seasonal concentration areas are areas where wildlife species occur annually in aggregations at certain times of the year. Such areas are sometimes highly concentrated with members of a given species, or several species, within relatively small areas. In spring and autumn, migratory wildlife species will concentrate where they can rest and feed. Other wildlife species require habitats where they can survive winter.

The Subject Lands were determined not to have suitable habitat conditions for seasonal concentration areas identified by MNR (2015).

5.1.5.2. Rare Vegetation Communities or Specialized Habitat for Wildlife

Rare, or 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, could qualify. It is assumed that these habitats are at risk and that they are also likely to support additional wildlife species that are considered significant. As previously identified, there are no rare vegetation communities on or adjacent to the Subject Lands.

Specialized habitats require large areas of suitable habitat for successful breeding. This SWH type is community/diversity-based. The largest and least fragmented habitats are generally considered more significant. Similar to the approach taken with Seasonal Concentration Areas, this SWH component requires specific habitat criteria to warrant targeted surveys. Targeted surveys were completed where such habitat was present.

There were several seasonal areas of ponded water on the Subject Lands that met some of the habitat criteria to be considered candidate Woodland Amphibian Breeding Habitat (within or <120 m from woodlands). However, based on amphibian surveys the only amphibian heard calling from the features was American Toad, which is not an indicator wildlife species for this type of habitat. This species was documented in 2018, although it was not documented during the first round of the surveys in 2026. Therefore, these areas do not meet the criteria to be confirmed SWH.

The Proposed Development Area and lands within 120 m did not have suitable habitat conditions to provide any of the other specialized habitat SWH types identified in MNR (2015).

5.1.5.3. Habitat for Species of Conservation Concern

Species of conservation concern include those that are rare and whose populations are significantly declining. According to the Significant Wildlife Habitat Ecoregion Criterion Schedule (MNR 2015), habitat for species of conservation concern includes five types of habitats:

- Marsh bird breeding habitat;
- Open country bird breeding habitat;
- Shrub/early successional bird breeding habitat;
- Terrestrial crayfish; and
- Special concern and rare wildlife species.

Of the types of habitat for species of conservation concern that may be present, based on presence of suitable ELC Ecosite and other habitat criteria identified in MNR (2015), additional information is provided in respect of Marsh Breeding Bird Habitat SWH and Terrestrial Crayfish SWH, both of which met the habitat criteria to be considered candidate SWH.

Given that there is a swamp community on the Subject Lands (SWD3-2), the habitat criteria for Marsh Bird Breeding Habitat was met, regardless of the fact that the wetland area is very small and highly disturbed. However, none of the indicator bird species identified in the criteria Schedule (MNR 2015) were found on the Subject Lands. Therefore, this type of habitat is considered absent. Given that there is one swamp community on the Subject Lands, that habitat could be suitable for terrestrial crayfish. However, no evidence of terrestrial crayfish (i.e., chimneys) was noted during multiple site investigations within the swamp area. Therefore, this type of SWH is considered to be absent.

Monarch Butterfly (designated as Special Concern in Ontario and Special Concern on the federal *Species at Risk Act*) was observed on the Subject Lands incidentally during the breeding bird surveys in 2018. Two Monarchs were observed during June and July of 2018. However, since 2018, this area is now frequently disturbed by mowing (in the Urban Area) and agricultural operations of the adjacent vineyard (in the Greenbelt Plan area). Therefore, the Subject Lands do not contain suitable habitat and are not considered SWH for the species.

Although located >120 m from the Proposed Development Area, the woodland in Paradise Grove Plain ANSI may provide SWH for Eastern Wood-pewee, given the observations of singing males during the breeding period.

5.1.5.4. Animal Movement Corridors

Animal movement corridors are areas that are traditionally used by wildlife to move from one habitat to another. In EcoRegion 7E, only amphibian movement corridors require assessment when Amphibian Breeding Habitat (Wetland) SWH is present.

As significant amphibian breeding habitats were not identified on the Subject Lands, this SWH type is not present.

5.1.5.5. Significant Wildlife Habitat Summary

Based on the results of the assessment described above and as outlined in **Table 10** (**Appendix B**) there is no SWH on the Subject Lands or in areas within 120 m of the Proposed Development Area.

5.1.6. 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 One Mile Creek Watershed Plan indicates that upstream reaches of One Mile Creek, including areas upstream of King Street, do not provide functional fish habitat, although they contribute surface flow to downstream reaches that support fish communities. Consistent with this assessment, One Mile Creek has been classified by the MNR and the Watershed Plan as Type 3 (Marginal) fisheries habitat. Type 3 watercourses are generally characterized as marginal or highly degraded systems that do not contribute directly to fish production or long-term population sustainability (MNR, 2000a).

Therefore, One Mile Creek is identified as not providing direct fish habitat, but it does provide indirect fish habitat that may support downstream fish communities in off-site reaches. Associated habitat functions may include conveyance of flow, maintenance of water quality, movement of organic materials, sediment transport functions and benthic invertebrate habitat (a potential source of forage for the downstream fish community).

Similarly, the tributary of One Mile Creek on and adjacent to the Subject Lands does not provide direct fish habitat but is classified as Type 3 (Marginal) fish habitat. It provides some limited contributing function through conveyance of ephemeral flows to downstream reaches of One Mile Creek but is highly degraded due to adjacent residential development and channel modification.

5.1.7. Habitat for Endangered and Threatened Species

Endangered and threatened species are those identified on the SARO list. Threatened or endangered species observed on the Subject Lands during ecological investigations included:

- Little Brown Bat – Endangered;
- Small-footed Myotis – Endangered;
- Hoary Bat – Endangered;
- Eastern Red Bat – Endangered;
- Silver-haired Bat – Endangered;
- Chimney Swift - Threatened.

No additional Endangered or Threatened species identified through the background information review as occurring within the general area of the Subject Lands were observed during the ecological field investigations.

These observations are discussed in the following sections.

5.1.7.1. Bats

Five Endangered bat species (Silver-haired Bat, Hoary Bat, Eastern Red Bat, Little Brown Myotis and Small-footed Myotis), were documented on the Subject Lands during acoustic surveys in June 2018 and 2019. Potential habitat trees are present throughout the residential portion of the 144/176 John Street East properties, along the driveway to the 200 John Street East property and within the SWD3-2/CUW.

The definition of “habitat” has been revised for the SCA. Based on guidance received from MECP, “habitat” for SAR bats includes:

Maternity roosting habitat *(for Resident and Migratory Bats)* generally includes:

- as a dwelling place, the natural roost feature (e.g., tree, snag, rock) or entire anthropogenic structure (e.g., entire bridge, barn, or rock pile) occupied for breeding (gestation, birth) and rearing pups (hereafter, “maternity roost”)
- the portion of the area required by the species for breeding and rearing pups, up to a 1000 m radius from the maternity roost

Migratory stopover habitat *(for Migratory Bats)* generally includes:

- as a dwelling place, the natural roost feature (e.g., tree) or anthropogenic structure (e.g., building) occupied for staging during migration
- the portion of the area required by the species for staging during migration, up to a 1000 m radius from the occupied feature or structure

Hibernating and swarming habitat *(for Resident Bats)* generally includes:

- as a dwelling place, the entire natural feature or anthropogenic structure (e.g., cave, crevice, mine, tunnel),including all entry points and extent of underground chambers, occupied for wintering (hibernation) and breeding (swarming) (hereafter, "hibernaculum")
- all area immediately within a 200 m radius of the hibernaculum
- the portion of the area required by the species for the purposes of breeding in the fall and staging in the spring, up to a 1000 m radius from the hibernaculum

Overwintering habitat *(for Migratory Bats)* generally includes:

- as a dwelling place, any habitat feature or structure (e.g., tree, leaf litter, natural cavity or building) occupied by a migratory bat for wintering
- all area immediately within a 25 m radius of the occupied feature or structure

Based on this definition and the presence of SAR bats, the identified habitat trees on the Subject Lands could be considered habitat for the species. In the local context of the EIS Study Area, the larger woodlands to the northeast and southeast are expected to be important in maintaining the local population of bats relative to the disturbed habitat on the Subject Lands. Regardless, the individual potential habitat trees will be treated as potential SAR bat habitat in this EIS.

None of the structures surveyed on the 200 John Street East and 588 Charlotte Street properties were documented as providing habitat for SAR bats during the 2022 study.

No assessment of the potential for structures on 144 and 176 John Street East to provide habitat for SAR bats has been completed to date. A screening of these buildings will need to be completed to confirm if they provide potential entry/exit points that could facilitate bat maternal use of the interior. If entry/exit points are present, structure surveys will be necessary to confirm the presence/absence of SAR bats.

The Subject Lands are not expected to provide migratory, overwintering, hibernating or swarming habitat functions for SAR bats.

5.1.7.2. Birds

Chimney Swift (Threatened in Ontario and Canada) were observed foraging over the Subject Lands and adjacent lands during the Round 1 and Round 3 surveys. No suitable nesting habitat was identified on the Subject Lands, although a commercial building located approximately 700 m northwest of the Subject Lands was noted as having a large old-style chimney that could potentially provide nesting or roosting habitat for this species. The Subject Lands are not considered to be habitat for the species.

Given the nature of the lands within 120 m of the Proposed Development Area (i.e., dominated by residential, managed open space and vineyard agricultural use), no SAR birds are expected to use these areas for breeding purposes.

5.1.7.3. Vegetation

There were several SAR plant species documented on the Subject Lands, however they were determined to be cultivated ornamental species as part of a landscaped residential yard not naturally occurring species and as such would not be protected under the *SCA*.

5.1.8. Significant ANSI's

An ANSI is identified by the MNR as

"*areas of land and water containing natural landscapes or features that have been identified as having life science or earth science values related to protection, scientific study or education"* (MNR 2010).

The MNR's Geospatial Ontario database does not identify the presence of any provincially significant ANSI's on or within 120 m of the Proposed Development Area. The closest ANSI to the Subject Lands is the Paradise Grove Plain ANSI (located 215 m away).

5.2. Greenbelt Plan Natural Heritage Features

The presence/absence of Key Natural Heritage Features and Key Hydrological Features in the Greenbelt Plan area on and adjacent to the Subject Lands is discussed in the following sections.

5.2.1. Key Natural Heritage Features

Key Natural Heritage Features under the Greenbelt Plan include:

- Habitat of Endangered species and Threatened species;
- Fish habitat;
- Wetlands;
- Life Science ANSIs;
- Significant Valleylands;
- Significant Woodlands;
- SWH (including habitat of special concern species);
- Sand barrens, savannahs and tallgrass prairies; and
- Alvars.

As discussed previously, the portion of the Subject Lands within the Greenbelt contains a wetland, which is a KNHF and KHF. As per the evaluation in **Section 5.1**, none of the other KNHFs (aside from the wetland) are present in the Greenbelt on or within 120 m of the Proposed Development Area.

Other features within the broader EIS Study Area (including the Paradise Grove Plain ANSI and woodland to the southeast) may meet criteria to be multiple types of KNHF. However, given that they are located greater than 120 m from the Proposed Development Area, and therefore, outside the distance for the proposed development to be considered with the "Adjacent Lands" to these features, no evaluation of the significance of these areas was completed to confirm presence/absence of KNHF.

Linkages, such as the potential linkage that has been identified in the Greenbelt NHS on and adjacent to the Subject lands are not a type of KNHF.

5.2.2. Key Hydrological Features

Key Hydrologic Features (KHF's) under the Greenbelt Plan include:

- Permanent and intermittent streams;
- Lakes (and their littoral zones);
- Seepage areas and springs; and
- Wetlands.

As noted in Section 5.2.1, the wetland in the Greenbelt Plan area on the Subject Lands is a KHF. The portion of One Mile Creek within the Greenbelt Plan area (off the Subject Lands) would be a KHF.

None of the other types of KHFs have been identified in the Greenbelt Plan area on or within 120 m of the Proposed Development Area on the Subject Lands.

5.3. Region of Niagara Natural Environment System

The following sections assess the presence/absence of components of the Region's Natural Environment System on and adjacent to the Subject Lands.

5.3.1. Provincial Natural Heritage Systems

Under the NOP (2022), this component of the Natural Environment System includes the Natural Heritage System for the Growth Plan and the Greenbelt Plan NHS. However, the Growth Plan was repealed in 2024, so that is not applicable to the current development.

The Greenbelt Plan NHS is located on and adjacent to the Subject Lands (**Figure 6**, **Appendix A**). The entirety of the Greenbelt Plan NHS is considered to be a component of the Region's Natural Environment System.

5.3.1.1. KNHF and KHF in Greenbelt

This component of the Natural Environment System is associated with KNHF/KHF within the Greenbelt Plan area. It does not apply to areas outside the Greenbelt Plan area. As discussed in **Section 5.2**, the SWD3-2 wetland and One Mile Creek (where it is present within the Greenbelt) are the only KNHF/KHF present within the Greenbelt Plan area on and within 120 m of the Proposed Development Area.

5.3.2. Natural Heritage Features and Areas

These components of the Region's Natural Environment System are located outside of Provincial Plan NHS's (i.e., with the Town's Urban Area). The presence/absence of these features on and adjacent to the Subject Lands is discussed in the following sections.

5.3.2.1. Significant Wetlands

As per the analysis in **Section 5.1.1**, there are no significant wetlands on or within 120 m of the Proposed Development Area.

5.3.2.2. Significant Coastal Wetlands

As per the analysis in **Section 5.1.2**, there are no significant coastal wetlands on or within 120 m of the Proposed Development Area.

5.3.2.3. Other Coastal Wetlands

As per the analysis in **Section 5.1.2**, there are no coastal wetlands (and therefore no other coastal wetlands) on or within 120 m of the Proposed Development Area.

5.3.2.4. Fish Habitat

As per the analysis in **Section 5.1.6**, indirect fish habitat is present in One Mile Creek and its tributary on and within 120 m of the Proposed Development Area.

5.3.2.5. Significant Woodlands

As per the analysis in **Section 5.1.3**, there are no significant woodlands present on or within 120 m of the Proposed Development Area.

5.3.2.6. Significant Valleylands

As per the analysis in **Section 5.1.4**, there are no Significant Valleylands on or within 120 m of the Proposed Development Area.

5.3.2.7. Habitat of Endangered and Threatened Species

As per the analysis in **Section 5.1.7**, trees that provide bat habitat characteristics on the Subject Lands are considered to be "habitat" for Endangered bat species, per the MECP's interpretation of the definition of "habitat" for the SCA. Potential habitat trees may also be present within residential and open space areas within 120 m of the Proposed Development Area.

5.3.2.8. Significant Wildlife Habitat

As per the analysis in **Section 5.1.5**, there is no SWH on or within 120 m of the Proposed Development Area.

5.3.2.9. ANSIs

As per the analysis in **Section 5.1.8**, there are no ANSIs on or within 120 m of the Proposed Development Area. The closest ANSI is the Paradise Grove Plain Regionally Significant Life Science ANSI located north of John Street East approximately 215 m from closest part of the Subject Lands.

5.3.3. Other Natural Heritage Features

5.3.3.1. Other Wetlands

The SWD3-2 meets the criteria to be a wetland (per the definition in the PPS), but it has not been evaluated as a PSW (as discussed in **Section 5.1.1**). Accordingly, it is considered to be an "Other Wetland" under the NOP (2022). The wetland is also regulated by NPCA. Other Wetlands are not Natural Features and Areas, but are part of the Water Resources System, as described in **Section 5.3.5**.

5.3.3.2. Other Woodlands

The NOP (2022) defines Other Woodlands as

"*Woodlands determined to be ecologically important in terms of features, functions, representation, or amount, and contributing to the quality and diversity of an identifiable geographic area or natural heritage system. Other woodlands include all terrestrial treed vegetation communities where the percent tree cover is greater than 25 per cent. Other woodlands would not include woodlands meeting the criteria as significant woodlands*."

The NOP (2022) provides criteria for identification of Other Woodlands as a terrestrial treed area with ≥ 25% tree cover and meeting one or more of the following criteria:

- an average minimum width of 40 m and is ≥ 0.3 ha, measured to crown edges; or
- any size abutting a significant woodland, wetland or permanent stream.

Treed areas that "abut" a significant woodland, wetland or permanent stream are considered adjacent when located within 20 m of each other.

The 0.37 ha FOD7 woodland along the southern boundary of the Subject Lands meets the ≥ 25% tree cover based on ELC but it does not meet the criteria listed above to be classified as an "Other Woodland" as the width of the community was measured to be an average minimum width of 35.51 m. Measurements were taken approximately 10 meters apart in an east-west orientation, then averaged to obtain an average width.

As discussed in **Section 5.1.3**, the SWD3-2/CUW did not meet the Region's definition to be a woodland based on ELC (i.e., it is not a "Forest") per the definition of "Woodland" in the NOP (2022), nor did it meet stem density criteria to be considered a woodland under the *Forestry Act* definition. However, regardless of the definition of woodland in the NOP (2022), Table 5-1 in Schedule L of the NOP (2022) indicates that features such as hedgerows (which are not a "Forest" in ELC) can be considered "Other Woodlands" if they meet the criteria of 25% tree cover. On this basis and the interpretation that appears to be presented by Table 5-1 in Schedule L of the NOP (2022), the CUW could be a type of "Other

Woodland" since it has >25% tree cover. Given that it abuts a wetland (the SWD3-2), it meets the criteria to be an "Other Woodland". As per Table 5-1 in the NOP (2022), the SWD is not a candidate to be an Other Woodland.

As noted in **Section 2.4**, the Region's online Natural Environment System mapping identifies two treed areas on the 144 and 176 John Street East properties as "Other Woodlands". These treed areas were assessed by a qualified vegetation ecologist as part of the botanical investigations completed in 2022.

These investigations determined that tree cover within the mapped area consists of planted ornamental and landscaping species arranged in a deliberate, managed configuration typical of residential yards, rather than naturally established forest communities. Overstory species composition reflected common horticultural plantings and does not correspond to native woodland associations identified under the ELC system. Ground cover is dominated by maintained lawn with woodchip mulch and evidence of regular mowing and pruning. No discernible structural, compositional, or functional differences were observed between the areas mapped as "Other Woodland" in the NOP (2022) and the surrounding residential lawn. Furthermore, no evidence of natural regeneration, successional development, or self-sustaining woodland processes was documented during field surveys.

As a result, the subject treed areas do not exhibit the ecological attributes, natural community characteristics, or functional linkages typically associated with "Other Woodlands" under the NOP (2022). The features do not represent a naturally occurring terrestrial treed community.

In addition, One Mile Creek within the Subject Lands is not considered permanent, as defined by the NOP (2022): "*Permanent streams are watercourses that contain water at all times of the year*". As such, the subject treed areas do not appear to satisfy the second criterion of "Other Woodland" related to adjacency to a permanent stream.

Accordingly, the landscaped residential treed areas located at 144 and 176 John Street are not considered to meet the intent of an "Other Woodland" designation and are more appropriately characterized as a managed residential area.

5.3.3.3. Linkages

The NOP (2022) defines linkage as

> "*an area, that may or may not be associated with the presence of existing natural features and areas, that provides and maintains ecological connectivity between core areas consisting of natural features and areas, and supports a range of community and ecosystem processes enabling plants and animals to move among natural heritage features, in some cases over multiple generations, thereby supporting the long-term sustainability of the overall natural environment system*."

The NOP (2022) provides criteria to determine Large, Medium and Small Linkages. Large and Medium linkages can only be located outside Settlement Areas and outside Provincial Natural Heritage Systems; therefore, these types of linkage cannot be present on the Subject Lands.

The NOP (2022) identifies Small Linkages, which can be located both inside and outside of Settlement Areas and outside of the Provincial Natural Heritage System, as being 60-100 m in width and connecting core areas (defined as groups of natural features and areas within 30 m of each other with a combined areas of ≥10 ha). Based on these criteria, no part of the Subject Lands located within the Settlement Area (i.e. the Town Urban Area) would be considered a Small Linkage.

Regardless, the Greenbelt Plan NHS provides a potential linkage function that will be considered through this EIS.

5.3.3.4. Buffers

Buffers are a component of the Region's Natural Environment System. With Settlement Areas (i.e., within the Town's Urban Area), buffers from natural heritage features and areas (as identified in **Section 5.3.2**) are mandatory. Section 3.1.9.10 of the NOP (2022) indicates:

> "*The width of an ecologically appropriate buffer would be determined through and environmental impact study and/or hydrological evaluation at the time an application for development or site alteration is made, or through the completion of a subwatershed study in support of a secondary plan or other large scale development. The width of the buffer would be based on the sensitivity of the ecological functions from the proposed development or site alteration, and the potential for impacts to the feature and ecological functions as a result of the proposed change in land use*".

In accordance with the NOP (2022), buffers have been provided from the unevaluated wetland (SWD3-2) and One Mile Creek and its Tributary, both of which provide fish habitat. These buffers are identified and discussed further in **Section 6**.

5.3.4. Supporting Features and Areas

The NOP (2022) indicates that supporting features and areas means "*lands that have been restored or have the potential of being restored*" and includes grasslands, meadows and thickets, other valleylands, other wildlife habitat and enhancement areas. These areas are considered "*where they are determined to contribute to the biodiversity and ecological function of the natural environment system*".

Each type of potential supporting feature and area is discussed in the following sections.

5.3.4.1. Grasslands, Meadows and Thickets

The majority of the 200 John Street East and 588 Charlotte Street properties are currently managed as open space areas with regular mowing to maintain vegetation in a lawn-like condition. These areas are not generally identified as grasslands and natural meadows in accordance with ELC. There are no thickets on the Subject Lands. Therefore, this type of Supporting Feature and Area is not present on the Subject Lands. Further, no areas within 120 m of the Proposed Development Area have been identified as grassland, natural meadow or thicket ELC polygons.

5.3.4.2. Other Valleylands

The NOP (2022) defines a valleyland as "*a natural area that occurs in a valley or other landform depression that has water flowing through or standing for some period of the year*". Per the NOP (2022), an Other Valleyland would be a valleyland that is not identified as a Significant Valleyland (per the assessment documented in **Section 5.1.4**).

Neither One Mile Creek nor its tributary were identified as Significant Valleylands and neither flow within a confined valley, which is typically identified as a depressional area with valley slopes 2 m or greater in height. Both watercourses flow within a defined channel that could be considered a "landform depression".

Both watercourses are impaired due to historical and ongoing land uses and management (e.g., historical straightening, bank modifications, riparian vegetation removal and management). Given that both watercourses could be restored and that they contribute to the biodiversity and ecological function of the Region's Natural Environment System, they have been identified as Supporting Features and Areas. Both features are also regulated by NPCA (per **Section 5.5**) and are considered components of the Region's Water Resources System.

5.3.4.3. Other Wildlife Habitat

This type of supporting features and areas consists of "*wildlife habitat that is not considered to be significant wildlife habitat*", per Section 3.1.15.1 of the NOP (2022). Wildlife habitat is defined in the NOP (2022) as

"*areas where plants, animals and other organisms live, and find adequate amounts of food, water, shelter, and space needed to sustain their populations. Specific wildlife habitats of concern may include areas where species congregate at a vulnerable point in their annual or life cycle; and areas which are important to migratory or non-migratory species*".

Based on the definitions in the NOP (2022) areas providing wildlife habitat that have the potential to be restored and contribute to the biodiversity and ecological function of the Region's Natural Environment System could meet the criteria.

With respect to the Subject Lands, other wildlife habitats are generally limited due to the historic and ongoing residential and agricultural uses. However, the SWD3-2/CUW on the Subject Lands appears to support some limited potential for bat roosting and bird nesting habitat and could potentially be restored by allowing the groundcover within the feature to naturally regenerate (relative to the current management approach of regular mowing). Therefore, this feature is identified as an Other Wildlife Habitat meeting the Supporting Features and Areas criteria. While other areas of the Subject Lands may provide limited wildlife habitat, they do not warrant identification as Supporting Features and Areas due to the historic use/disturbance and location in the Town's Urban Area or ongoing agricultural use (in the Greenbelt Plan area).

5.3.4.4. Enhancement Areas

The NOP (2022) defines Enhancement Areas as

"*ecologically supporting areas adjacent to natural heritage features and areas, key natural heritage features, key hydrologic features. Enhancement areas can also be measures internal to feature that increase the ecological resilience and function of individual features or groups of natural features and areas. Enhancement areas are identified where they:*

- *Connect natural features and areas to create larger contiguous natural areas;*
- *Reduce edge habitat and increase proportion of interior conditions (> 100 m from edge); and*
- *Include critical functions zones and important catchment areas critical to sustaining ecological functions.*"

Schedule L of the NOP (2022) provides additional criteria for Enhancement Areas inside settlement areas as follows:

- In 'bays and inlets' along the edge of features - <60 m wide
- Interior gaps in features - <0.5 ha
- Gaps between features - < 60 m.

Given the features on the Subject Lands, enhancement areas need to be assessed in the areas adjacent to the Other Woodland/Wetland (SWD3-2/CUW) and fish habitat in One Mile Creek and its Tributary. However, based on the above-noted criteria, no opportunities for enhancement areas exist on the Subject Lands, given the nature of the woodland and fish habitat. However, enhancements in buffers (e.g., vegetation naturalization) are expected to result in enhancements to the form and function of fish habitat and the on-site wetland.

5.3.5. Water Resources System

5.3.5.1. Key Hydrologic Features

5.3.5.1.1. Permanent and Intermittent Streams

No permanently flowing streams are present on or within 120 m of the Proposed Development Area. One Mile Creek and its Tributary are identified as intermittent streams and are therefore part of the Water Resources System component of the Region's Natural Environment System.

5.3.5.1.2. Inland Lakes and Their Littoral Zones

No inland lakes are present on or within 120 m of the Proposed Development Area.

5.3.5.1.3. Seepage Areas and Springs

No seepage areas and springs are known to exist on or within 120 m of the Proposed Development Area.

5.3.5.1.4. Wetlands

One wetland (the SWD3-2) is located on the Subject Lands and is identified as a Key Hydrologic Feature. No other wetlands have been identified on or within 120 m of the Proposed Development Area.

5.3.5.2. Key Hydrologic Areas

5.3.5.2.1. Significant Groundwater Recharge Areas

The NOP (2022) identifies significant groundwater recharge area as

"*An area that has been identified as:*

a. *A significant groundwater recharge area by any public body for the purposes of implementing the PPS;*
b. *A significant groundwater recharge area in the assessment report required under the Clean Water Act, 2006; or*
c. *An ecologically significant groundwater recharge area delineated in a subwatershed study or equivalent in accordance with provincial guidelines*."

The NOP (2022) summarizes that "*a recharge area is considered significant when it helps to maintain the water level in a aquifer that supplies a community with drinking water, or supplies groundwater recharge to a coldwater ecosystem that is dependent on this recharge to maintain its ecological function*".

The Subject Lands are not located within a Significant Groundwater Recharge Area identified in the Niagara Peninsula Source Water Protection Report (NPSCP, 2013). The Subject Lands are not known to supply ground water recharge to a coldwater ecosystem. Therefore, this type of Key Hydrologic Area is considered to be absent from the Subject Lands.

5.3.5.2.2. Highly Vulnerable Aquifers

The NOP (2022) indicates that Highly Vulnerable Aquifers are "*aquifers, including lands above the aquifers, on which external sources have or are likely to have a significant adverse effect*".

The Niagara Peninsula Source Water Protection Report (NPSCP, 2013) and the NOP (2022) both identify portions of the Subject Lands to be part of a Highly Vulnerable Aquifer. This was confirmed in the Hydrogeological Investigation Report (Cole Engineering, 2020).

5.3.5.2.3. Significant Surface Water Contribution Areas

The NOP (2022) identifies Significant Surface Water Contribution Areas as

"*areas, generally associated with headwater catchments that contribute to baseflow volumes which are significant to the overall surface water flow volumes within a watershed. Significant surface water contribution areas include headwater drainage features classified as protection, conservation and mitigation".*

Based on this definition, the Mitigation HDFs associated with the Town's Heritage Trail south of the Subject Lands (**Figure 6**, **Appendix A**) are considered Significant Surface Water Contribution Areas. That said, the volumes of baseflow contributed to One Mile Creek by these ditches along the trail are not expected to be significant to the overall surface water volume in the watershed.

5.3.5.3. Other Hydrologic Features and Functions

5.3.5.3.1. Groundwater Features

The NOP (2022) indicates that groundwater features include "*water related features in the earth's subsurface including recharge/discharge areas, water tables, aquifers and unsaturated zones that can be defined by surface and subsurface hydrogeological investigations*". The NOP (2022) defines sensitive groundwater features as "*areas that are particularly susceptible to impacts from activities or events including, but not limited to, water withdrawals, and additions of pollutants*".

The Hydrogeological Investigation Report (Cole Engineering, 2020) for the 200 John Street East and 588 Charlotte Street properties indicated:

- Groundwater was present in the subsurface below the Subject Lands at depths ranging from 1.27 to 4.12 metres below ground surface. These water levels were interpreted by Cole (2020) to be representative of the shallow groundwater table.
- One Mile Creek on the 200 John Street East property was not identified as receiving groundwater discharge. No groundwater discharge zones have been identified on the Subject Lands.
- Infiltration does occur on the Subject Lands, although it accounts for a small portion (16%) of total precipitation. Cole (2020) noted that infiltration to the underlying aquifer units occurs.

Based on this information, the Subject Lands are considered to contain subsurface Groundwater Features as defined in the NOP (2022) including recharge areas, water tables and aquifers.

5.3.5.3.2. Surface Water Features

The NOP (2022) indicates that surface water features include headwater drainage features, recharge/discharge areas and "*associated riparian lands that can be defined by their soil moisture, soil type, vegetation or topographic characteristics*". The NOP (2022) defines sensitive surface water features as "*areas that are particularly susceptible to impacts from activities or events including, but not limited to, water withdrawals, and additions of pollutants*".

The HDFA completed in support of the EIS (as described in **Section 4.5.1**) identified a number of HDFs on and adjacent to the Subject Lands. However, HDFs identified as "No Management Required" do not provide important characteristics that would warrant maintaining them on the landscape or mitigating their ecological functions if they were to be removed. Therefore, No Management Required HDFs should not be considered "Surface Water Features" that are a component of the Region's Natural Environment System. Mitigation HDFs were identified in the ditches adjacent to the Town's Heritage Trail south of the Subject Lands. These HDFs were identified as Mitigation since they provide seasonal hydrological inputs towards downstream sections of One Mile Creek and its tributary. Therefore, these Mitigation HDFs on the Town's property (within 120 m of the Subject Lands) could be considered Surface Water Features that are a part of the Region's Natural Environment System. The riparian lands adjacent to the Mitigation HDFs on the Town's Heritage Trail property (which are generally treed outside the trail surface) would also be considered part of the Surface Water Features component.

No specific recharge/discharge areas have been identified on the Subject Lands. Any non-impervious area where surface water infiltrates into the shallow or deep groundwater layer could be identified as a recharge area. As noted in Cole (2020) recharge occurring on the Subject Lands represents a low portion of the overall precipitation. However, given that "recharge area" is not defined and some level of recharge occurs in impervious surface areas throughout the Subject Lands, these areas are considered to be "Surface Water Features".

One Mile Creek and its tributary are already identified as Key Hydrologic Features and therefore, do not need to be identified as Surface Water Features.

5.3.5.3.3. Floodplains

NPCA has mapped a floodplain on One Mile Creek where it crosses the 144, 176 and 200 John Street East properties as depicted on **Figure 6** (**Appendix A**).

No floodplain is present on the Tributary of One Mile Creek (Schaeffers, 2026).

5.3.5.3.4. Shoreline Areas

Shoreline areas are defined in the NOP (2022) as

"*the interface between terrestrial and aquatic environments, allowing for interactions between them, providing specialized habitats (e.g., natural beach, overhanging cover, bird stopover or nesting, etc.), natural cover, areas of shoreline erosion or accretion, nutrient and sediment filtration/buffering, shading, foraging opportunities*."

The NOP (2022) further indicates that shoreline areas include "*any natural vegetation community (as determined according to Ecological Land Classification) and will be identified based on the following criteria:*

a. *≥ 0.1 hectare in size; and*
b. *Located within 30 m of the limits of the shoreline flood hazard associated with the Great Lakes, or within 15 m of a surface water feature, and defined by the Provincial Policy Statement*".

As noted in **Section 2.4**, the online mapping for the NOP (2022) Natural Environment System depicts several "shoreline areas" along One Mile Creek on the Subject Lands.

However, based on the ELC mapping none of these areas are considered to be natural vegetation communities located within 15 m of One Mile Creek that are >0.1 ha in size. Therefore, there are no shoreline areas on or within 120 m of the Proposed Development Area.

5.4. Town of Niagara-on-the-Lake Conservation/Wetland Features

Part 4, Section 16, Subsection 16.1 of the Town OP (2017) indicates that the following features are to be designated as "Conservation/Wetlands":

- Provincially Significant Wetlands

- Flood prone and shoreline erosion areas
- ANSI
- Woodlots
- Fish habitats.

As discussed in **Section 5.1.1**, there are no Provincially Significant Wetlands on or within 120 m of the Proposed Development Area.

As discussed in **Section 5.3.5.3.3**, there is a floodplain associated with One Mile Creek on the Subject Lands (as depicted on **Figure 6**, **Appendix A**). The floodplain is therefore identified a Conservation/Wetland feature under the Town's OP (2017).

As discussed in **Section 5.1.8**, there are no ANSIs on or within 120 m of the Proposed Development Area.

There is no definition in the Town OP (2017) for what constitutes a woodlot. Neither of the treed areas on the Subject Lands (SWD3-2/CUW and FOD7) are identified as Conservation lands on Schedule B of the Town OP (2017). The 0.37 ha treed area on the southern side of the Subject Lands was identified as a Fresh-Moist Lowland Deciduous Forest (based on ELC mapping protocols). This treed area has an average width of approximately 35.5 m, with a hedgerow extending from both sides of the feature along the southern boundary of the Subject Lands. Based on the analysis completed in **Sections 5.1.3** and **5.3.3.2**, this area did not meet any criteria to be considered a Significant Woodland or Other Woodland in Region's Natural Environment System. Based on this analysis, the FOD7 has not been identified as a feature warranting protection in a Conservation land use designation under the Town OP (2017).

The cultural woodland in the Greenbelt Plan area met the criteria to be an Other Woodland under the NOP (2022), although it does not meet ELC criteria to be a "forest" nor does it meet stem density criteria to be a woodland under the *Forestry Act* criteria. The adjacent SWD3-2 did not meet the criteria to be part of the Other Woodland under the NOP (2022). However, it is a contiguous treed area. Given the lack of definition in the Town's OP with respect to what constitutes a "woodland", this feature has conservatively been identified as a Woodland for the purposes of the Town's OP based on its designation under the NOP (2022).

5.5. NPCA Regulated Features

The following features on and adjacent to the Subject Lands are regulated by NPCA:

- Wetland (SWD3-2) and all areas within 30 m
- One Mile Creek, its floodplain (where present) and meander belt (where present, as discussed in **Section 4.5.2**)
- The Tributary of One Mile Creek (although no flooding or erosion hazards have been defined).

These regulated features are depicted in **Figure 6** (**Appendix A**).

5.6. Summary of Natural Heritage Features Subject to Impact Assessment

The results of the analysis in the preceding sections determined that the following components of the Town's Conservation/Wetland designation, the Region's Natural Environment System and the NPCA's regulated features are present that will need to be carried forward to the impact assessment in **Section 7**:

Significant Natural Features and Areas (PPS) / Natural Heritage Features and Areas (NOP, 2022)

- Fish Habitat (indirect)
  - One Mile Creek
  - Tributary of One Mile Creek
- Habitat for Endangered Species
  - Trees providing bat habitat characteristics are present on the 144, 176 and 200 John Street properties in association with the residential area and SWD3-2/CUW
  - Potential bat maternity roost habitat within the buildings on 144 and 176 John Street East (not confirmed to date)

Region Natural Environment System

- Greenbelt Plan NHS
  - SWD3-2 wetland is a KNHF and KHF in the Greenbelt Plan NHS
  - One Mile Creek is a KHF in the Greenbelt Plan NHS
- Other Wetland
  - SWD3-2
- Other Woodland
  - CUW in Greenbelt Plan area
- Linkage
  - Greenbelt Plan NHS
- Buffers (Urban Area)/Vegetation Protection Zones (Greenbelt Plan Area)
  - Fish habitat and SWD3-2
- Supporting Features and Areas
  - Other Valleylands – One Mile Creek and Tributary of One Mile Creek
  - Other Wildlife Habitat – SWD3-2/CUW
- Key Hydrologic Features
  - Intermittent Streams – One Mile Creek and Tributary of One Mile Creek

  - Wetland – SWD3-2
- Key Hydrologic Areas
  - Highly Vulnerable Aquifer
  - Significant Source Water Contribution Areas – Mitigation HDFs on Town Heritage Trail
- Groundwater Features
  - Recharge Areas (non-impervious surfaces)
  - Water Tables
  - Aquifers
- Surface Water Features
  - Mitigation HDFs on Town Heritage Trail
  - Recharge Areas (non-impervious surfaces)
- Floodplain

Town of Niagara-on-the-Lake Conservation/Wetland Areas

- One Mile Creek floodplain
- Woodland – SWD3-2/CUW

NPCA Regulated Features

- SWD3-2 and all areas within 30 m
- One Mile Creek (including floodplain and meander belt, where present)
- Tributary of One Mile Creek.

Given the overlap between features between the PPS, Greenbelt Plan, NOP (2022), Town OP (2017) and NPCA regulation, the impact assessment in **Section 7** will assess the potential for impacts on the following features (some of which may have multiple designations and/or multiple ecological and biophysical functions that they may provide):

- Wetland (SWD3-2)
- SAR bat habitat
- One Mile Creek
- Tributary of One Mile Creek
- CUW in Greenbelt
- FOD7 in Urban Area
- Greenbelt Plan NHS (including linkage function)
- Other NOP Water Resources System Features.

6. Proposed Development

The proposed development consists of a hotel with an associated indoor/outdoor spa complex and five three-story residential buildings, as illustrated in the proposed Site Plan prepared by Peter J. Lesdow (**Appendix D**). Relevant servicing and grading plans from the Functional Servicing Report (FSR; Schaeffers, 2026) are provided in **Appendix E**. **Figure 7** (**Appendix A**) provides an overlay of the main elements of the Site Plan as well as the proposed servicing and grading plans.

The proposed hotel will consist of a single primary building with an underground parking structure. The building will contain mixed-use spaces including restaurants, approximately 105 hotel suites, and banquet and conference facilities. The spa complex will consist of nine buildings arranged in a rectangular configuration.

The residential component of the development will include five residential buildings containing between 36 and 42 units each, for a total of 198 residential units. Each building will include an underground parking structure. Recreational facilities are also proposed within the residential area. A proposed surface parking area would be located west of the residences.

Access to the proposed hotel and residential area will be provided from John Street East. The primary access to the hotel will consist of a new 2-lane driveway with a new entrance from John Street East. The primary access to the residential area will be a new two-lane condominium driveway (referred to as Ritz-Carlton Lane) from John Street East that will follow the existing driveway entrance on the 200 John Street East property. Three existing driveways with One Mile Creek Crossings will be upgraded to facilitate the proposed driveway configuration including the proposed Ritz-Carlton Lane and the proposed hotel main entrance, as well as a secondary driveway access to the hotel originating from an entrance on the 144 John Street East property. The proposed upgraded creek crossing structures will consist of closed bottom box culverts with dimensions of 2.4 meters in width by 1.2 meters in height, and varying lengths. A channel tie-in with the native bed will be constructed at both downstream and upstream ends of each culvert consisting of river run stone that is that is partially embedded within the native channel bed. All crossings will utilize retaining walls comprised generally of armour stone to limit grading required within and along the One Mile Creek corridor. Culvert crossings are described in more detail in the FSR (Schaeffers, 2026).

Wastewater generated by the residences and hotel/spa will be conveyed via a gravity sewer to a new pumping station on the Subject Lands (located on the 588 Charlotte Street property adjacent to the proposed SWM pond). The pumping station will convey discharge into a sanitary forcemain which will connect to an existing gravity sewer located within Charlotte Street. Potable water supply will be provided through a connection to an existing municipal watermain located within Charlotte Street. The sanitary forcemain and watermain will both need to be installed beneath the Tributary of One Mile Creek.

The proposed stormwater management (SWM) system outlined in the FSR (Schaeffers, 2026) has been designed to collect, treat and convey stormwater runoff to One Mile Creek to meet the relevant quantity, quality and erosion control criteria. The proposed SWM system (as depicted in the Drawings in **Appendix**

E) includes a SWM pond to manage runoff from the residential area and an underground storage tank to manage runoff from the hotel and spa area. The SWM pond will outlet to One Mile Creek via an ~116-m long buried concrete stormwater pipe (1800 x 900 mm) that will discharge at an outlet headwall to a scour pool consisting of 300-mm diameter rip rap installed to a depth of 600 mm over filter cloth. The discharge will be conveyed to One Mile Creek through an approximately 40-m long open channel downstream from the headwall.

These SWM facilities will provide 60% removal of Total Suspended Solids (TSS), which is the basic level of protection required by NPCA for this reach of One Mile Creek. Catchbasin shields or oil-grit separators are proposed for pre-treatment, which, combined with the storage tank, would result in an overall 80% TSS removal.

Construction of the proposed development will commence in a phased manner. This will generally include:

- Installation of erosion and sedimentation control measures (including a temporary stormwater management pond) as outlined in **Appendix E**;
- Site-wide grading;
- Installation of driveways;
- Installation of buried services (e.g., water distribution, stormwater and sanitary sewer pipes, electrical lines);
- Installation of SWM Pond and storage tank and associated infrastructure;
- Construction of residential units and hotel/spa facilities; and
- Landscaping throughout the development, including open space.

Requirements for construction dewatering will be confirmed in a Hydrogeological Assessment that will be completed at the Site Plan stage, as required by the Town. If construction dewatering is required, mitigation (e.g., erosion control, filtration) may be required to prevent negative impacts on receiving watercourses.

7. Impact Assessment and Mitigation

This section of the EIS assesses the potential effects on the previously identified natural features that could occur over the short-term during construction of the proposed development and long-term, following implementation of the development plan discussed in **Section 6**. Appropriate mitigation measures to avoid or minimize effects and the associated potential of those effects to cause negative impacts and/or to enhance features and functions are suggested where practical. The sensitivity of each feature to potential effects, which could influence whether the effect could cause a negative impact, is also discussed.

Impacts from a proposed land development application can generally be considered in two broad categories, direct and indirect. 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 to less visible functions or pathways that could cause negative impacts to natural features over time. Both direct and indirect impacts are discussed, by feature, in the following sections. In addition, potential cumulative effects (i.e., effects of the proposed development, acting cumulatively with the effects of historical or existing land uses or other stressors) are also discussed.

When assessing the potential for negative impacts, this EIS has considered the following definition of negative impacts from the NOP (2022):

a. "*in regard to water, degradation to the quality or quantity of surface or groundwater, key hydrologic features or vulnerable areas and their related hydrologic functions, due to single, multiple or successive development or site alteration activities*;

b. In regard to fish habitat, any permanent alteration to, or destruction of fish habitat, except where, in conjunction with the appropriate authorities, it has been authorized under the Fisheries Act; and

c. *In regard to other natural heritage features and area, degradation that threatens the health and integrity of the natural features or ecological functions for which an area is identified due to single, multiple or successive development or site alteration activities*".

Throughout this EIS, the terms effects and impacts are generally used interchangeably to refer to potential changes to the form and/or function of natural features that may occur as a result of the development. Effects/impacts are not necessarily negative; assessment of the potential for negative impacts to occur depends on the nature and sensitivity of the feature and the nature of the impact, including but not necessarily limited to the location, timing, duration and magnitude of effect.

7.1. Wetlands

A 0.23 ha isolated deciduous swamp (SWD3-2) community is present on the Subject Lands (both within and outside the Urban Area). The wetland is unevaluated but is not considered to be a candidate to be a PSW. It is identified as an Other Wetland and Key Hydrologic Feature under the NOP (2022). The wetland is regulated by NPCA and the portion of it within the Greenbelt Plan area is identified as a KNHF and KHF under the Greenbelt Plan.

The wetland only appears to receive surface water runoff from a small local drainage area (Cole Engineering, 2020), which when combined with the poorly drained soils, promotes surface water ponding for a sufficient duration to facilitate growth of wetland vegetation species. Site visits support this conclusion as there are no headwater drainage features that direct surface flows to the wetland, rather that the wetland is isolated without outflow; water in the feature either infiltrates, is taken up by vegetation or evaporates.

The wetland provides general wildlife habitat functions including but not necessarily limited to potential nesting habitat for birds, potential bat maternity roosting habitat (three potential bat habitat trees are present within or immediately adjacent to the wetland), amphibian breeding habitat (American Toad) and general mammal habitat. The wetland has been identified as "Other Wildlife Habitat" under the NOP (2022) Supporting Features and Areas category.

The wetland has been historically disturbed due to vegetation removal in the adjacent areas. Ongoing disturbance occurs due to ground cover management (e.g., regular mowing) within and adjacent to the wetland and adjacent agricultural activities on the Subject Lands (e.g., vineyard operations).

The wetland could be sensitive to changes in surface water runoff that alter the hydrology of the feature (e.g., flow volume, timing, duration/hydroperiod, ponding level), depending on the nature and magnitude of the change. The existing wildlife habitat functions may exhibit some sensitivity to more intensive human presence (including noise), but wildlife using the wetland are likely tolerant of anthropogenic activities due to adjacent residential and agricultural land use both at a landscape and local scale, combined with the small size of the wetland and regular disturbance due to current management.

7.1.1. Potential Direct Impacts

No direct impacts on the wetland (i.e., within the boundary of the wetland) are expected as a result of the construction or long-term presence of the proposed development on the Subject Lands. The wetland will be retained in place with an appropriate buffer (as discussed in **Section 7.1.2**) with no site alteration within the boundary of the wetland.

Limited temporary construction activities are proposed within portions of the wetland buffer, including grading and installation of a man-hole inlet (to provide drainage for overflow from the wetland). Vegetation planting is also proposed in portions of the buffer. These activities occurring adjacent to the wetland are not expected to have direct impacts on the wetland; potential indirect impacts are addressed in **Section 7.1.2**.

It is recommended that limit of work fencing (e.g., temporary construction fence or silt fencing) be installed around the boundary of the wetland buffer (or at the limit of construction activity within the buffer) to prevent inadvertent direct impacts on the wetland due to temporary construction activities on the adjacent lands. All construction within and adjacent to the extent of the buffer should occur from the development side of the wetland (e.g., when grading up to the limit of disturbance, heavy equipment should be restricted to only operating on the development side of the limit).

7.1.2. Potential Indirect Impacts

Potential indirect impacts on the wetland could occur as a result of:

Construction

- Erosion and sedimentation during construction
- Impacts on quality of surface water runoff during construction
- Alterations in wetland water balance due to stormwater management during construction
- Noise

Post-Construction

- Alterations in wetland water balance due to stormwater management
- Alterations in water quality due to stormwater runoff
- Invasive species
- Pedestrian encroachment
- Domestic pets
- Noise and light

These potential impacts and the proposed mitigative approaches to prevent or minimize the potential for negative impacts are discussed in the following sections.

To minimize the potential for indirect negative impacts on the wetland, a 10 m buffer has been provided from the adjacent development within the Urban Area, although the proposed driveway encroaches slightly into the buffer area, as shown on **Figure 7** (**Appendix A**). The 10 m buffer will provide a setback from adjacent residential and driveway use activities and provide for naturalization in the buffer (relative to the predominantly mowed open space currently adjacent to the wetland). The buffer will also function, in part, to maintain the wetland's surface area catchment. As per the analysis of potential indirect effects in the following sections, the 10 m buffer, when combined with additional mitigative approaches, is expected to be effective in preventing negative impacts on the wetland due to adjacent land use.

The driveway surface (including sidewalk) will encroach a maximum of ~3.3 m into the 10 m buffer, over a linear distance of ~19 m (relative to the overall ~100 m length of the buffer). The driveway will occupy a total area of ~46 m^2 in the buffer. Limited grading in the buffer will also be required to accommodate the transition from the sidewalk to existing grade. The 3:1 slope will extend a maximum of 2.2 m into the buffer from the edge of the sidewalk. Grading within the buffer will extend over a linear distance of ~30 m in the southwest corner of the buffer. The proposed storm sewer inlet (to provide drainage for any overflow from the wetland) will be located adjacent to the driveway and graded slope. It will be located approximately 2.4 m from the wetland boundary. The graded slope will be revegetated following grading to prevent erosion and provide buffering functions. To enhance buffers functions, the existing mowed area within the feature will be planted with native shrubs adjacent to the limit of the wetland and the

buffer will be permitted to naturalize (e.g., regular mowing will cease). This minor encroachment into the buffer is not expected to negatively impact the function of the buffer to protect the wetland from negative impacts from the adjacent land use, when combined with the mitigative approaches outlined in the following sections.

As required by the Greenbelt Plan, a 30 m VPZ from the wetland within the Greenbelt Plan area will be implemented. No development or site alteration is proposed within the 30 m VPZ. Given that the existing area of the 30 m VPZ is occupied by agricultural activities (vineyard), no naturalization of the 30 m VPZ area is proposed.

7.1.2.1. Potential Impacts and Proposed Mitigation During Construction

Erosion and sedimentation from the construction area could result in negative impacts on the wetland due to smothering of vegetation (potentially leading to mortality, with associated impacts on the function of the wetland) and/or infilling of topographic depressions within the wetland, which could potentially result in a change in the wetland hydrology (with associated potential impacts on the wetland). Erosion and sedimentation could also negatively impact wildlife (e.g., smothering of amphibian eggs deposited in the wetland). To prevent negative impacts due to erosion and sedimentation, an Erosion and Sedimentation Control (ESC) Plan has been prepared (Schaeffers, 2026) as summarized in **Section 6**. A detailed ESC plan will be prepared as part of the Site Plan for review and approval by the Town and NPCA prior to commencement of construction. Monitoring of ESC measures during construction (as outlined in **Section 8**), with implementation of remedial measures where necessary to correct any deficiencies, is also recommended to minimize the potential for negative impacts on the wetland. With implementation of appropriate mitigation, erosion and sedimentation from the construction area is not expected to have a negative impact on the wetland.

Accidental spills of potentially contaminating materials (e.g. fuel, hydraulic oil, cement) within the construction zone adjacent to the wetland could potentially have negative impacts on the wetland form and function if those materials were to be transported to the wetland. Potential negative impacts could include plant and animal health impairments or mortality. To minimize the potential for negative impacts on the wetland due to accidental spills during construction, it is recommended that a spill prevention and response plan be in place for the construction period. Monitoring of spill prevention measures should be completed throughout the duration of construction (as outlined in **Section 8**) with implementation of remedial measures as necessary to correct any deficiencies. In the event of an accidental spill that could have an impact on the wetland, a response plan should be implemented that includes (but is not limited to) stopping work, contacting the Ontario Spills Action Centre (and other necessary authorities, potentially including the Town and NPCA), containing and cleaning up the spilled material and restoring any impacted area. With implementation of appropriate mitigation, the potential for accidental spills from the construction area to have a negative impact on the wetland is minimized.

Inadvertent transfer of invasive vegetation species to the Subject Lands during construction (e.g., due to accidental transfer on equipment entering the site or through use of invasive plant material during landscaping) could potentially result in negative impacts on the wetland. Clean equipment protocols should be used during construction to minimize the potential that invasives are brought into the area on equipment. Landscaping plans should avoid use of invasive species and all vegetation and soil brought onto the site should be inspected to ensure it does not contain invasive species. With this mitigation, the

potential for introduction of invasive species adjacent to the wetland during construction will be minimized.

Alterations in surface water runoff to the wetland from the surrounding catchment area could potentially affect the hydrology of the wetland (with associated potential changes in wetland form and function). To prevent changes in hydrology during construction, it is recommended that the detailed ESC plan consider provision of sufficient volume of treated surface water runoff to the wetland (as per the volumes discussed in **Section 7.1.2.2**). This can be achieved through use of temporary stormwater collection and treatment features with discharge adjacent to the wetland to ensure that stormwater continues to flow to the feature to maintain its hydroperiod. With appropriate mitigation, no negative impacts on the wetland form and function are expected due to temporary changes in stormwater runoff during construction.

Construction adjacent to the wetland is expected to result in temporary increases in noise and vibration due to use of heavy equipment in adjacent areas and increased human presence. Wildlife using the wetland are likely tolerant of some degree of noise and vibration due to periodic mowing and agricultural activities in the adjacent areas, but the noise and vibration associated with construction are expected to be longer in duration and higher in magnitude. To minimize the potential for impacts on wildlife use of the wetland, construction activities in the adjacent area should be planned to minimize their duration. Construction encroachment into the wetland should be prevented (through limit of work devices such as temporary fencing or silt fence) and the construction crew should not be permitted to encroach into the wetland. Limit of work devices should be installed as far from the wetland as possible (e.g., at the wetland buffer or limit of encroachment into the buffer, where required). Although some noise and vibration disturbance is expected to occur, based on the relatively limited use of the wetland under current conditions and presence of other treed habitats in the general area that could support wildlife use, no long-term negative impacts on wildlife using the wetland are expected to occur due to temporary disturbance during construction.

In summary, the potential for negative impacts on the wetland due to adjacent construction activities will be minimized through the recommended mitigative approaches. Temporary increases in noise and vibration due to heavy equipment use adjacent to the wetland may result in short term decrease in use by wildlife, but no negative impacts on wildlife populations are expected due to the small size and limited use expected to be occurring under current conditions.

7.1.2.2. Potential Impacts and Proposed Mitigation Post-Construction

Development is proposed within the catchment area of the wetland. Accordingly, GEI completed a feature-based wetland water balance assessment to identify potential impacts and required mitigation measures to ensure that appropriate wetland hydrology is maintained.

Water Balance Components

A water balance is an accounting of the water resources within a given area. A water balance analysis is conducted to assess the difference between pre-development and post-development conditions with respect to infiltration and runoff conditions. The water balance equates the precipitation (P) over a given area to the summation of the change in groundwater storage (S), evapotranspiration/evaporation (ET),

surface water runoff (R) and infiltration (I) using the following equation from Thornthwaite and Mather (1957):

$$P = S + I + ET + R$$

The components of the water balance vary in space and time and depend on climatic conditions as well as the soil and land cover conditions (i.e., rainfall intensity, land slope, soil hydraulic conductivity and vegetation). For example, runoff occurs at the higher percentage during periods of snowmelt when the ground is frozen or during intense rainfall events.

Precise measurement of the water balance components is difficult, as such, approximations and simplifications are made to characterize the water balance of a feature. Field observations of the land cover, soil types, groundwater levels and local climatic records can be important input to the water balance calculations. The following water balance components were calculated based on the Thornthwaite and Mather monthly water balance model.

Precipitation (P): For the purposes of approximating the monthly and annual precipitation value (838 mm/yr) for the feature catchment area, the monthly rainfall data published in the Vineland 1991 – 2020 Climate Normals was used. The weather station is located approximately 27 km from the site.

Storage (S): Although there are groundwater storage gains and losses on a short-term basis, the net change in groundwater storage on a long-term basis is assumed to be zero. This assumption must be used in the water balance calculations in order to calculate the conditions needed to maintain the groundwater storage long-term (i.e., no loss of groundwater on site).

Evapotranspiration/Evaporation (PET): The evapotranspiration and evaporation components vary based on the characteristics of the land surface cover (i.e., type of vegetation, soil moisture conditions, perviousness of surfaces, etc.). Potential evapotranspiration refers to the water loss from a vegetated surface to the atmosphere under conditions of an unlimited water supply. For the purposes of this assessment, adjusted monthly PET was estimated based on the Thornthwaite and Mather (1957) formula, using information from the Vineland climate station. The unadjusted PET was then adjusted using factor of U to account for variation in daylight hours and solar radiation based on the site latitude.

Water Surplus (R+ I): The difference between the mean precipitation and evapotranspiration is referred to as the water surplus. The water surplus is divided into two parts: surface or overland runoff (R) and infiltration into the surficial soil (I). The infiltration and runoff conditions depend on a number of factors including soil types, vegetation cover and slope of the site. To estimate the infiltration, an infiltration factor was estimated based on the Ontario Stormwater Management Planning and Design Manual (MECP, 2003). According to this Manual, a series of infiltration factors can be applied to a site, based on its slope, soil type and vegetation coverage. The cumulative value of these factors is termed the infiltration factor, with the values ranging from 0 to 1. The difference between the value 1 and the infiltration factor is referred to as the runoff factor.

Approach and Methodology

The analytical approach to calculating the water balance involves monthly soil-moisture balance calculations to determine the pre- and post-development infiltration and runoff volumes. The detailed water balance calculations are provided in **Appendix F**, which is summarized in this and subsequent

sections of the report. The following assumptions were used as part of the soil-moisture balance calculations.

- A soil moisture balance approach assumes that soil does not release water as potential recharge while a soil moisture deficit exists.
- During wetter periods, any excess of precipitation over evapotranspiration first goes to restore soil moisture. Considering the nature of the current near surface soils and vegetation cover, varying soil moisture storage capacities were assumed for pre- and post-development scenarios based on specific land surface characteristics. The factors which determine the water holding capacity are given in **Table 7-1**.
- Once the soil moisture deficit is overcome, any further excess water can then pass through the soil as infiltration and either become interflow (indirect runoff) or recharge (deep infiltration).

Table 7-1. Determination of Water Holding Capacity

Select from Dropdown List	Urban Lawns/Shallow Rooted Crops	Moderately Rooted Crops	Pasture and Shrubs	Mature Forests	Hydrologic Soil Group
Fine Sand	50	75	100	250	A
Fine Sandy Loam	75	150	150	300	B
Silt Loam	125	200	250	400	C
Clay Loam	100	200	250	400	CD
Clay	75	150	200	350	D

The MECP SWM Planning and Design Manual (2003) methodology for calculating total infiltration based on topography, soil type and land cover was used, and a corresponding infiltration factor was calculated for pre- and post-development conditions. Land surface conditions and corresponding infiltration factors are given in **Table 7-2**. The water surplus was multiplied by the infiltration factor to determine both the pre-existing and post-conditions annual volumes for runoff and infiltration for the wetland catchment.

Table 7-2. Infiltration Factors

Topography	
Condition	**Infiltration Factor**
Flat Land - Average Slope Less Than 0.6 m/km	0.3
Gently Rolling Land - Average Slope 0.6 to 2.8 m/km	0.25
Rolling Land - Average Slope 2.8 to 3.8 m/km	0.2
Steeply Rolling Land - Average Slope 3.8 m/km to 28 m/km	0.15
Hilly Land - Average Slope 28 to 47 m/km	0.1
Soils	
Condition	**Infiltration Factor**
Tight Impervious Clay	0.1
Tills	0.15
Medium Combinations of Clay and Loam	0.2
Silty Sand	0.3

Open Sandy Loam	0.4
Vegetation	
Condition	**Infiltration Factor**
Cultivated Land/AGR/ANTH/CGL	0.1
Wetland/Meadow/MAS/MEM/CUM	0.15
Woodland/FOM/FOD/FOC/SWM/SWD/CUT	0.2

Notes:
1. Adapted from MECP (2003)

The pre-development scenario was estimated using ELC mapping as presented on **Figure 5** in **Appendix A** and the existing wetland drainage area delineated by Schaeffers (**Appendix E**). The existing wetland drainage area is predominantly covered by meadow, agriculture, woodland, and swamp; the condition of the existing drainage area is estimated to be 100% permeable. The pre-development catchment area of the wetland is approximately 1.53 ha.

The post-development water balance scenario was based on the ELC mapping (**Figure 5**, **Appendix A**), the site plan (**Appendix D**), and the proposed wetland drainage area delineated by Schaeffers (**Appendix E**). The off-site catchment area is assumed to remain unchanged in the proposed scenario. Under the proposed conditions, the wetland catchment area is estimated to be reduced to 1.35 ha. The site characterization is given in **Table 7-3**.

Table 7-3. Site Characterization

Pre-Development (Existing) Conditions				
Land Cover	**Area (ha)**	**% Impervious**	**Water Holding Capacity (mm)**	**Infiltration Factor**
Swamp	0.2331412	0	300	0.9
Woodland	0.4317263	0	300	0.9
Meadow	0.2277028	0	75	0.9
Lawn	0.3714824	0	75	0.9
Agriculture	0.2628914	0	75	0.9
Post-Development (Proposed) Conditions				
Land Cover	**Area (ha)**	**% Impervious**	**Water Holding Capacity (mm)**	**Infiltration Factor**
Swamp	0.2331412	0	300	0.9
Woodland	0.4317263	0	300	0.9
Buffer & Swale Drainage	0.24263281	0	75	0.9
Lawn	0.3481187	0	75	0.9
Agriculture	0.2628914	0	75	0.9

It is noted that the infiltration and runoff values presented in **Appendix F** are estimates only. Single values are used for water balance calculations, but it is important to understand that infiltration rates are dependent upon the hydraulic conductivity of the surficial soils which may vary over several orders of magnitude. As such, the margins of error for the calculated infiltration and runoff component values are potentially quite large. These margins of error are recognized, but for the purposes of this assessment, the numbers used in the water balance calculations are considered reasonable estimates based on the site-specific conditions and useful for comparison of pre- to post-development conditions.

Results

The detailed feature-based water balance calculations are included in **Appendix F**. The pre- and post-development calculations are summarized in **Table 7-4** below.

Table 7-4. Feature-Based Pre- to Post-Development Water Balance Results

Condition	Permeable Areas (m^2)	Impermeable Areas (m^2)	Average Annual Infiltration Volume (m^3/year)	Average Annual Runoff Volume (m^3/year)
Pre-Development Land Use (Existing Conditions)	15,269.44	0.00	3,584	696
Post-Development Land Use (Proposed Conditions)	15,185.10	0.00	3,563	691
Pre- to Post-Development Change	-84.34 (-1%)	0.00 (0%)	-21 (-1%)	-5 (-1%)

These calculations suggest that the proposed development will decrease average infiltration in the wetland catchment by about 21 m^3/year (1% decrease). The proposed development will decrease runoff by about 5 m^3/year (1% decrease). The calculated change in runoff and infiltration are considered negligible and are not expected to result in adverse impacts to the wetland.

The proposed sewers that will occur adjacent to the wetland, including the proposed overflow manhole discussed in **Section 6**, should be fitted with collars to prevent creation of preferential groundwater flow pathways that could alter groundwater flow (per recommendation of Cole Engineering, 2020).

With implementation of this mitigation, no negative impacts on wetland water balance are expected. As outlined in **Section 8**, post-construction vegetation monitoring in the wetland is proposed in Years 1, 2 and 3 following construction to confirm that area retains wetland characteristics and is not exhibiting negative impacts due to changes in hydrology.

Surface water runoff from impervious surfaces will be collected and conveyed to the SWM pond for treat, but runoff from landscaped areas adjacent to the driveway and Residence K will be directed towards the wetland. Generally, runoff from landscaped areas is considered to be “clean” with limited potential for negative impacts on the wetland. However, some land use activities in the residential area could potentially impair the quality of runoff water, with potential negative impacts on the wetland, including, but not necessarily limited to:

- Use of lawn fertilizer
- Use of pesticides
- Domestic pet waste
- Salting/sanding of the driveway in winter

Mitigative approaches to address these potential long-term changes in water quality include those intended to eliminate or reduce potential pollutants at the source and those intended to minimize the potential for conveyance to the wetland itself. Recommended controls to minimize the source of pollutants include:

- Use of landscape maintenance approaches that avoid or minimize the use of fertilizer and pesticides within the area adjacent to the wetland.
- All residents should be informed of the potential negative impacts associated with leaving domestic pet waste in landscaped areas. Residents should be required to pick up and properly dispose of pet waste.
- Avoiding or minimizing salting/sanding of the driveway and sidewalk adjacent to the wetland. Snow should not be stored in an area that would cause direct runoff to the wetland.

Any runoff from the adjacent residential area will need to flow through the buffer before entering the wetland. The buffer will promote retention, infiltration, evaporation and uptake, which may function to assist in reducing the potential pollutant load prior to dispersion into the wetland. With appropriate controls, no negative impacts on the wetland are expected due to surface water runoff from landscaped areas.

Invasive species should not be used in landscaping or gardening adjacent to the residence or on any balconies where species could disperse. Residents should be informed of the potential negative impacts associated with use of such species through a targeted information brochure identifying potentially harmful species. Only native, or non-invasive ornamentals should be used in adjacent landscaping/gardening to minimize the potential.

Encroachment of residents into the wetland could result in trampling of vegetation and disturbance of wildlife. A multi-faceted mitigative approach is recommended. All residents of the community should be informed of the presence and sensitivity of the wetland, through a distributed brochure or other informative materials. Planting of a dense shrub layer and other naturalization within the wetland buffer, will also provide additional discouragement to human encroachment into the wetland. Interpretive signage at the edge of the wetland buffer should also be considered. Temporary measures (e.g., signage or low fencing) should be installed at the edge of the naturalization area in the wetland buffer to prevent inadvertent mowing of the area. All landscaping maintenance contractors employed by the condominium corporation should be made aware that naturalized areas in buffers should not be mowed or maintained to prevent inadvertent disturbance. These measures are expected to be effective to minimize the potential of residents encroaching into the wetland.

Domestic pets, particularly cats, can have negative impacts on wildlife populations (birds, small mammals) through predation. If pets are allowed in the residences, homeowners should be provided with an information brochure requesting that domestic pets not be allowed to roam outside to prevent predation.

Noise and light levels adjacent to the wetland are expected to increase over the long-term due to adjacent residential use. Naturalization and planting within the buffer will assist in reducing noise and light levels propagating towards the wetland. It is recommended that no lighting be provided on the side

of the residence fronting the wetland. If lighting on that side of the residence is required, it should be downward facing, as opposed to upward or outward facing, to minimize light propagation towards the wetland. Any lighting on the driveway/sidewalk should also be directed away from the wetland. Although light and noise levels will increase, wildlife using this small wetland is not expected to be particularly sensitive given its location within the rural residential/agricultural area. No negative impacts on wildlife use of the wetland are expected.

In summary, with implementation of mitigative approaches, although land use adjacent to the wetland will change, with increases in human presence and disturbance, no negative impacts on the form and function of the wetland are expected to occur over the long-term.

7.1.3. Potential Cumulative Impacts

The wetland may have experienced cumulative impacts over time due to adjacent land use including tree removal, regular mowing of vegetation within the feature and the adjacent area and adjacent agricultural activities. However, no further direct impact on the wetland is proposed as part of the development, and enhancements (e.g., naturalization of the understory, buffer planting and naturalization) are expected to improve the form and function of the wetland and prevent any further negative impact on the wetland. Therefore, no cumulative effects on the wetland are expected as a result of the proposed development.

7.1.4. Potential Enhancements

Enhancements to the form and function of the wetland will include passive naturalization in the wetland and vegetation enhancements within the proposed buffer.

Currently, the understory of the wetland is mowed on a regular basis minimizing the function of the groundcover vegetation and preventing growth of woody shrubs and trees. Once the development is constructed, regular mowing within the wetland will cease, and the groundcover will be permitted to grow naturally. This is expected to enhance the form and function of the wetland through provision of enhanced ground cover and understory habitat (e.g., enhanced cover and foraging habitat).

The area of the proposed buffer on the Subject Lands is also currently subject to regular mowing. Following development, shrub plantings are proposed along the length of the buffer adjacent to the wetland boundary. The existing ground cover within the remainder of the buffer will be permitted to naturalize (e.g., grow without being mowed). This planting and naturalization is expected to enhance the form and function of the buffer and provide complementary habitat functions to the wetland (e.g., vegetated upland). The portion of the swale behind Residence K that will direct water to the wetland should be planted with native species and permitted to grow naturally without periodic mowing, to facilitate water quality enhancement functions.

7.2. SAR Bat Habitat

A total of 52 potential bat habitat trees are present on the Subject Lands, including 10 in the SWD3-2/CUW and 42 in the residential areas. SAR bats including Silver-haired Bat, Little Brown Myotis, Eastern

Small-footed Myotis, Eastern Red Bat and Hoary Bat, were documented on the Subject Lands during acoustic surveys.

SAR bats would be sensitive to removal of trees providing potential habitat during the maternity roosting window and may be sensitive to construction during evening/nighttime hours during this period. Overall, the value of the habitat on the Subjects Lands is likely less than forested areas within the general EIS Study Area, given the disturbance associated with residential/commercial land use and relatively small size of features. Forested areas to the northeast and southeast are expected to support roosting and foraging of substantially higher number of bats in the landscape than the existing habitat trees on the Subject Lands.

7.2.1. Potential Direct Impacts

All bat habitat trees within the SWD3-2/CUW will be retained. A total of 12 potential bat habitat trees within the existing residential areas of the Subject Lands are expected to require removal to facilitate construction of the proposed development, although this will need to be confirmed through the Tree Preservation Plan that GEI understands will be prepared in spring 2026. On a landscape scale, removal of 12 trees on the Subject Lands (out of the 52 that are present) is not expected to have a negative impact on bats, as a substantial number of potential habitat trees will remain on the Subject Lands and within the forested areas in the broader landscape. Bats that would have used the potential habitat trees for maternal roosting purposes are expected to be able to find suitable trees elsewhere on the Subject Lands or in the EIS Study Area without any negative impact on the overall population.

To avoid direct impacts on bats, tree removal on the Subject Lands should not occur between March 15 and November 30, given the presence of Eastern Small-footed Myotis (as per the timing window recommended by MECP). If tree removal is required within this window, a bat entry/exit survey completed by a qualified person would be required to confirm that bats are not using individual trees prior to removal. If no bat use of individual trees is documented, they could be removed within 48 hours.

No SAR bat use of the structures on the 200 John Street East or 588 Charlotte Street properties was documented during the exit surveys completed in 2022. However, it is recommended that the structures be screened again prior to removal to determine if potential entry/exit points remain. If they do, additional exit surveys would be recommended in June prior to any building demolition. Similarly, structures on the 144 and 176 John Street property have not yet been screened. It is recommended that, prior to any building alteration, they be assessed to confirm if potential entry/exit points are present. If they are, exit surveys will be required to confirm if the structures are being used by SAR bats. If bat use is documented, structure alteration would not be permitted during the bat maternal roosting season to prevent direct impacts on bats.

Removal of bat habitat trees and alterations to structures documented as providing habitat for SAR bats will need to address the requirements of the SCA). All relevant requirements will need to be addressed before any alterations occur.

7.2.2. Potential Indirect Impacts

Indirect effects on SAR bats could include disturbance during construction (due to noise and vibration from heavy equipment) and long-term alterations due to increased evening/nighttime light levels. Given the prominence of larger forested areas on the landscape within the EIS Study Area, reduced suitability of the Subject Lands is not expected to have a negative impact on overall bat populations in the area. However, to mitigate potential impacts, the following approaches are recommended:

- Heavy equipment construction adjacent to the SWD3-2/CUW or within the existing residential area (where bat habitat trees have been documented) should be limited to daylight hours during the maternity roosting period (March 15 to November 30) to minimize noise and vibration during the evening/night bat emergence and foraging period
- Lighting fixtures associated with the hotel and residences should be downward facing to minimize upward light pollution. Some lighting may be required throughout the night to facilitate safety, but opportunities to minimize lighting throughout the nighttime period, particularly in the existing areas where bat habitat trees were documented should be considered.

7.2.3. Potential Cumulative Impacts

Historical removal of trees on the Subject Lands and in the surrounding area has likely resulted in reductions in the quantity of potential maternity roosting habitat on the landscape. Development of residential areas in the surrounding subdivisions in the Town Urban Area has also likely resulted in reductions in foraging habitat.

Further removal of potential habitat trees and potential foraging habitat on the Subject Lands will act cumulatively to reduce bat habitat on the landscape. However, larger forested areas to the northeast and southwest and agricultural areas in the Greenbelt Plan area are expected to remain over the long-term due to the Greenbelt Plan protections. These areas are expected to continue to provide suitable maternal roosting and foraging opportunities to support current levels of bat use of the general area.

7.2.4. Potential Enhancements

Tree planting is expected to be required on the Subject Lands to address tree removal compensation requirements. Over time, planted trees may become suitable bat habitat trees. Vegetation enhancements within buffers and planting around the proposed SWM pond may result in benefits to insect populations, which in turn may provide additional foraging opportunities for bats.

7.3. One Mile Creek and Tributary of One Mile Creek

One Mile Creek and the Tributary of One Mile Creek within the Subject Lands do not provide direct fish habitat but do provide indirect fish habitat functions that support direct fish habitat in downstream (off-site) reaches of the watercourse. These watercourses have the following designations:

- Indirect fish habitat (Type 3 – marginal)

- Regulated watercourses (NPCA)
- Floodplain and meander belt (Reach 3) on One Mile Creek (hazards regulated by NPCA)
- Other Valleylands (per NOP, 2022)
- Key Hydrologic Features
- Conservation/Wetland Areas (per Town OP, 2017)

From a sensitivity perspective, these watercourses are less sensitive than watercourses that would support direct fish habitat, since no fish are expected to be present (fish are generally sensitive to disturbance, habitat alteration and/or barriers to movement, although sensitivity varies by species and habitat functions/life cycle uses). However, the functions of these watercourses could exhibit sensitivity to changes in hydrology that could reduce/impair indirect fish habitat functions or increase hazards. The sensitivity of these reaches to changes in the riparian area is relatively low, given the general lack of naturalized riparian vegetation associated with current management (mowing and landscaping), although trees providing overhead cover do provide several functions for the watercourse.

Potential Impacts on the watercourses and their associated functions could include:

Construction

- Direct alteration for upgrades to existing One Mile Creek driveway crossings
- Potential direct impacts due to installation of buried services beneath the Tributary of One Mile Creek;
- Erosion and sedimentation due to construction activities on the Subject Lands
- Accidental spills during construction on the Subject Lands

Post-Construction

- Changes in water quality due to stormwater run-off
- Changes in flow due to stormwater management.

These potential impacts and the recommended mitigative approaches are discussed in the following sections.

7.3.1. Potential Direct Impacts

7.3.1.1. One Mile Creek Driveway Crossings

There are three existing driveway crossings along One Mile Creek within the Subject Lands that will require upgrades to meet driveway access standards for the proposed development (**Figure 7**, **Appendix A**). The proposed driveways have, in part, been located to make use of existing crossings to avoid the requirement to construct new crossings.

Potential direct impacts associated with the upgraded crossings include:

- Erosion and sedimentation and accidental spills during construction
- Disruption due to work-in-water
- Enclosure of additional watercourse length within the footprint of the culvert (with associated impacts on indirect fish habitat functions)
- Impacts on flooding and erosion
- Impacts on wildlife movements.

Given that One Mile Creek does not provide direct fish habitat, no impacts on fish movements in the watercourse are expected to occur and the crossings do not need to be designed to facilitate fish passage.

Erosion and Sedimentation and Accidental Spills during Culvert Installation

Erosion and sedimentation from the culvert installation area could result in negative impacts on fish habitat within or downstream from the work area due to increased sediment transport/deposition and impaired water quality, which could cause negative impacts on habitat (e.g., infilling rocky riffles or pools with fine sediment) or direct impacts on fish and benthic invertebrates (potentially causing injury or mortality.) To prevent negative impacts due to erosion and sedimentation, an ESC Plan has been prepared (Schaeffers, 2026) as summarized in **Section 6**. A detailed ESC plan associated with culvert installation will be prepared as part of the Site Plan for review and approval by the Town and NPCA prior to commencement of construction. Monitoring the ESC measures during construction (as outlined in **Section 8**) with implementation of remedial measures as necessary to correct any deficiencies is also recommended to minimize the potential for negative impacts on the watercourse. With implementation of appropriate mitigation, erosion and sedimentation from the construction area is not expected to have a negative impact.

Accidental spills of potentially contaminating materials (e.g. fuel, hydraulic oil, cement) within the culvert installation work area could potentially have negative impacts on the watercourse and its biota. Potential negative impacts could include plant and animal health impairments or mortality. To minimize the potential for negative impacts on the watercourse due to accidental spills during construction, it is recommended that a spill prevention and response plan be in place for the construction period. Monitoring of spill prevention measures should be completed throughout the duration of construction (as outlined in **Section 8**) with implementation of remedial measures as necessary to correct any deficiencies. In the event of an accidental spill that could have a negative impact on the watercourse, a response plan should be implemented that includes (but is not limited to) stopping work, contacting the Ontario Spills Action Centre (and potentially other regulatory authorities), containing and cleaning up the spilled material and restoring any impacted area. With implementation of appropriate mitigation, the potential for accidental spills from the construction area to have a negative impact on the watercourse is minimized.

Work in Water Requirements

Adherence to in-water timing restriction windows specified by the MNR will prevent adverse effects on fish during sensitive life cycle periods processes (e.g., spawning, egg incubation and fry emergence) in downstream (off-site) portions of the watercourse. The timing window states in-water work should not be conducted between March 1 and June 30 to protect the reproductive periods of warm water fish species (Denyes pers. comm. 2018).

Given the intermittent nature of the watercourse, if possible, the water crossing structures should be installed during periods when the watercourse is dry, which would prevent direct effects on fish downstream from the work area, since there would be no potential for downstream conveyance of any sediment or spilled material generated during construction.

If installation of the water crossing structures are required when water is present in the watercourse, work site isolation measures would be required to dewater the work area, minimize in-water work requirements and facilitate proper installation of the structures. If work-site isolation is necessary, it could consist of dam and pump operations or various other types of bypass systems. These types of work site isolation systems would result in temporary direct effects on the watercourse within the dewatered work area but given that fish are not anticipated to be present in the reach, this will not result in any effects on fish or fish habitat. A fish rescue program would still occur to ensure that no fish are present within the work area prior to construction. Should dewatering be necessary, any flows should be run through appropriate sedimentation filtration system prior to discharge to a vegetated area.

Long-term Impacts on Fish Habitat Functions

The three proposed closed-bottom culverts will result in enclosure in additional length of the channel bed and removal of the associated riparian vegetation function adjacent to the enclosed portion of the channel.

This enclosure will reduce the amount of open channel bed and banks, resulting in some localized alteration of natural stream biophysical processes (e.g., organic material, sediment transport). To minimize potential alterations in indirect fish habitat functions, the following mitigative measures are recommended:

- Crossing the watercourse at existing crossing locations to prevent the requirement for new crossings
- Use of retaining walls along the driveway crossings to minimize grading requirements in riparian areas upstream and downstream from each crossing
- Plunge pools, consisting of river-run stones are proposed upstream and downstream from culverts to prevent erosion of the native stream bed and provide benthic invertebrate habitat
- The bottom of the culvert should be situated at the channel bed such that it does not create a topographical difference in the bed elevation at the upstream or downstream edges of the culvert to maintain bedload and organic material transport
- Disturbed riparian areas upstream and downstream from crossings should be revegetated with an appropriate mix of native species and vegetation forms to restore riparian habitat functions.

With implementation of the mitigation measures described above and considering the existing degraded condition and indirect fish habitat classification of this reach of One Mile Creek, coupled with the proposed riparian vegetation enhancements discussed in **Section 7.3.4**, the proposed crossing structures are not expected to result in negative impacts (i.e., the Harmful Alteration, Disruption or Destruction of fish habitat, nor the death of fish) to downstream fish habitat or fish populations. Following detailed design of the crossings, a Request for Review will need to be prepared and submitted to DFO so they can review and determine if the proposed works would require an authorization under the *Fisheries Act*.

Impacts on Flooding and Erosion

Improper culvert design and/or installation could result in negative impacts on flooding (e.g., increasing upstream flood levels) or erosion (e.g., increased erosion at culvert outlet). Schaeffers (2026) indicates that the culverts have been sized to pass the regulatory flood without resulting in an increase in upstream flood levels.

The proposed plunge pools downstream from the culverts will assist in dissipating the velocity of flow leaving the culvert and provide structure erosion protection for the bed and banks. Therefore, no increased erosion is expected as a result of the culverts.

Wildlife Passage at Culverts

The potential for movement of ground-based wildlife that is not common in residential areas (e.g., amphibians or turtles) at the proposed driveway crossings of One Mile Creek is limited given the nature of the Subject Lands and surrounding areas. Specifically, based on the relatively small size and intermittent nature of this section of One Mile Creek and the relative lack of naturalized areas of vegetation on the private properties surrounding the creek upstream from John Street East, this watercourse is not expected to be a significant movement corridor for amphibians. Further, no turtle overwintering habitat is known to be present in the general area, such that turtles are not expected to be present. Accordingly, turtles and amphibians, which may be subject to higher mortality rates at driveway crossings than other wildlife species common in urban areas (e.g., small to medium sized mammals) are not expected to use the creek as a movement corridor. Small to medium sized mammals are expected to range throughout the area and not necessarily use the watercourse crossings for preferential movement.

Regardless of the preceding analysis, for completeness, an assessment of the ability of the proposed upgraded culverts to provide wildlife passage is provided in this section.

Wildlife passage assessments typically involve consideration of the following factors:

- Openness ratio;
- Crossing structure dimensions;
- Substrate within the crossing structure;
- Fencing; and
- Landscaping.

The proposed replacement crossing structures (as identified in Schaeffers, 2026) each consist of a 2.4-m wide by 1.2 m high box culvert of varying lengths, with the longest being 23 m. Given these dimensions for the longest culvert, the openness ratio is 0.115, which exceeds the minimum requirements for passage of mid-sized mammals (0.1), amphibians and snakes (0.07) and turtles (0.1) identified in the Credit Valley Conservation (CVC) 2017 Road Crossing Guidelines. Based on these values, passage through the structure by these wildlife types appears to be possible.

CVC (2017) notes that for mid-sized mammals, the width and height of the crossing should be >1 m; for small mammals, width and height should be at least between 0.3 and 1 m and for amphibians and reptiles, width and height should be equal to or greater than 1 m but not less than 0.5 m. The proposed crossing satisfies these recommendations. CVC (2017) also notes that the length of the crossing should ideally be less than 25 m to facilitate movement of amphibians and reptiles. The proposed crossings satisfy this recommendation.

Closed bottom box culverts would likely prevent passage of non-aquatic species during periods of flow, when the flow is spread out on the culvert bottom. Therefore, during the spring period and following storm events when One Mile Creek is expected to be flowing, passage of terrestrial wildlife (e.g., small to mid-sized mammals) through the culverts is not expected to occur. However, based on the nature of the watercourse and surrounding area, these mammals are not expected to preferentially use the crossings anyways. While this may expose them to potential mortality, there are numerous other roads in the area without suitable passage structures (e.g., John Street East, Charlotte Street) that present similar challenges to wildlife. Given that wildlife are not expected to preferentially move through the residential and commercial properties on either side of the crossings, lack of available passage through the culverts during certain intermittent flow periods is not expected to have any incremental negative impacts on wildlife relative to general movements throughout the area. During periods when the creek is not flowing, the culvert may provide passage opportunities for small to medium sized mammals.

Amphibians (frogs and toads) and turtles, although not generally expected to be present in this area, would be able to move through the culvert throughout the year (when wet or dry).

Based on the analysis herein, given the general lack of predicted wildlife movement at this location, use of wildlife directional fencing to guide wildlife to the culvert entrances is not recommended. Riparian planting in the riparian zone in select areas on the Subject Lands has been recommended in the EIS. Additional planting may assist in guiding any wildlife that may be present towards the crossings.

Therefore, overall, the upgraded crossings are not expected to be a significant movement corridor for wildlife, given the nature of the watercourse and surrounding area. Regardless, the proposed dimensions of the crossings appear suitable to provide passage opportunities for wildlife such as small to medium sized mammals, frogs and turtles, should they be present in the area.

7.3.1.2. Installation of Buried Services

New sanitary and water line crossings of the Tributary of One Mile Creek will be required to service the proposed development. Given the nature of the watercourse (e.g., channelized, shallow intermittently flowing, minimal existing riparian vegetation), it is expected that installation of services will be completed using open-cut trenching as opposed to trenchless methods (which are more typically used for watercourses that exhibit higher sensitivity).

To minimize the potential for negative impacts on the watercourse and associated fish habitat functions, the following mitigative approaches are recommended:

- Open-cut installation should occur outside the spring fish spawning period (March 1 to June 30) to prevent potential negative impacts on fish reproductive activities in downstream (off-site) reaches of One Mile Creek
- Works should be planned for implementation when the watercourse is typically dry
- A work-site isolation system (e.g., dam and pump) should be installed (if work is completed when water is present), or available for rapid installation (if work is completed when the stream is dry), to ensure that downstream flows in the watercourse can be maintained and to minimize the potential for negative impacts due to instream work
- Although fish are not expected to be present, fish salvage should be completed prior to dewatering for instream work
- If dewatering of the work area is required, any pumped water should be passed through an appropriate treatment facility (e.g., sediment bag) and discharged to a vegetated area at least 30 m from the watercourse, or conveyed to a temporary construction sediment pond for appropriate treatment prior to discharge
- The size of the disturbed area should be minimized to the extent possible through use of measures such as trench boxes
- Following installation, the bed and banks of the watercourse should be restored to match or enhance existing conditions
- Disturbed riparian areas should be planted with native vegetation forms and species to enhance riparian functions (as part of the overall naturalization of this section of the watercourse buffer).

With implementation of these mitigative approaches, no negative impacts on fish or fish habitat are expected to occur. It is recommended that the proposed servicing installation be reviewed by DFO through the Request for Review process to ensure all requirements under the *Fisheries Act* are addressed prior to implementation.

7.3.2. Potential Indirect Impacts

Potential indirect impacts on the watercourses could occur due to:

<u>Construction</u>

- Erosion and sedimentation during construction
- Impacts on quality of surface water runoff during construction
- Alterations in watercourse flows due to stormwater management during construction

<u>Post-Construction</u>

- Alterations in watercourse flows due to stormwater management

- Alterations in water quality due to stormwater runoff

These potential impacts and the proposed mitigative approaches to prevent or minimize the potential for negative impacts are discussed in the following sections.

To minimize the potential for indirect negative impacts on the watercourses, a 10 m buffer is provided from the adjacent development, although there are several proposed encroachments into the buffer area, as shown on **Figure 7** (**Appendix A**). To enhance buffer functions, select areas of the existing mowed buffer will be planted with native shrubs adjacent to the watercourse and the remainder of the buffer will be permitted to naturalize (e.g., regular mowing will cease).

As will be discussed in the following sections, the proposed buffer (generally 10 m with several small areas of encroachment) is expected to function to prevent negative impacts on the form and function of the watercourse due to adjacent development.

7.3.2.1. Erosion and Sediment Controls

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) and/or sedimentation and associated effects on fish (e.g., injury or mortality due to suspended sediments or altered habitat use) or fish habitat (e.g., loss of interstitial spaces in rocky areas, smothering of aquatic vegetation and/or incubating eggs) in areas of One Mile Creek that are known to provide direct fish habitat downstream from the Subject Lands.

To prevent negative impacts due to erosion and sedimentation, an ESC Plan has been prepared (Schaeffers, 2026) as summarized in **Section 6**. A detailed ESC plan will be prepared as part of the Site Plan for review and approval by the Town and NPCA prior to commencement of construction. Monitoring the ESC measures during construction (as outlined in **Section 8**) with implementation of remedial measures as necessary to correct any deficiencies is also recommended to minimize the potential for negative impacts on the watercourse. With implementation of appropriate mitigation, erosion and sedimentation from the construction area is not expected to have a negative impact on the watercourse.

7.3.2.2. Accidental Spills

Accidental spills of potentially hazardous materials (e.g., fuel and oil from heavy equipment), if transported to One Mile Creek and/or its tributary on the Subject Lands and eventually to downstream portions of the creek that provide direct fish habitat (i.e., downstream from King Street), could cause stress, health effects or mortality of fish and other aquatic biota (e.g., benthic invertebrates).

In order to mitigate the potential for adverse effects on fish and fish habitat due to accidental spills during construction, spill prevention and response measures regarding 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 the Spills Action Centre, and response measures including containment and clean-up) should be implemented during construction. Implementation of an effective

spill prevention and response plan is anticipated to be largely effective in preventing adverse effects on fish and fish habitat.

Monitoring of spill prevention measures should be completed throughout the duration of construction (as outlined in **Section 8**) with implementation of remedial measures as necessary to correct any deficiencies. In the event of an accidental spill that could have a negative impact on the watercourse, a response plan should be implemented that includes (but is not limited to) stopping work, contacting the Ontario Spills Action Centre, containing and cleaning up the spilled material and restoring any impacted area. With implementation of appropriate mitigation, the potential for accidental spills from the construction area to have a negative impact on the watercourses is minimized.

7.3.2.3. Post-Construction Water Quality Impacts

Surface water runoff that is not infiltrated into the ground or conveyed to retained natural features as overland flow will be collected and conveyed within the proposed storm sewer system within the development to the proposed stormwater management facilities (e.g. SWM Pond for the residences or SWM tank for the hotel/spa). The SWM system will provide treatment prior to discharge to One Mile Creek.

The proposed stormwater management system is designed to achieve an enhanced level of water quality control (80% Total Suspended Solids removal), which will mitigate potential impacts to the receiving watercourse associated with suspended sediments and turbidity. The stormwater management system will also provide storage capacity to attenuate post-development runoff rates and volumes. Discharge from the facility will be controlled to meet applicable design criteria to prevent increases in peak flows that could contribute to channel erosion within the tributary or adversely affect downstream fish habitat in One Mile Creek.

Some surface water within the Subject Lands will infiltrate into soil or flow across residential/commercial lawns and open space areas toward the tributary of One Mile Creek. Runoff generated from landscaped areas has the potential to contain contaminants associated with typical residential/hotel property land uses (e.g., lawn fertilizers or pesticides). The mitigative recommendations identified in **Section 7.1.2**, would also assist in mitigating potential for impacts on watercourses. To provide further mitigation, a 10 m vegetated buffer will be maintained from the existing banks of the watercourses. This buffer will assist in mitigating potential impacts to surface water quality by providing filtration, sediment retention, and infiltration functions prior to runoff entering the watercourse.

Given the above, no negative impacts on downstream fish habitat in One Mile Creek because of changes in water quality are anticipated to occur.

7.3.2.4. Post-Construction Water Quantity Impacts

Stormwater management on the Subject Lands is expected to result in alterations in the flow in One Mile Creek and its Tributary relative to current conditions. Specifically, the proposed SWM system will collect and convey flow from impervious surfaces in the development area to one of two treatment systems (SWM Pond or underground storage tank) for treatment prior to release back to One Mile Creek. The

proposed SWM system will address all required quantity and erosion control criteria for the proposed discharge (Schaeffers, 2026).

Expected alterations include:

- Minor reductions in flow in the sections of One Mile Creek and its Tributary upstream from the proposed SWM outlet due to collection of stormwater and conveyance to the treatment system that may have otherwise been conveyed to the watercourse via overland flow
- Potential increases in the event-based volume and duration of flow in One Mile Creek downstream from the outlet but matching peak flow to pre-development levels.

Ultimately, surface water flows will be generally maintained in One Mile Creek downstream from the SWM outlet. Diversion of a minor volume of flow out of the upstream portions of One Mile Creek and its Tributary is not expected to have a measurable overall effect on the indirect fish habitat functions of the watercourses on the Subject Lands, given the intermittent nature of the features and current characterization.

7.3.3. Potential Cumulative Impacts

One Mile Creek and the Tributary of One Mile Creek have been historically altered through land use activities within and adjacent to the Subject Lands that are expected to have resulted in impacts to their form and function. For One Mile Creek, this includes construction of driveway crossings, historic channelization and historic/ongoing riparian vegetation removal and management, as well as alterations in the upstream part of the watershed, including the Epp Drain diversion. For the Tributary of One Mile Creek, this includes construction of the 588 Charlotte Street driveway crossing, historic channelization and retaining wall construction and historical removal of riparian vegetation associated with land use activities on the Subject Lands and adjacent properties.

The proposed development is expected to cumulatively increase the portion of the One Mile Creek channel that is enclosed in culverts (due to the required driveway upgrades), although no negative impacts on the indirect fish habitat functions nor any increase in natural hazard is expected as a result of this cumulative effect. Stormwater management on the Subject Lands may reduce flooding and erosion in the Tributary of One Mile Creek, which may assist in mitigating historical impacts associated with channelization and construction of adjacent residences. The stormwater management approach is expected to mitigate changes in flow, water quality and erosion potential to prevent cumulative effects on the watercourse. Finally, the proposed buffer enhancement measures in select areas are also expected to reduce historical impacts associated with riparian vegetation maintenance on the Subject Lands.

7.3.4. Potential Enhancements

Riparian vegetation enhancements are proposed in select areas of One Mile Creek and the Tributary. These enhancements will consist of select planting of trees and shrubs, coupled with passive naturalization of existing riparian vegetation (which is currently regularly mowed to the water's edge, or in some cases, through the watercourse itself). Riparian vegetation enhancements are expected to:

- Assist with maintaining bank stability and minimizing excessive erosion
- Assist with shading of the watercourse to regulate the thermal regime
- Provide a source of increased organic material (e.g., leaves and twigs) which may be a source of forage for the benthic invertebrate community which in turn, may be a source of forage for the downstream (off-site) fish community.

Riparian vegetation enhancements are expected to result in a net benefit for the watercourses and their associated fish habitat functions. Riparian enhancements will be confirmed at the site plan stage.

7.4. Cultural Woodland in Greenbelt Plan Area

The CUW located within the Greenbelt Plan Area on and adjacent to the Subject Lands is identified as an Other Woodland (per the NOP, 2022), habitat for SAR bats (as previously discussed in **Section 7.2**), part of the Greenbelt Plan area linkage (as discussed in **Section 7.6**) and as part of the Town Conservation/Wetland land use designation. The woodland has been identified as "Other Wildlife Habitat" under the NOP (2022) Supporting Features and Areas category.

The woodland has been historically disturbed due to vegetation removal in the adjacent areas. Ongoing disturbance occurs due to ground cover management (e.g., regular mowing) within and adjacent to the woodland and adjacent agricultural activities on the Subject Lands (e.g., vineyard operations).

The woodland provides general wildlife habitat functions including but not necessarily limited to potential nesting habitat for birds, potential bat maternity roosting habitat (10 potential bat habitat trees are present within the woodland) and general mammal habitat. Habitat functions are limited by the small size and location of the feature (adjacent to agricultural and residential areas) and lack of naturalized ground cover.

The existing wildlife habitat functions may exhibit some sensitivity to more intensive human presence, but wildlife using the woodland are likely tolerant of anthropogenic activities due to adjacent residential and agricultural land use, combined with the small size of the woodland and regular disturbance due to current management.

7.4.1. Potential Direct Impacts

No potential direct impact on the woodland is expected, given that it is being retained in place with no tree removal proposed. No Greenbelt VPZ is required, given that the feature is not a KNHF, nor is there a mandatory buffer required under the NOP (2022) or Town OP (2017). Regardless, no development or site alteration is proposed within 30 m of the woodland area. Existing agricultural land use activities on the Subject Lands within this 30 m zone will continue.

7.4.2. Potential Indirect Impacts

The potential for indirect impacts on the woodland is relatively low, given the distance from the proposed development area to the woodland. However, indirect impacts could occur due to

- Erosion and sedimentation
- Accidental Spills
- Invasive species
- Pedestrian encroachment
- Domestic pets

The mitigative approaches previously outlined in **Section 7.1** (with respect to the wetland that is contiguous with the cultural woodland) are also expected to be effective in preventing negative indirect impacts on the woodland.

No stormwater runoff from the Proposed Development Area will be directed towards the woodland so no changes in runoff or water quality are expected.

Overall, no negative indirect impacts on the woodland are expected to occur.

7.4.3. Potential Cumulative Impacts

The woodland has experienced cumulative impacts over time due to adjacent land use including tree removal, regular mowing of vegetation within the feature and the adjacent area and due to adjacent agricultural activities. However, no further direct impact on the woodland is expected to occur as part of the development. Therefore, no cumulative effects on the woodland are expected as a result of the proposed development.

7.4.4. Potential Enhancements

No potential enhancements to the woodland are proposed.

7.5. FOD7 in Urban Area

The ~0.37 ha FOD7 in the Urban Area did not meet any criteria to be protected. However, it is recognized that treed areas in general provide several functions (e.g., some wildlife habitat, visual screening, shading, air quality, etc.). Therefore, it is included in the impact assessment section for completeness.

7.5.1. Potential Direct Impacts

The proposed adjacent residential building and associated grading will result in removal of 0.17 ha (46%) of the existing FOD7 area. The proposed grading adjacent to the feature was minimized to retain as much of the treed area as possible.

The Tree Preservation Plan, which will be prepared in spring 2026, will identify tree removal requirements and compensation.

It is recommended that compensation tree planting (with native species suitable for the area) occur on the Subject Lands at the south end of the feature to maintain its long-term presence on the landscape.

7.5.2. Potential Indirect Impacts

Potential indirect impacts on the FOD7 could occur due to

- Erosion and sedimentation
- Accidental Spills
- Invasive species
- Pedestrian encroachment
- Domestic pets

The mitigative approaches previously outlined in **Section 7.1** are also expected to be generally effective in preventing negative indirect impacts on the FOD7.

7.5.3. Potential Cumulative Impacts

The feature has experienced cumulative impacts over time due to adjacent land use including tree removal and regular mowing of vegetation within the adjacent area. The proposed tree removal required to facilitate the proposed development will have a cumulative effect on trees in the area.

7.5.4. Potential Enhancements

Compensation tree planting at the south end of the feature would assist in maintaining the long-term feature on the landscape.

7.6. Greenbelt Plan NHS and Ecological Linkage

The overall Greenbelt Plan NHS area on and adjacent to the Subject Lands is part of the Region Natural Environment System. The Greenbelt Plan NHS area also functions as a potential ecological linkage to facilitate wildlife movements between the Paradise Grove Plain ANSI northeast of the Subject Lands and the woodland providing deer overwintering habitat southeast of the Subject Lands. These two latter features are located >120 m from the Proposed Development Area, although they are addressed in this section anyways. The portion of the wetland within the Greenbelt Plan NHS is identified as a KNHF and KHF. This wetland was previously discussed in **Section 7.1** and is not addressed further in this section.

The Greenbelt Plan NHS and its associated ecological linkage have a relatively low level of sensitivity to the land use changes that are permitted within the Greenbelt Plan NHS. The area is a mix of rural residential and agricultural land with a road crossing (John Street East) and pedestrian trail crossing (Heritage Trail). The area experiences regular disruption due to agricultural activities, activities of the winery, residential land use activities and traffic and is therefore not overly sensitive to disruption of this nature. The wildlife living in and/or using this general area are likely tolerant of disruption and human presence to some degree given the nature of the agricultural/rural environment on the edge of the settlement area. However, the wildlife movement function of the corridor may be sensitive to new linear crossings of the Greenbelt, substantial increases in traffic, or conversion of agricultural lands to alternative land uses that would create a less permeable environment.

The wildlife habitat functions of the Paradise Grove Plain ANSI and woodland providing deer wintering habitat would be expected to be sensitive to increased human presence to some degree, although wildlife using these features are subject to anthropogenic disturbance on a regular basis due to traffic on John Street East and Queen's Parade, walking trails within the ANSI and agricultural and residential land uses within and around the woodland to the southeast. Based on aerial photograph interpretation, a house appears to be present within the woodland immediately adjacent to the portion identified by the MNR as providing deer wintering habitat and an agricultural operation, including barn and work yard is immediately adjacent to the southeast side of the woodland.

7.6.1. Potential Direct Impacts

No direct impacts on the Greenbelt NHS will occur as a result of the proposed development, since no site alteration activities are proposed on the portion of the Subject Lands within the Greenbelt.

7.6.2. Potential Indirect Impacts

Residential development on the portion of the Subject Lands adjacent to the Greenbelt Plan NHS is not expected to negatively impact the ecological corridor function of the Greenbelt Plan NHS area. The Greenbelt Plan NHS is approximately 400 m wide adjacent to the proposed development area. While residential noise emanating from the proposed development could potentially result in wildlife preferentially avoiding the direct area adjacent to the development, the width of the NHS corridor appears to be suitable to permit continued wildlife movements through the area. Further, the area of the Greenbelt Plan NHS immediately adjacent to the residences is not the most direct route between the off-site ANSI and woodland, since it is on the periphery of the Greenbelt Plan NHS. Wildlife moving between the two adjacent features would most likely take the most direct route and minimize the amount of time they spend in the generally open area between the features. Therefore, wildlife is unlikely to utilize the area immediately adjacent to the residences regardless of potential residential noise. Wildlife using this corridor is expected to be somewhat tolerant of noise and other human disturbance, given the overall nature of this rural area on the boundary of the Town's urban area.

With respect to the broader study area, the Paradise Plains Grove ANSI is located a minimum of approximately 215 m from the Subject Lands (i.e., from the entrance to the 200 John Street East property off John Street East). This feature is also located on the opposite side of John Street East relative to the Subject Lands. The ANSI is bordered by John Street East on the south and east and Queen's Parade to the north and, as such, is already subject to disturbance by traffic noise. Based on this distance and location of the feature, no direct negative impacts on the form or function of the ANSI are expected as a result of the proposed development. The potential increase in traffic on John Street East as a result of the proposed development is not expected to have an incremental negative impact on the wildlife habitat functions of the woodland given existing traffic levels along this roadway into Niagara-on-the-Lake and the Two Sisters Vineyards. Increased pedestrian use of the walking trails within the ANSI may occur due to increase in residents in the general area. However, given the overall generally high level of disturbance in the area due to existing trails and roads within and adjacent to the woodland, wildlife are not expected to be sensitive to increased levels of pedestrian trail use.

The woodland identified as a deer wintering area by MNR is located approximately 175 m south of the Urban Area portion of the Subject Lands (on the opposite side of the Heritage Trail). It is located in the

Greenbelt Plan area and the Greenbelt Plan NHS overlay is applied to the woodland. The woodland is separated from the Subject Lands by active agricultural areas and the Heritage Trail. Therefore, no direct impacts on the woodland are expected to occur due to the proposed development. Further, given the distance of the proposed development to the woodland, no indirect impacts as a result of construction of the proposed development, or long-term presence of the proposed development, are expected. While some increase in human use of the trail may occur as a result of the increase in population from the proposed development, no incremental negative impacts on the form and function of the woodland are expected as a result, given that the trail is approximately 47 m from the closest part of the woodland.

7.6.3. Potential Cumulative Impacts

The Greenbelt NHS and its associated linkage functions have experienced cumulative impacts historically as residential and agricultural developments in the area removed trees, increased levels of disturbance and brought increased traffic on local roads.

The proposed development is not expected to result in any cumulative effects on the physical nature of the Greenbelt Plan NHS since no development or site alteration is proposed within the portion on the Subject Lands.

As discussed in the previous section, cumulative increases in use of the Heritage Trail and trails in the Paradise Grove Plain ANSI are expected, although no negative impact on the features or associated wildlife habitat functions are expected, given the existing nature and use of the area. Cumulative increases in traffic are expected on John Street East due to the proposed development. As noted above, this is not expected to result in negative impacts on wildlife habitat use of the area.

7.6.4. Potential Enhancements

No enhancements to the Greenbelt Plan area on the Subject Lands are proposed given that the existing agricultural uses are intended to continue.

7.7. Other Water Resources System Components

Several components of the Region's Water Resources System (i.e., One Mile Creek, Tributary of One Mile Creek and SWD3-2 wetland) have been addressed in previous sections. The remaining components of the Water Resources System that are assessed in this section include:

- Key Hydrologic Areas
    - Highly Vulnerable Aquifer
    - Significant Source Water Contribution Areas – Mitigation HDFs on Town Heritage Trail
- Groundwater Features
    - Recharge Areas (non-impervious surfaces)
    - Water Tables
    - Aquifers

- Surface Water Features
    - Mitigation HDFs on Town Heritage Trail
    - Recharge Areas (non-impervious surfaces)

No consolidated hydrogeological assessment has been prepared at this point in the planning process, although GEI understands that the Town requires an assessment at the Site Plan stage. Therefore, the information in this section relies in part on the conclusions of the Hydrogeological Assessment completed for the formerly proposed residential development at 200 John Street East and 588 Charlotte Street (Cole Engineering, 2020). This section also references mitigative approaches identified in the FSR (Schaeffers, 2026).

From a sensitivity perspective, Cole Engineering (2020) indicated that the 200 John Street East and 588 Charlotte Street properties were not expected to contribute a significant amount of infiltration on a watershed scale due to the generally low permeability of the overburden.

7.7.1. Potential Direct Impacts

Some components of the water resources system will be directly altered by the proposed development which will result in an increase in impervious surfaces and collection and conveyance of stormwater runoff to the treatment system prior to discharge. This is expected to result in local alterations in infiltration and surface water runoff patterns on the landscape. Cole (2020) previously noted that, in the absence of mitigation, development on the Subject Lands could potentially result in reductions in infiltration, lowering of overburden groundwater levels and the introduction of potential preferential pathways for contaminants.

A site-wide water balance analysis will be required at the Site Plan stage to identify mitigation requirements to maintain overall site infiltration. Cole (2020) previously concluded that minor reductions in site-wide infiltration may result in long-term impacts to the regional groundwater system, but the impact was expected to be small at the watershed scale.

Cole (2020) indicated that impacts on the groundwater system could be mitigated through the use of best management practices to promote infiltration and the use of collars or other methods to restrict preferential groundwater flow along subsurface infrastructure.

No direct impact on the Mitigation HDFs along the Town-owned Heritage Trail will occur as a result of the proposed development. These HDFs will continue to convey ephemeral flows to the Tributary of One Mile Creek to maintain the seasonal hydrological function.

7.7.2. Potential Indirect Impacts

No indirect impacts on these water resources system components are expected to occur as a result of the proposed development.

7.7.3. Potential Cumulative Impacts

The components of the Water Resources System in this section have likely bene cumulatively impacted due to historical development within the watershed and regional aquifer area due to increased imperviousness. Depending on the final site-wide water balance (which will be finalized at the Site Plan stage), minor cumulative impacts on groundwater infiltration could occur as a result of the proposed development. However, based on Cole (2020), the on-site features (including the SWD3-2 wetland and One Mile Creek) are not groundwater dependent, so minor changes are not expected to have negative impacts on these water resources system features.

7.7.4. Potential Enhancements

No specific enhancements for the Water Resources System components addressed in this section are proposed.

8. Monitoring Recommendations

The proposed ecological monitoring program is intended to ensure that:

- Mitigation strategies and actions are effectively implemented;
- Ecological enhancement measures are effectively implemented; and
- The wetland form is maintained.

Construction monitoring is intended to monitor the effectiveness of measures and practices designed and implemented to manage potential impacts due to construction. This form of monitoring most often translates into ensuring that all ESC and spill prevention measures are in place and functioning; however, other aspects of construction monitoring can relate to the Tree Protection Zone (TPZ), 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 retained wetland and watercourses and associated buffers and any plant materials (e.g., landscape warranty).

Post-construction performance monitoring relates to the maintained functionality of the existing wetland area and associated buffer. 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.

The following sections provide the methodology to be used for each component of the monitoring program.

8.1. Construction Monitoring

Construction monitoring components are defined and described in the following sections and are intended to ensure that potential impacts as a result of construction are effectively managed and mitigated.

Additional monitoring efforts typically associated with construction not addressed herein are required, including the reporting of deficiencies and landscaping survival assessments. These activities should be conducted in a standard manner to provide a level of certainty to approval agencies that works have been constructed as designed and approved.

Vegetation Monitoring

Ecological restoration and invasive species management oversight should be conducted on all construction and works associated with ecological design aspects (vegetative components of the enhanced buffer areas), which could include the following tasks:

- Identify suitable native species substitutions and/or stock size adjustments and secure approval for these substitutions with the Town and NPCA, if required;
- Review layout of plant material prior to/during installation, including species type, location and densities;
- Observation of installations of planting, mulch, beds, seeding, and topsoil amendments;
- Verify native vegetation at the site prior to installation, as per the Issued for Construction Drawings to minimize the potential for non-native and/or invasive species from being installed on site; and
- Provision of monitoring and identification of management options for local outbreaks of aggressive (i.e., Category 1) invasive species that threaten the establishment, health and/or success of the native vegetation or pose a danger to human health within the restoration area.

Post-development vegetation compliance monitoring will be conducted once per year for two years to ensure that all works are established during the warranty period.

As noted above, ecological guidance will also be provided regarding suitable native plant substitutions should certain plant materials not be available for installation. All plant material substitutions will be reviewed by a Botanist to ensure that all plant materials installed within natural feature buffers follow the planting requirements outlined within the Landscape Plan.

Tree Protection Zone

Monitoring of any identified tree protection zones (TPZ) should be conducted or supervised by a Certified Arborist prior to and during construction to ensure compliance with tree protection guidelines. The Arborist Report will provide monitoring recommendations.

Erosion and Sediment Control

As discussed within the FSR (Schaeffers, 2026), an ESC Plan will be prepared at detailed design to ensure that all natural heritage features and functions will be protected. ESC measures will be applied to prevent the release of sediment from the construction site. ESC monitoring should be conducted on a regular basis to confirm that mitigative measures are installed and functioning as designed and to identify requirements for remedial measures.

Spill Prevention Measures

As outlined in this EIS, spill prevention measures are recommended to minimize the potential for an accidental spill that could have a negative impact on natural heritage features during construction of the proposed development. Spill prevention measure monitoring should be conducted on a regular basis to confirm that mitigative measures are installed or implemented and functioning as designed and to identify requirements for remedial measures.

Post-Construction Compliance Monitoring

Post-construction compliance monitoring is intended to demonstrate compliance with permits or other approvals through local monitoring to verify that measures have been constructed as designed. This type of monitoring applies to the buffer proposed for planting enhancements.

All landscaped works within the watercourse and wetland buffers will be reviewed during the construction period to ensure all planting and surface treatments are installed per specifications. It is also anticipated that the works will be inspected with both the Town and/or NPCA once substantially complete. An additional inspection will be arranged once a year for the two-year compliance period following implementation to ensure that all works are established.

8.2. Post-Construction Monitoring

Given that mitigative measures are proposed to protect the on-site wetland, post-construction vegetation monitoring is recommended to confirm that mitigative approaches are being effective to maintain the wetland. The proposed vegetation monitoring includes botanical inventory, ELC, and invasive species (Category 1) monitoring within the SWD3-2 and buffer on the Subject Lands.

8.2.1. Botanical Inventory

Botanical inventory will occur once in the summer of ecological monitoring years 1, 2 and 3. The purpose of botanical inventory is to assess the vegetation within the on-site wetland and buffer area and to confirm that the vegetation continues to reflect a wetland ecosite (targeting the continuation of the SWD3-2, but recognizing that natural succession could occur), that groundcover wetland vegetation is establishing following the cessation of management and that buffer vegetation is establishing to assist in buffer functions (as outlined in this EIS).

The botanical inventory will record the vegetation observed within the wetland and the buffer enhancement area separately. Botanical inventory data collected from the buffer will be compared to the prescribed landscape plantings to assess ecological integrity, and notable trends in species success or decline.

A vascular plant inventory will be completed concurrently with the ELC survey when appropriate. Species names will generally follow nomenclature from the Database of Vascular Plants of Canada (Brouillet et al. 2010+). The provincial status of all plant species and vegetation communities will be determined based on NHIC. The botanical inventory will also identify potentially sensitive native plants based on their assigned coefficient of conservatism (CC) value (Oldham et al. 1995).

The botanical inventory monitoring results will be mapped, summarized and discussed in ecological monitoring reports.

8.2.2. Ecological Land Classification

ELC of the wetland will be conducted once in the summer of ecological monitoring years 1, 2 and 3. ELC is intended to confirm that the community classification of the wetland is not changing over time.

Changes in wetland community could reflect unexpected alterations in water balance, although they may occur due to natural succession.

Vegetation community data will be recorded following the ELC protocol for Southern Ontario (Lee et al. 1998; Lee 2008).

Other observations such as general health of the vegetation, disease infestations, abundant dieback, stunted growth, bare vegetation patches, etc. will be recorded.

The ELC monitoring results will be mapped, summarized and discussed in ecological monitoring reports.

8.2.3. Invasive Species (Category 1)

Invasive species monitoring will occur once in the summer of ecological monitoring years 1, 2 and 3 within the wetland, wetland buffer and planted watercourse buffers. Invasive species monitoring is intended to facilitate early detection of invasive species and changes in distribution and abundance over time.

A grid methodology will be established to monitor Category 1 invasive species (Urban Forest Associates 2002) which are targeted because of their aggressive ability to dominate a site, exclude all other species, and remain dominant on the site indefinitely. For each Category 1 invasive species recorded, the distribution and abundance will be mapped. and results will be summarized and discussed in ecological monitoring reports. Recommendations for management will be identified (where necessary).

8.2.1. Incidental Wildlife Observations

Incidental wildlife observations will be recorded opportunistically during all field visits associated with the ecological monitoring program. Incidental observations may include visual or auditory detections of wildlife species (e.g., amphibians, reptiles, birds, mammals) utilizing the wetland, buffer, or adjacent habitats.

Incidental observations are intended to provide supplementary, qualitative information on wildlife presence and habitat use and will not involve targeted surveys, population estimates, or species-specific monitoring protocols. Observations will be documented through field notes and, where appropriate, photographic records, and will be summarized in the monitoring reports.

9. Conclusions and Recommendations

This EIS has been developed as part of the planning process for the proposed redevelopment of the properties at 144, 176 and 200 John Street East and 588 Charlotte Street in Niagara-on-the-Lake, Ontario. The EIS Study Area includes the Proposed Development Area (i.e., the area within the Subject Lands which development and site alteration may be proposed, subject to constraints), areas within 120 m of the Proposed Development Area (to address the "adjacent lands" requirements of the PPS and NOP) and the broader landscape surrounding the Subject Lands (including known natural features in the general vicinity but beyond 120 m from the Proposed Development Area).

The presence/absence of natural features, as identified in the PPS, Greenbelt Plan, NOP (2022), Town OP (2017) and NPCA regulations has been determined based on desktop information review and on-site field investigations. The following natural features were identified:

Significant Natural Features and Areas (PPS) / Natural Heritage Features and Areas (NOP, 2022)

- Fish Habitat (indirect)
  - One Mile Creek
  - Tributary of One Mile Creek
- Habitat for Endangered Species
  - Trees providing bat habitat characteristics are present on the 144, 176 and 200 John Street properties in association with the residential area and SWD3-2/CUW
  - Potential bat maternity roost habitat within the buildings on 144 and 176 John Street East (not confirmed to date)

Region Natural Environment System

- Greenbelt Plan NHS
  - SWD3-2 wetland is a KNHF and KHF in the Greenbelt Plan NHS
- Other Wetland
  - SWD3-2
- Other Woodland
  - CUW in Greenbelt Plan area
- Linkage
  - Greenbelt Plan NHS
- Buffers (Urban Area)/Vegetation Protection Zones (Greenbelt Plan Area)
  - Fish habitat and SWD3-2
- Supporting Features and Areas

  - Other Valleylands – One Mile Creek and Tributary of One Mile Creek
  - Other Wildlife Habitat – SWD3-2/CUW
- Key Hydrologic Features
  - Intermittent Streams – One Mile Creek and Tributary of One Mile Creek
  - Wetland – SWD3-2
- Key Hydrologic Areas
  - Highly Vulnerable Aquifer
  - Significant Source Water Contribution Areas – Mitigation HDFs on Town Heritage Trail
- Groundwater Features
  - Recharge Areas (non-impervious surfaces)
  - Water Tables
  - Aquifers
- Surface Water Features
  - Mitigation HDFs on Town Heritage Trail
  - Recharge Areas (non-impervious surfaces)
- Floodplain

<u>Town of Niagara-on-the-Lake Conservation/Wetland Areas</u>

- One Mile Creek floodplain
- Woodland – SWD3-2/CUW

<u>NPCA Regulated Features</u>

- SWD3-2 and all areas within 30 m
- One Mile Creek (including floodplain and meander belt, where present)
- Tributary of One Mile Creek.

The proposed development will consist of the construction and operation of a hotel/spa on the 144 and 176 John Street East properties and a series of five 3-story condominium buildings on the 200 John Street East and 588 Charlotte Street properties. Other accessory components of the proposed development include sanitary and water servicing, stormwater management (via a SWM Pond and underground storage tank), driveway construction (including replacement of three culverts on One Mile Creek) and associated grading and landscaping.

An assessment of impacts on natural features and their associated functions has been conducted, and discussed in relation to the PPS, related guidance documents, the Greenbelt Plan and the local and regional official plans. Potential impacts that have been considered include direct, indirect and cumulative

impacts. Mitigative measures have been identified to avoid or minimize the potential for negative impacts on natural features.

Based upon the analyses carried out, the following conclusions are provided:

- The SWD3-2 wetland is an Other Wetland (but not a candidate to be a PSW) and is regulated by NPCA. The portion in the Greenbelt Plan area is a KNHF/KHF. The wetland will be retained with a general 10-m buffer (with minor encroachment for a driveway and a storm sewer inlet), which will be naturalized. Wetland water balance will be maintained through conveyance of additional surface water drainage to the feature through a clean-water collector swale. Potential indirect impacts on the wetland will be prevented through various mitigative approaches. The currently managed (mowed) understory of the wetland will be allowed to passively naturalize, resulting in an expected net gain to the form and function of the feature.

- SAR bats including Silver-haired Bat, Little Brown Myotis, Eastern Small-footed Myotis, Eastern Red Bat and Hoary Bat, were documented on the Subject Lands. A total of 52 trees providing suitable habitat characteristics were present, predominantly within the residential areas of the 144/176 John Street East properties. Removal of 12 potential bat habitat trees is proposed to occur outside the maternity roosting period, but this is not expected to have a negative impact on overall bat populations in the general area. Screening of structures will be required prior to development.

- One Mile Creek and the Tributary of One Mile Creek are Key Hydrologic Features and the watercourse and associated flooding and erosion hazards are regulated by NPCA. The watercourses provide Type 3 (marginal) indirect fish habitat functions. The three proposed driveway crossing upgrades will alter fish habitat, but this is not expected to have a negative impact on the indirect fish habitat functions that support downstream (off-site) direct fish habitat. No impacts on flooding or erosion hazards are expected. Local alterations in flow are expected in certain reaches due to stormwater management, but the proposed SWM system will provide required quantity, quality and erosion control criteria. Enhancements to riparian vegetation communities are expected to result in long-term benefits to the form and function of the watercourses.

- The CUW in the Greenbelt Plan area is identified as an Other Woodland and provides habitat for SAR bats. No direct impacts on the woodland are expected and mitigative approaches recommended for implementation are expected to be effective to provide indirect impacts on the feature.

- The FOD7 does not meet the criteria to be protected under any relevant legislation, plans or guidelines. However, as a treed area it provides general wildlife habitat. A portion of the woodland will be removed for the proposed development. Tree planting is expected to be required (to be confirmed in the Arborist Report). This EIS has recommended that any required compensation trees be planted adjacent to the residual part of the woodland.

- No direct impacts on the Greenbelt Plan NHS, which is located immediately adjacent to the Proposed Development area are expected. The Greenbelt Plan NHS has been identified as

providing a potential ecological linkage to facilitate wildlife movements between the Paradise Grove Plain ANSI northeast of the Subject Lands and a woodland providing deer overwintering habitat southeast of the Subject Lands. No negative impact on the function of the potential linkage is expected to occur as a result of the proposed development. Further, no negative impacts on the form or wildlife habitat functions of the ANSI or deer overwintering woodland are expected.

- Other Water Resources System components, including Mitigation HDFs on the Town-owned Heritage Trail, and general groundwater resources are present on or adjacent to the Subject Lands. No alterations to the form or function of the off-site Mitigation HDFs are expected. Localized alterations to groundwater infiltration, recharge and local water tables may occur due to increase in impervious surfaces and stormwater management on the Subject Lands. With appropriate mitigation, negative impacts on these features are not expected as a result of such changes.

A monitoring plan, consisting of construction and post-construction monitoring measures, has been recommended in this EIS. A detailed monitoring plan will be prepared during the permitting stage.

Potential natural heritage-related permits and/or agency discussions that may be required include:

- NPCA development permit for alterations to watercourse and development within 30 m of the SWD3-2 wetland;
- Submission of a Request for Review to DFO to confirm if an Authorization under the Fisheries Act is required for any of the proposed alterations to One Mile Creek and its tributary;
- Potential discussions with MECP and/or permitting/registration under relevant provincial SAR legislation may be required to address potential alterations in SAR bat habitat.

Considering the analysis completed in this EIS, the development of the Subject Lands can be completed without negative impact on the natural features and associated functions.

10. References

Aquafor Beech Limited and LURA Consulting Limited. 2005. One Mile Creek Watershed Strategy. Final Report. October 2005. Prepared for Niagara Peninsula Conservation Authority. 63 pp. + Figures and Appendices.

Bird Studies Canada, Environment Canada and the U.S. Environmental Protection Agency. 2009. Marsh Monitoring Program Participant's Handbook for Surveying Amphibians. 2009 Edition. 13 pp.

Brouillet, L., F. Coursol, S.J. Meades, M. Favreau, M. Anions, P. Bélisle & P. Desmet 2010. VASCAN, the Database of Vascular Plants of Canada. http://data.canadensys.net/vascan/

Cadman, M.D., D.A. Sutherland, G.G. Beck, D. Lepage, and A.R. Courturier (eds.) 2007. Atlas of the breeding birds of Ontario, 2001-2005. Bird Studies Canada, Environment Canada, Ontario Field Ornithologists, Ontario Ministry of Natural Resources, and Ontario Nature, Toronto, xxii + 706 pp.

Caverhill, B., Johnson, B., Phillips, J., & E. Nadeau 2011. Blanding's Turtle (Emydoidea landingii) and Snapping Turtle (Chelydra serpentina) Habitat Use and Movement in the Oakland Swamp Wetland Complex, and Their Response to the Provincial Highway 24 Exclusion Fence and Aquatic Culvert Ecopassage. Toronto Zoo Adopt-a-Pond-Programme.

Chapman, L.J. and D.F. Putnam 1984. The Physiography of Southern Ontario, 3rd edition. Ontario Geological Survey, Toronto.

Cole Engineering Group Ltd. (Cole Engineering). June 2020. Hydrogeological Investigation. 200 John Street and 588 Charlotte Street, Niagara-on-the-Lake, Ontario. Prepared for Solmar (Niagara 2) Inc. 12 pp. + Appendices.

Credit Valley Conservation (CVC). 2017. Fish and Wildlife Crossing Guidelines. April 28, 2017. 32 pp.

Credit Valley Conservation and Toronto and Region Conservation Authority (CVC and TRCA). 2014. Evaluation, Classification and Management of Headwater Drainage Features Guidelines. January 2014. 26 pp.

Denyes, D. 2018. Personal Communication - Email. D. Denyes (Management Biologist, MNRF, Vineland Field Office) to N. Boucher (Senior Fisheries Biologist, Savanta Inc.), August 20, 2018.

Fisheries and Oceans Canada (DFO). 2025. Aquatic Species at Risk Map. Online at https://www.dfo-mpo.gc.ca/species-especes/sara-lep/map-carte/index-eng.html. Accessed March 2026.

GEI Consultants (GEI). 2022. Environmental Impact Study Addendum. Proposed Residential Development at 200 John St. & 588 Charlotte Street, Niagara-on-the-Lake, ON. Prepared for Solmar (Niagara 2) Inc. March 8, 2022. 15 pp. + Appendices.

GEI Consultants (GEI). 2024. 200 John Street East & 588 Charlotte Street, Niagara-on-the-Lake. Environmental Impact Study Technical Brief. Prepared for Solmar (Niagara 2) Inc. February 23, 2024. 14 pp. + Appendices.

King's Printer for Ontario. 2023. Geospatial Ontario. Make A Map: Natural Heritage Areas. Ministry of Natural Resources. Online at https://www.lioapplications.lrc.gov.on.ca/Natural_Heritage/index.html?viewer=Natural_Heritage.Natural_Heritage&locale=en-CA. (Accessed February 2026).

Lee, H.T., W.D. Bakowsky, J. Riley, J. Bowles, M. Puddister, P. Uhlig and S. McMurray 1998. Ecological land classification for Southwestern Ontario: first approximation and its application. Ontario Ministry of Natural Resources, South Central Region, Science Development and Transfer Branch. Technical Manual ELC-005.

Ministry of Environment, Conservation and Parks (MECP). 2003. Stormwater Management Planning and Design Manual, 2003. Available online: https://www.ontario.ca/document/stormwater-management-planning-and-design-manual-0

Ministry of Environment, Conservation and Parks (MECP). Undated. Use of Buildings by Species at Risk Bats Survey Methodology. 3 pp.

Ministry of Municipal Affairs (MMA). 2017. Greenbelt Plan (2017). 76 pp. + Schedules.

Ministry of Municipal Affairs and Housing (MMAH). 2024. Provincial Planning Statement, 2024. 56 pp.

Ministry of Natural Resources (MNR). 2000a. Niagara Regional Municipality Fish Habitat Types with Management Rationale. Niagara Area, Guelph District.

MNR. 2000b. Significant Wildlife Habitat Technical Guide. October 2000. 151 pp.

MNR. 2010. Natural Heritage Reference Manual for natural heritage Polices of the Provincial Policy Statement, 2005. Second Edition. Toronto: Queen's Printer for Ontario. 248pp.

MNR. 2012a. Technical Definitions and Criteria for Key Natural Heritage Features in the Natural Heritage System of the Protected Countryside Area. Greenbelt Plan 2005. December 7, 2012. 37 pp.

MNR. 2012b. Blanding's Turtle survey protocol. MNR Guelph District.

MNR. 2017. Survey Protocol for Species at Risk Bats within Treed Habitats. Little Brown Myotis, Northern Myotis & Tri-Colored Bat. April 2017. MNR Guelph District. 13 pp.

MNR. 2022. Ontario Wetland Evaluation System. Southern Manual, 4th Edition, 2022. 239 pp.

Ministry of Natural Resources and Forestry (MNRF). 2015. Significant Wildlife Habitat Criteria Schedules for Ecoregion 7E.

MNRF 2016. Survey Protocol for Ontario's Species at Risk Snakes. Ontario Ministry of Natural Resources and Forestry, Species Conservation Policy Branch. Peterborough, Ontario. ii + 17 pp.

Natural Heritage Information Centre (NHIC). 2021. Plant Communities List. Online at https://www.publicdocs.mnr.gov.on.ca/srb/Plant_Community_List.xlsx.

Niagara Region. 2022. Niagara Official Plan. November 4, 2022. 394 pp.

NHIC. 2025. Species Lists. Online at https://www.publicdocs.mnr.gov.on.ca/srb/Ontario_Species_list.xlsx.

NPCA 2011. Updated Assessment Report – Niagara Peninsula Source Protection Area. Online at http://www.sourceprotection-niagara.ca/documents/assessment-report/approved-assessment -report/. (Accessed December 13, 2018).

NPCA 2018. NPCA Watershed Explorer Online Mapping. Available online at http://camaps.maps.arcgis.com/apps/webappviewer/index.html?id=c7555050c8f24a7cbc829395557a7988. (Accessed December 13, 2018).

NPCA. 2024. NPCA Policy Document: Policies for Planning and Development in the Watersheds of the Niagara Peninsula Conservation Authority. April 15, 2024. 154 pp.

Niagara Peninsula Source Protection Committee (NPSPC). 2013. Updated Assessment Report Niagara Peninsula Source Protection Area. Prepared for Niagara Peninsula Source Protection Authority. November 28, 2013.

Oldham, M.J., W.D. Bakowsky and D.A. Sutherland 1995. Floristic quality assessment for southern Ontario. OMNR, Natural Heritage Information Centre, Peterborough. 68 pp.

Oldham, M.J. 2010. Checklist of the Vascular Plants of Niagara Regional Municipality. Ontario Natural Heritage Information Centre, Ministry of Natural resources. Peterborough, Ontario for Niagara Peninsula Conservation Authority, Welland, Ontario.

Oldham, M.J., and S.R. Brinker. 2009. Rare Vascular Plants of Ontario, Fourth Edition. Natural Heritage Information Centre, Ontario Ministry of Natural Resources. Peterborough, Ontario. 188 pp.OBBA 2022 birds Canada

Ontario Geological Survey (OGS) 2005. Bedrock Geology of Ontario. Seamless Coverage Data Set 6 (*cited in Cole Engineering 2020*).

Ontario Land Tribunal (OLT). 2024. Decision Delivered by S. Tousaw and W. Daniel Best with Order and Interim Order of the Tribunal. October 11, 2024. 55 pp.

Ontario Nature. 2022. Ontario Reptile and Amphibian Atlas [Database]. Available online: https://www.ontarioinsects.org/herp/

Savanta A GEI Company (Savanta). 2020. Environmental Impact Study. 200 John St. & 588 Charlotte Street, Niagara-on-the-Lake, ON. Prepared for Solmar (Niagara 2) Inc. July 2020. 71 pp. + Appendices.

Schaeffers Consulting Engineers. 2026. Functional Servicing Report.

Soil Engineers Ltd. 2018. A Geotechnical Investigation for Proposed Residential Development. File No. 1807-S136.

Stanfield, L. Editor 2017. Ontario Stream Assessment Protocol. Version 10 – 2017. Fisheries Policy Section. Ontario Ministry of Natural Resources. Peterborough, Ontario. 26 pp. 548 pp.

Town of Niagara-on-the-Lake. 2017. Town of Niagara-on-the-Lake Official Plan. As Amended July 17, 2017. 329 pp. + Appendices and Schedules.

Thornthwaite, C.W., and Mather, J.R. 1957. Instructions and Tables for Computing Potential Evapotranspiration and the Water Balance.

Waterloo Hydrogeologic Inc. (Waterloo Hydrogeologic) 2005. NPCA Groundwater Study Final Report (*cited in Cole Engineering 2020*).

Schaeffers Consulting Engineers. 2026. Functional Servicing Report.

Soil Engineers Ltd. 2018. A Geotechnical Investigation for Proposed Residential Development. File No. 1807-S136.

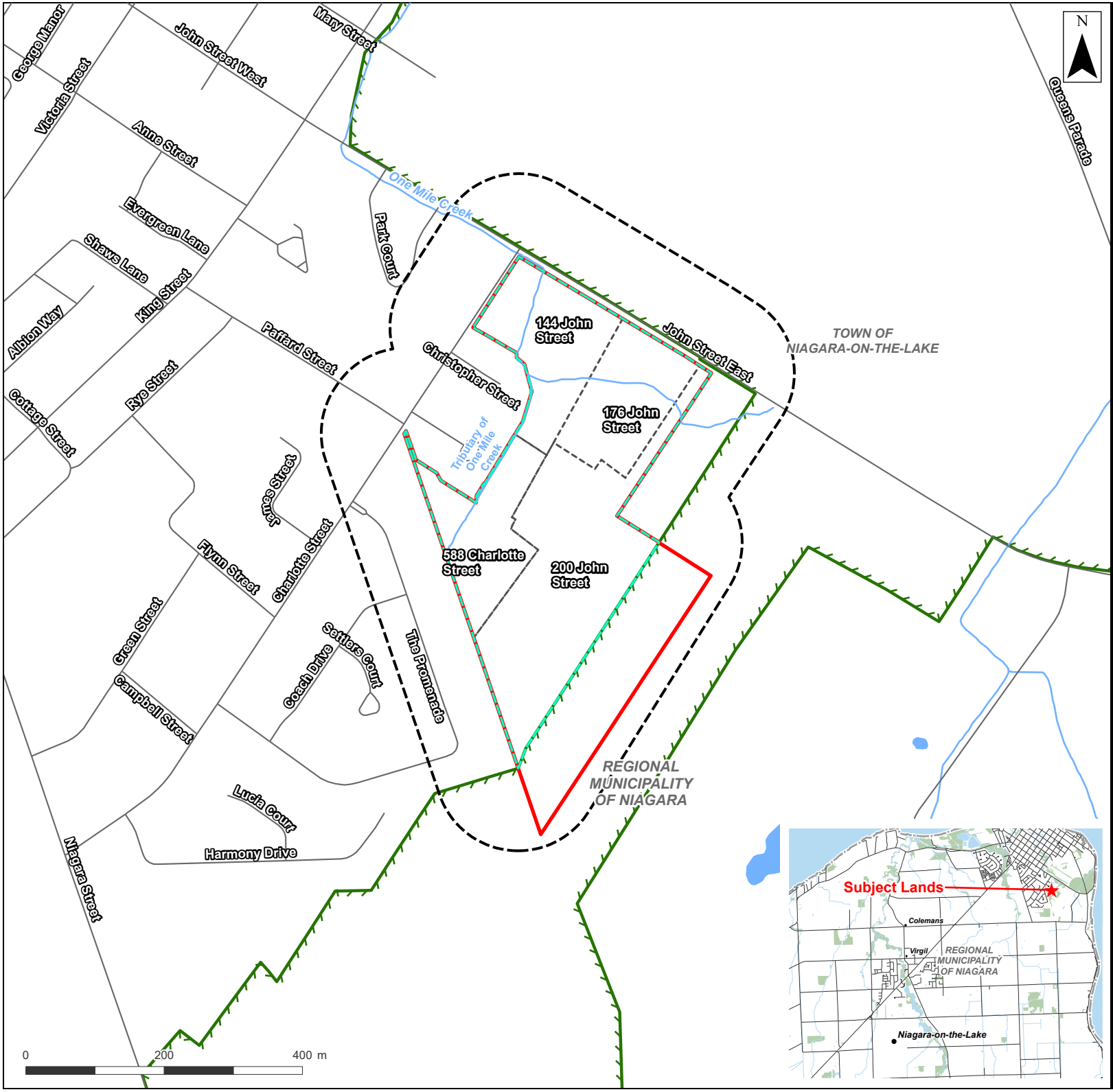
Stanfield, L. Editor 2017. Ontario Stream Assessment Protocol. Version 10 – 2017. Fisheries Policy Section. Ontario Ministry of Natural Resources. Peterborough, Ontario. 26 pp. 548 pp.

Town of Niagara-on-the-Lake. 2017. Town of Niagara-on-the-Lake Official Plan. As Amended July 17, 2017. 329 pp. + Appendices and Schedules.

Thornthwaite, C.W., and Mather, J.R. 1957. Instructions and Tables for Computing Potential Evapotranspiration and the Water Balance.

Waterloo Hydrogeologic Inc. (Waterloo Hydrogeologic) 2005. NPCA Groundwater Study Final Report (*cited in Cole Engineering 2020*).

Appendix A Figures



Reference(s):

1. Coordinate System: NAD 1983 CSRS UTM Zone 17N.
2. Base features produced under license with the Ontario Ministry of Natural Resources and Forestry © King's Printer for Ontario, 2026.

Figure 1
Location of Subject Lands

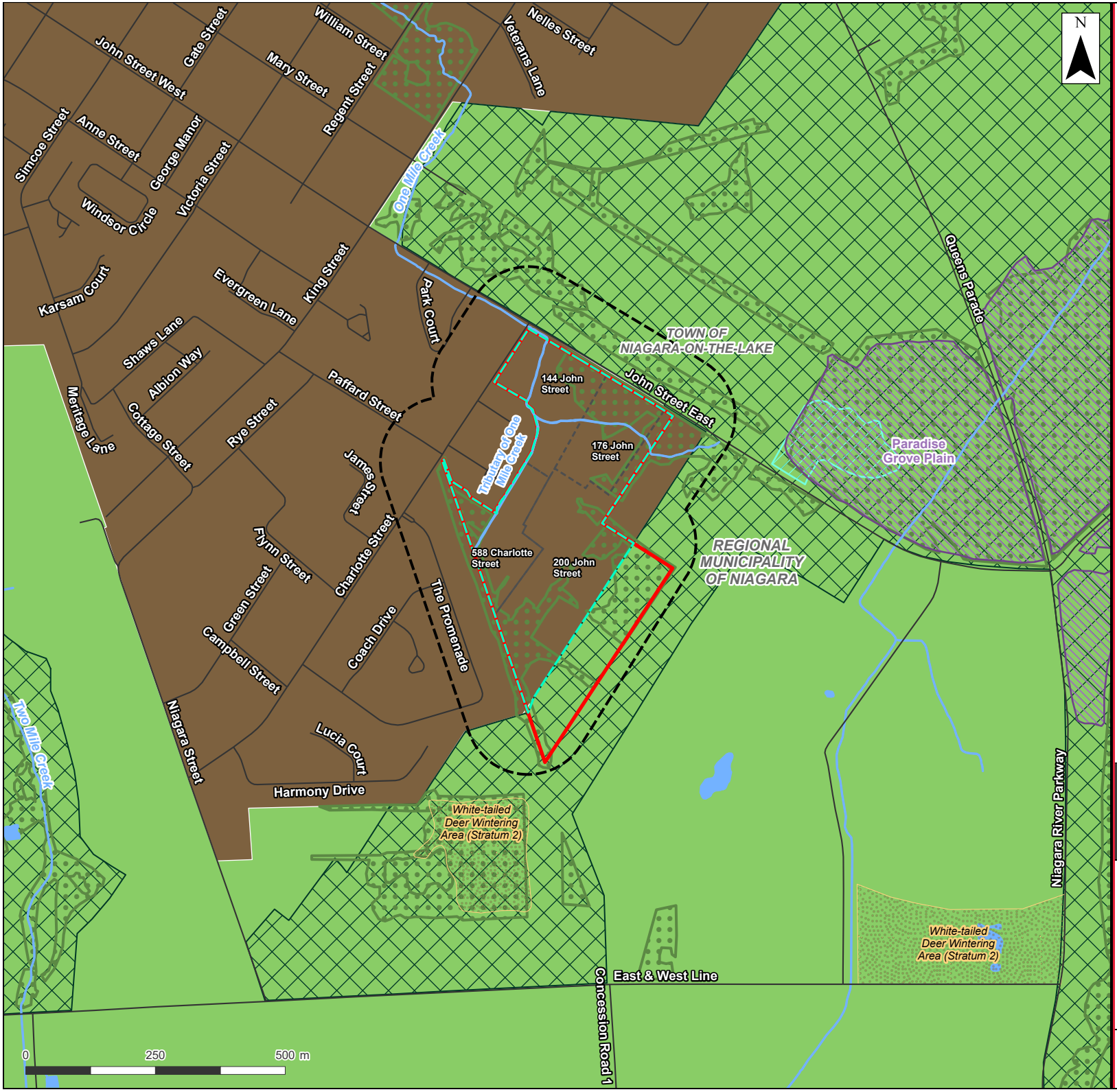
Project Name:
144, 176, 200 John St. East & 588 Charlotte St. NOTL

Client Name:
Two Sisters Resort Corp
(Ontario, Canada)

GEI Consultants Canada

Last Updated: March 2026
Document ID: 700000-G-000

Document Path: \\bos-pzcc-1\Data_Storage\Working\TWO SISTERS RESORTS CORP\26007\86 Randwood EIS\01_GIS\APRX\2026-03_EIS.aprx



Reference(s):

1. Coordinate System: NAD 1983 CSRS UTM Zone 17N.
2. Base features produced under license with the Ontario Ministry of Natural Resources and Forestry © King's Printer for Ontario, 2026.

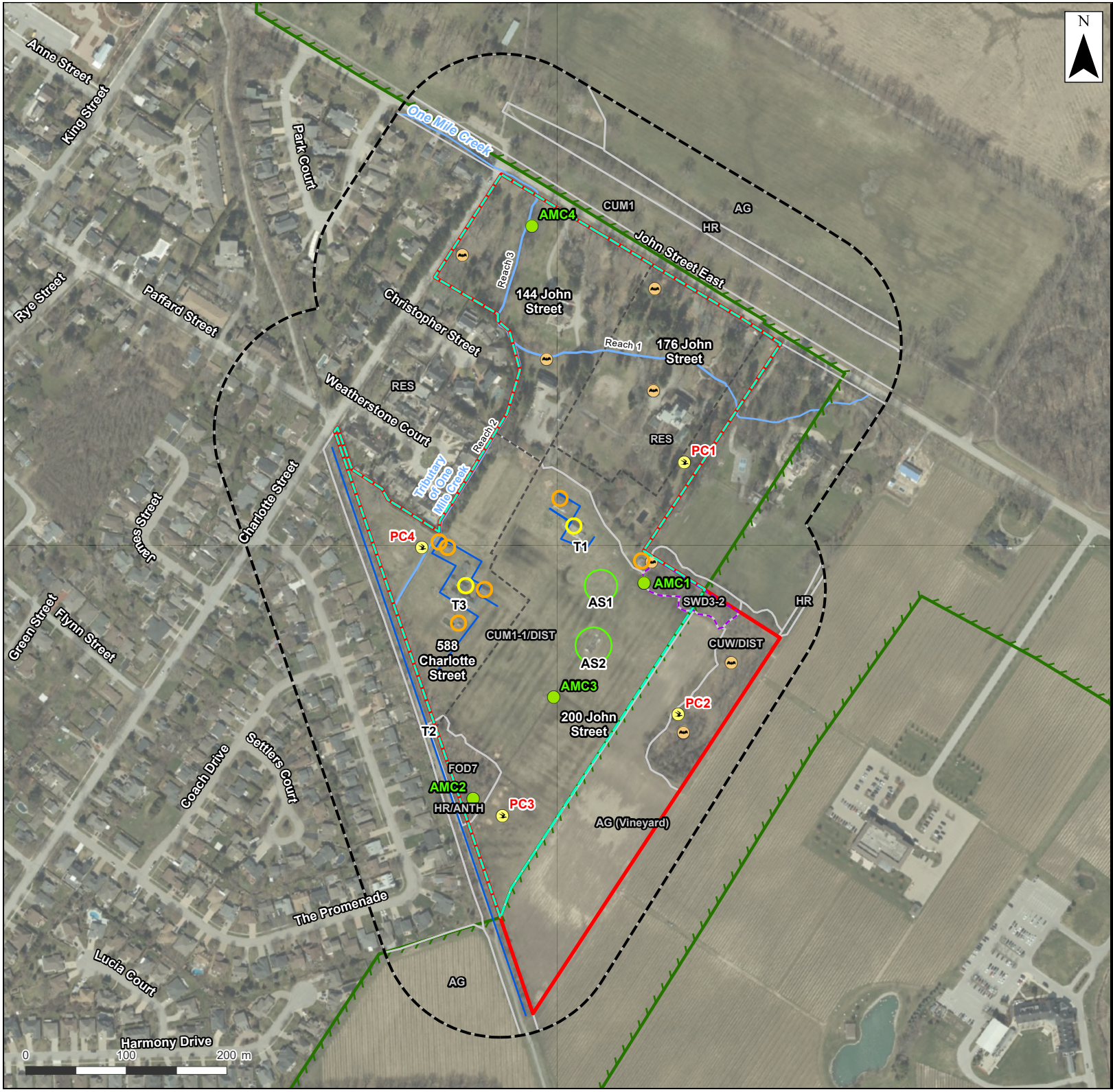
Figure 2
Landscape Setting

Project Name:
144, 176, 200 John St. East & 588 Charlotte St. NOTL

Client Name:
Two Sisters Resort Corp
(Ontario, Canada)

GEI Consultants Canada

Last Updated: March 2026
Document ID: 700000-G-000



- Subject Lands
- Proposed Development Area
- Proposed Development Area + 120 m
- Property Boundaries
- Watercourse (LIO & GEI)
- Wetland Regulated by NPCA
- Greenbelt Natural Heritage System
- Ecological Land Classification
- Amphibian Call Count Station
- Breeding Bird Point Count Station
- Bat Acoustic Monitoring Station
- Reptile Transect
- Reptile Area Search
- Structure - Bat Exit Survey Completed
- Structure - Bat Exit Survey Not Required

ELC Legend

CUM1-1, Dry - Moist Old Field Meadow
CUW, Cultural Woodland
DIST, Disturbed
FOD7, Fresh – Moist Lowland Deciduous Forest
RES, Residential
SWD3-2, Silver Maple Mineral Deciduous Swamp
AG, Agricultural
ANTH, Anthropogenic
HR, Hedgerow
Parkland

Reference(s):

1. Coordinate System: NAD 1983 CSRS UTM Zone 17N.
2. Base features produced under license with the Ontario Ministry of Natural Resources and Forestry © King's Printer for Ontario, 2026.
3. Orthoimagery © First Base Solutions, 2026. Imagery taken in 2023.

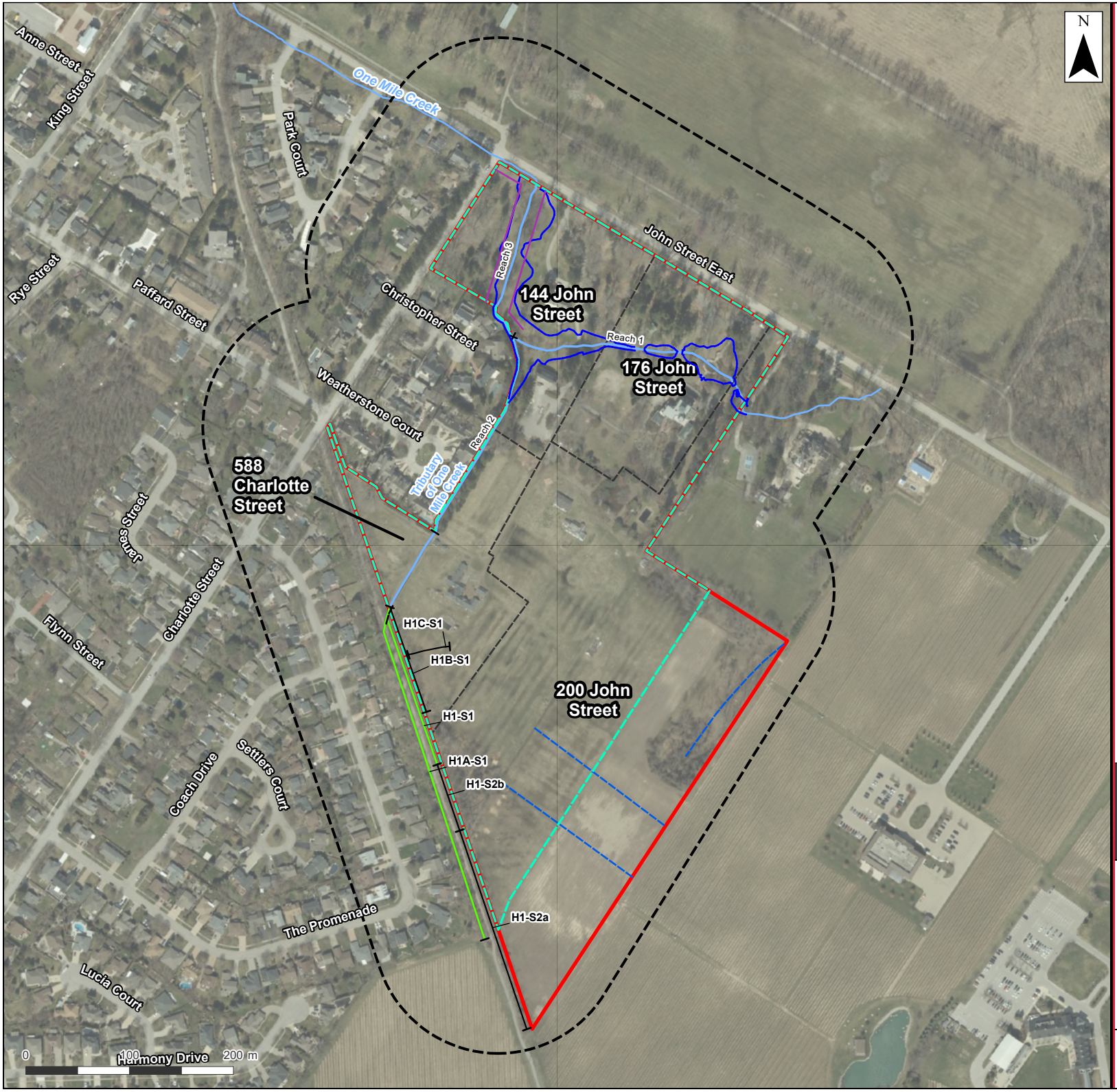
Figure 3
Wildlife Survey Locations

Project Name:
144, 176, 200 John St. East & 588 Charlotte St. NOTL

Client Name:
Two Sisters Resort Corp
(Ontario, Canada)

GEI Consultants Canada

Last Updated: April 2026
Document ID: 2600786



- Subject Lands
- Proposed Development Area
- Proposed Development Area + 120 m
- Property Boundaries
- Watercourse (LIO & GEI)
- Surface Water With No Outlet
- Existing 100 Year Floodline
- Empirical Meander Belt
- Reach Break

HDF Management Recommendations

- Mitigation
- Conservation
- No Management Required

Reference(s):

1. Coordinate System: NAD 1983 CSRS UTM Zone 17N.
2. Base features produced under license with the Ontario Ministry of Natural Resources and Forestry © King's Printer for Ontario, 2026.
3. Orthoimagery © First Base Solutions, 2026. Imagery taken in 2023.

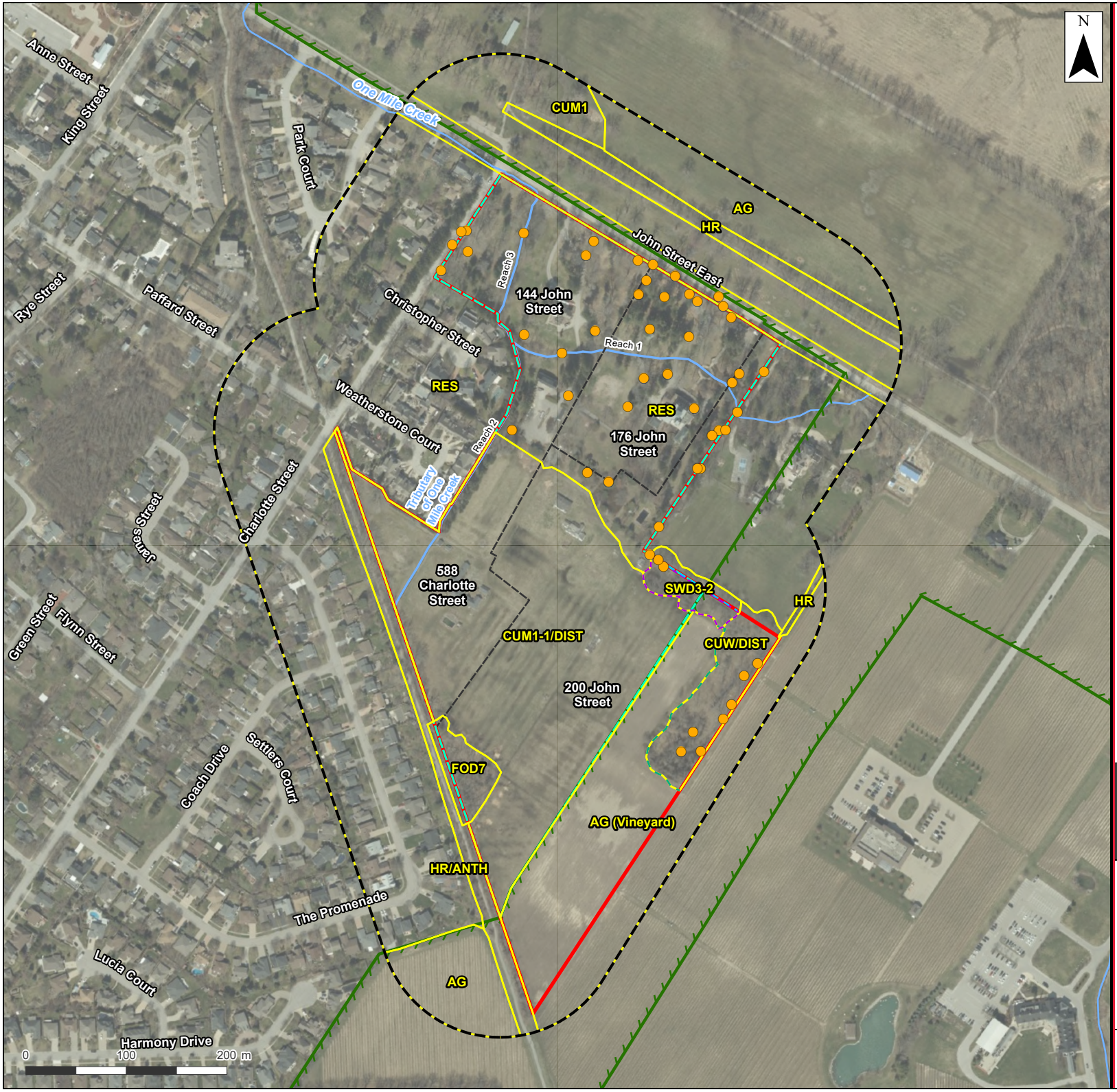
Figure 4
Watercourses and Headwater Drainage Features

Project Name:
144, 176, 200 John St. East & 588 Charlotte St. NOTL

Client Name:
Two Sisters Resort Corp
(Ontario, Canada)

GEI Consultants Canada

Last Updated: March 2026
Document ID: 2600786



Subject Lands
Proposed Development +120 m
Property Boundaries
Proposed Development Area
Watercourse (LIO & GEI)
Wetland Staked with NPCA (Oct. 13, 2021)
Greenbelt Natural Heritage System (LIO)
Estimated Wetland Boundary (per OWES)
Dripline Staked with Region (July 10, 2018)
Bat Habitat Tree
Ecological Land Classification

ELC Legend

CUM1-1, Dry - Moist Old Field Meadow
CUW, Cultural Woodland
DIST, Disturbed
FOD7, Fresh – Moist Lowland Deciduous Forest
RES, Residential
SWD3-2, Silver Maple Mineral Deciduous Swamp
AG, Agricultural
ANTH, Anthropogenic
HR, Hedgerow
Parkland

Reference(s):

1. Coordinate System: NAD 1983 CSRS UTM Zone 17N.
2. Base features produced under license with the Ontario Ministry of Natural Resources and Forestry © King's Printer for Ontario, 2026.
3. Orthoimagery © First Base Solutions, 2026. Imagery taken in 2023.

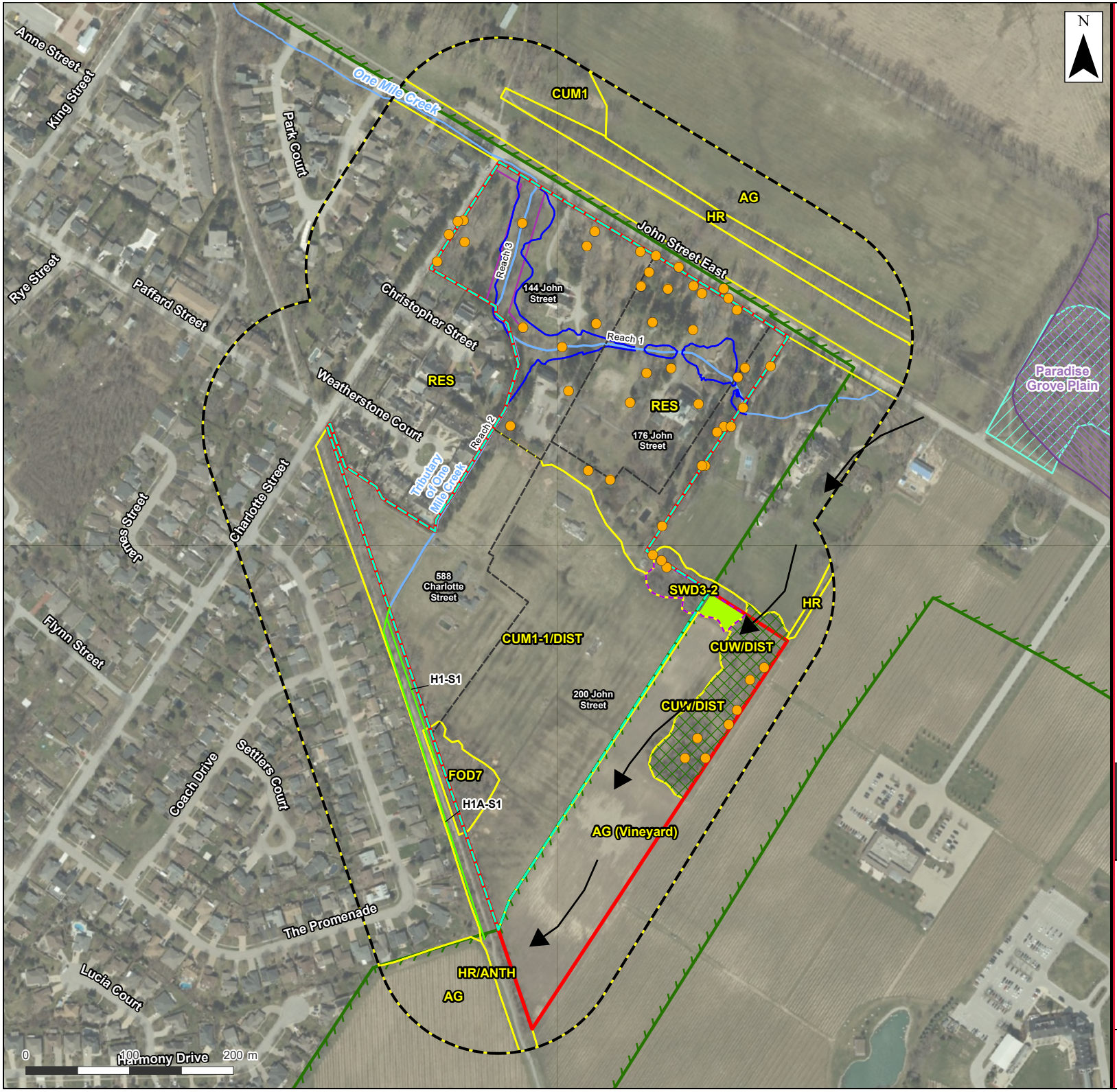
Figure 5
Ecological Land Classification

Project Name:
144, 176, 200 John St. East & 588 Charlotte St. NOTL

Client Name:
Two Sisters Resort Corp
(Ontario, Canada)

GEI Consultants Canada

Last Updated: March 2026
Document ID: 2600786



- Subject Lands
- Proposed Development Area
- Proposed Development Area + 120 m
- Property Boundaries
- Watercourse (LIO & GEI)
- Wetland (KNHF/KHF)
- Wetland Regulated by NPCA
- Greenbelt Natural Heritage System
- Regionally Significant Life Science ANSI (LIO)
- Wetland - Not evaluated per OWES (LIO)
- Ecological Land Classification
- Ecological Linkage
- Other Woodland and Other Wildlife Habitat (NOP, 2022)
- Bat Habitat Tree
- Existng 100 Year Floodline
- Empirical Meander Belt

HDF Management Recommendations

- Mitigation

ELC Legend

CUM1-1, Dry - Moist Old Field Meadow
CUW, Cultural Woodland
DIST, Disturbed
FOD7, Fresh – Moist Lowland Deciduous Forest
RES, Residential
SWD3-2, Silver Maple Mineral Deciduous Swamp
AG, Agricultural
ANTH, Anthropogenic
HR, Hedgerow
Parkland

Note: *Not all Natural Environment System Components are depicted on figure. Please see EIS Section 5 for complete list.*

Reference(s):

1. Coordinate System: NAD 1983 CSRS UTM Zone 17N.
2. Base features produced under license with the Ontario Ministry of Natural Resources and Forestry © King's Printer for Ontario, 2026.
3. Orthoimagery © First Base Solutions, 2026. Imagery taken in 2023.

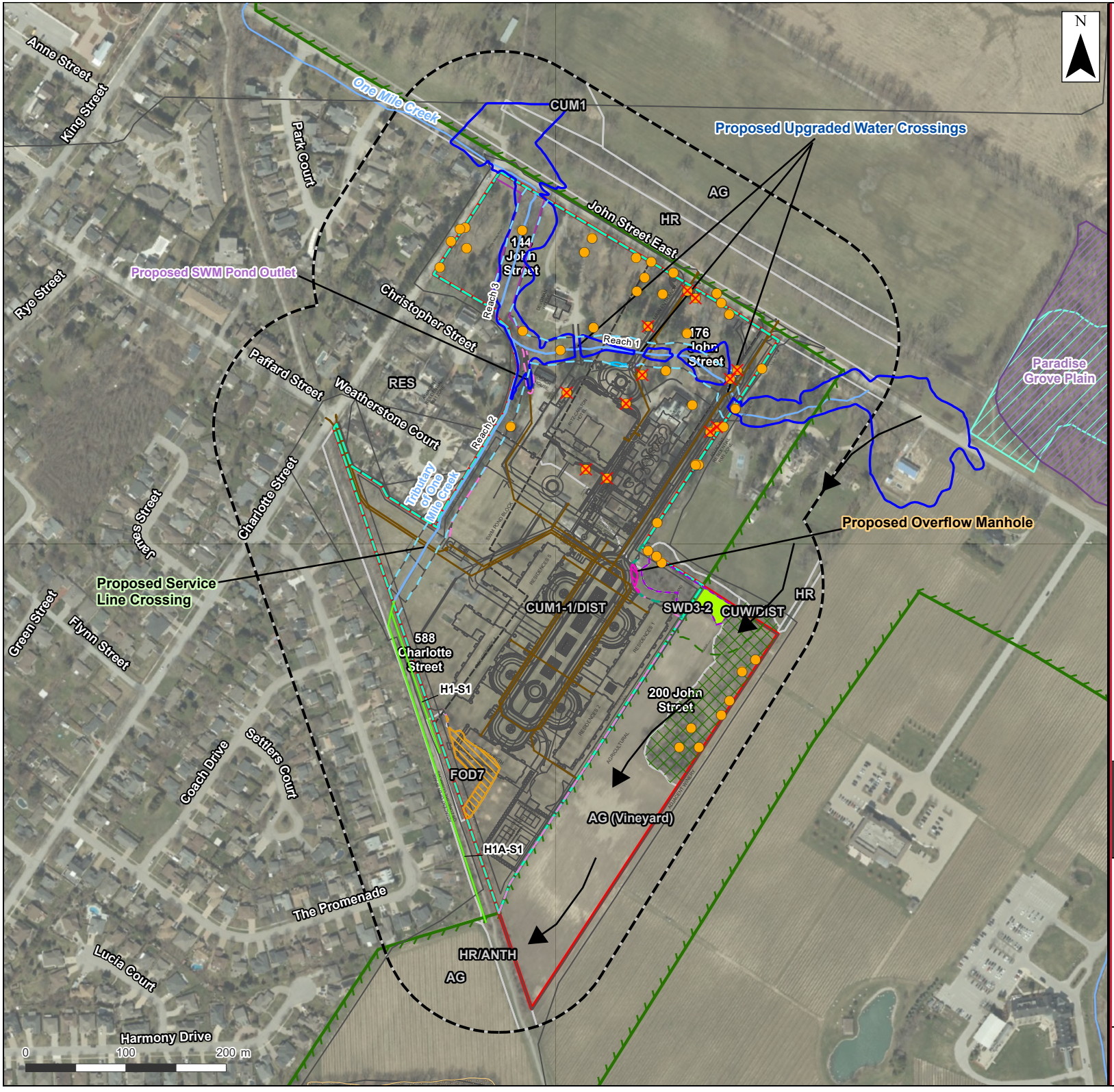
Figure 6
Natural Environment System Components

Project Name:
144, 176, 200 John St. East & 588 Charlotte St. NOTL

Client Name:
Two Sisters Resort Corp
(Ontario, Canada)

GEI Consultants Canada

Last Updated: March 2026
Document ID: 2600786



- Subject Lands
- Property Boundaries
- Proposed Development Area
- Proposed Development Area + 120 m
- Site Plan
- Service Lines
- Existng 100 Year Floodline
- Empirical Meander Belt
- Bat Habitat Tree
- Bat Habitat Requiring Removal * To Be Confirmed by Arborist
- Watercourse (LIO & GEI)
- Wetland Regulated by NPCA
- Wetland - Not evaluated per OWES (LIO)
- Greenbelt Natural Heritage System
- Regionally Significant Life Science ANSI (LIO)
- Wildlife Activity Area (LIO)
- Proposed Limit of Grading Adjacent to Natural Features
- Watercourse +10 m
- Wetland + 10 m
- Wetland + 30 m
- Wetland (KNHF/KHF)
- Other Woodland and Other Wildlife Habitat (NOP, 2022)
- Ecological Linkage
- Ecological Land Classification

HDF Management Recommendations

- Mitigation

Natural Feature Proposed Encroachment

- Proposed Grading with Watercourse Buffer
- Proposed Tree Removal in FOD7
- Proposed Watercourse Buffer Encroachment
- Proposed Wetland Buffer Encroachment

ELC Legend

CUM1-1, Dry - Moist Old Field Meadow
CUW, Cultural Woodland
DIST, Disturbed
FOD7, Fresh – Moist Lowland Deciduous Forest
RES, Residential
SWD3-2, Silver Maple Mineral Deciduous Swamp
AG, Agricultural
ANTH, Anthropogenic
HR, Hedgerow
Parkland

Reference(s):

1. Coordinate System: NAD 1983 CSRS UTM Zone 17N.
2. Base features produced under license with the Ontario Ministry of Natural Resources and Forestry © King's Printer for Ontario, 2026.
3. Orthoimagery © First Base Solutions, 2026. Imagery taken in 2023.

Figure 7
Proposed Site Plan

Project Name:
144, 176, 200 John St. East & 588 Charlotte St. NOTL

Client Name:
Two Sisters Resort Corp
(Ontario, Canada)

GEI Consultants Canada

Last Updated: April 2026
Document ID: 2600786

Appendix B Tables

Table 1: Field Studies and Natural Inventories (2017-2026)

FIELD DATE	NATURE OF INVESTIGATION	SURVEYOR(S)
September 6, 2017	• Aquatic Environment Assessment	N. Boucher
2018		
March 23, 2018	• Site Reconnaissance • Bat Habitat Assessment	M. Green J. Leslie
April 13, 2018	• Headwater Drainage Feature Assessment (Round 1)	M. Green N. Boucher
May 1, 2018	• Snake Transect Survey (Round 1)	M. Green N. Boucher
May 1, 2018	• Amphibian Call Count and Egg Mass Survey (Round 1)	M. Green
May 14, 2018	• Snake Transect Survey (Round 2)	M. Green R. Rossi
May 17, 2018	• Snake Transect Survey (Round 3)	M. Green
May 23, 2018	• Amphibian Call Count (Round 2)	M. Green
May 30, 2018	• Headwater Drainage Feature Assessment (Round 2)	M. Green L. Williamson
May 31 to June 11, 2018	• Bat Acoustic Survey	M. Green L. Williamson
June 7, 2018	• Breeding Bird Survey (Round 1)	B. Charlton
June 12, 2018	• Amphibian Call Count (Round 3)	M. Green
June 25, 2018	• Breeding Bird Survey (Round 2)	B. Charlton
July 4, 2018	• Breeding Bird Survey (Round 3)	B. Charlton
July 9, 2018	• Ecological Land Classification and Botanical Inventory	C. Zoladeski

FIELD DATE	NATURE OF INVESTIGATION	SURVEYOR(S)
September 14, 2018	• Headwater Drainage Feature Assessment (Round 3)	M. Green
October 17, 2018	• Fall Botanical Inventory	C. Zoladeski
November 21, 2018	• Late Fall Botanical Inventory	C. Zoladeski
2019		
May 16, 2019	• Bat Roosting Tree Survey	M. Green C. Zoladeski
June, 2019	• Bat Acoustic Survey	M. Green
2022		
May 25, 2022	• Bat Structure Screening	N. Boucher
June 23, 27, July 7, 12, 2022	• Bat Structure Entry/Exit Surveys	N. Boucher M. Nieroda J. White S. MacDonald
Aug 11, 2022	• Aquatic Habitat Assessment (One Mile Creek)	N. Boucher
Aug 26, 2022	• Tree Inventory, Botanical Assessment, ELC Review	J. Leslie
2026		
April 9, 2026	• Amphibian Call Count (Round 1)	N. Boucher

Table 2: Bat Acoustic Survey Dates and Conditions (2018)

SURVEYORS (SURNAME, INITIAL)	SURVEY ROUND	DATE (2018)	TIME		EQUIPMENT USED	AIR TEMP (C°)	HUMIDITY (%)	CLOUD COVER (%)	BEAUFORT WIND SPEED	PRECIPITATION	MOON PHASE
			START	END							
Williamson, L. Green, M.	1	MA31	21:00	5:30	SM3/SM4	20	74	N/A	2	None	Waning Gibbous (97%)
Williamson, L. Green, M.	2	JU01	21:00	5:30	SM3/SM4	22	79	N/A	2	None	Waning Gibbous (92%)
Williamson, L. Green, M.	3	JU02	21:00	5:30	SM3/SM4	10	70	N/A	2	None	Waning Gibbous (86%)
Williamson, L. Green, M.	4	JU03	21:00	5:30	SM3/SM4	16	82	N/A	1	None	Waning Gibbous (79%)
Williamson, L. Green, M.	5	JU04	21:00	5:30	SM3/SM4	15	77	N/A	2	None	Waning Gibbous (71%)
Williamson, L. Green, M.	6	JU05	21:00	5:30	SM3/SM4	11	76	N/A	2	None	Waning Gibbous (62%)
Williamson, L. Green, M.	7	JU06	21:00	5:30	SM3/SM4	13	73	N/A	1	None	Last Quarter (53%)
Williamson, L. Green, M.	8	JU07	21:00	5:30	SM3/SM4	17	73	N/A	1	None	Waning Crescent (43%)
Williamson, L.	9	JU08	21:00	5:30	SM3/SM4	17	61	N/A	1	None	Waning Crescent

Table 2: Bat Acoustic Survey Dates and Conditions (2018)

SURVEYORS (SURNAME, INITIAL)	SURVEY ROUND	DATE (2018)	TIME		EQUIPMENT USED	AIR TEMP (C°)	HUMIDITY (%)	CLOUD COVER (%)	BEAUFORT WIND SPEED	PRECIPITATION	MOON PHASE
			START	END							
Green, M.											(33%)
Williamson, L. Green, M.	10	JU09	21:00	5:30	SM3/SM4	16	67	N/A	1	None	Waning Crescent (23%)
Williamson, L. Green, M.	11	JU10	21:00	5:30	SM3/SM4	17	54	N/A	1	None	Waning Crescent (15%)
Williamson, L. Green, M.	12	JU11	21:00	5:30	SM3/SM4	16	56	N/A	1	None	Waning Crescent (23%)

LEGEND:

BEAUFORT WIND SPEED SCALE	
1	Calm (<1 km/hr)
2	Light Air (1-5 km/hr)
3	Light Breeze (6-11 km/hr)
4	Gentle Breeze (12-19
5	km/hr)
	Moderate Breeze (20-28 km/hr)

MONTH (CODE)	
JA	January
FB	February
MR	March
AP	April
MA	May
JU	June
JL	July
AU	August
SE	September
OC	October
NO	November
DE	December

Table 3: Headwater Drainage Feature Classifications and Management Recommendations

HDF Reach	Step 1		Step 2	Step 3	Step 4	Management Recommendation (Based on TRCA and CVC 2014)	Final Management Recommendation
	Hydrology	Modifiers	Riparian	Fish Habitat	Terrestrial Habitat		
H1-S1	Round 1 FC: 4 Round 2 FC: 2 Round 3 FC: 1 FT: 2 (Channelized) **Valued** – Feature was dry during the final assessment period	This feature consists of an anthropogenic ditch. Agricultural operations, a pedestrian walking trail to the west and recent vegetation clearing have likely modified the hydrology of this feature.	**Important** – Riparian vegetation consists of scrubland in the first corridor category (0-1.5 m) and lawn in the latter corridor categories (1.5-10 m and 10-30 m).	**Contributing** – No direct fish habitat present in feature.	**Limited** – No terrestrial habitat present in feature. No link to breeding habitat.	**Conservation** – Based on presence of scrubland associated with the vegetated area along the pedestrian trail (historical railway corridor) adjacent to the Subject Lands.	**Mitigation** – Actual ecological and biophysical value of anthropogenic ditch is low and removal should be considered viable, subject to hydrological Mitigation to maintain downstream flows in Tributary of One Mile Creek. However, Feature is located off the Subject Lands and will therefore not be altered.
H1A-S1	Round 1 FC: 4 Round 2 FC: 2 Round 3 FC: 1 FT: 2 (Channelized) **Valued** – Feature was dry during the final assessment period	This feature consists of an anthropogenic ditch. Adjacent residential development and pedestrian walking trail to the west have likely modified the hydrology of this feature.	**Important** – Riparian vegetation consists of scrubland in the first two corridor categories (0-1.5 m and 1.5-10 m) and lawn in the third corridor category (10-30 m).	**Contributing** – No direct fish habitat present in feature.	**Limited** – No terrestrial habitat present in feature. No link to breeding habitat.	**Conservation** – Based on presence of scrubland associated with the vegetated area along the pedestrian trail (historical railway corridor) adjacent to the Subject Lands.	**Mitigation** – Actual ecological and biophysical value of anthropogenic ditch is low and removal should be considered viable, subject to hydrological Mitigation to maintain downstream flows in Tributary of One Mile Creek. However, Feature is located off the Subject Lands and will therefore not be altered.
H1B-S1	Round 1 FC: 1 Round 2 FC: 1 Round 3 FC: 1 FT: 7 (Swale) **Limited** – Swale with no flow during any of the assessment periods	Historical vegetation clearing, residential development and lawn maintenance have likely modified the hydrology of this feature.	**Contributing** – Riparian vegetation consists of lawn in all corridor categories except the first corridor category (0-1.5 m) to the west, which contains of a narrow cultural hedgerow.	**Contributing** – No direct fish habitat present in feature.	**Limited** – No terrestrial habitat present in feature. No link to breeding habitat.	**No Management Required**	**No Management Required**
H1C-S1	Round 1 FC: 1 Round 2 FC: 1 Round 3 FC: 1 FT: 7 (Swale) **Limited** – Swale with no flow during any of the flow assessment periods	Historical vegetation clearing, residential development and lawn maintenance have likely modified the hydrology of this feature.	**Contributing** – Riparian vegetation consists of lawn in all corridor categories.	**Contributing** – No direct fish habitat present in feature.	**Limited** – No terrestrial habitat present in feature. No link to breeding habitat.	**No Management Required**	**No Management Required**
H1-S2a	Round 1 FC: 1 Round 2 FC: 1 Round 3 FC: 1 FT: 2 (Channelized) **Limited** – Dry during the first-round assessment	Agricultural operations and a pedestrian walking trail to the west have likely modified the hydrology of this feature.	**Limited** – Riparian vegetation consists of cropped land in all corridor categories.	**Contributing** – No direct fish habitat present in feature.	**Limited** – No terrestrial habitat present in feature. No link to breeding habitat.	**No Management Required**	**No Management Required**

Table 3: Headwater Drainage Feature Classifications and Management Recommendations

HDF Reach	Step 1		Step 2	Step 3	Step 4	Management Recommendation (Based on TRCA and CVC 2014)	Final Management Recommendation
	Hydrology	Modifiers	Riparian	Fish Habitat	Terrestrial Habitat		
H1-S2b	Round 1 FC: 1 Round 2 FC: 2 Round 3 FC: 1 FT: 2 (Channelized) **Limited** – Dry during the first round assessment			**Contributing** – No direct fish habitat present in feature.	**Limited** – No terrestrial habitat present in feature. No link to breeding habitat.	**No Management Required**	**No Management Required**

Legend

FC – Flow Condition Codes from Ontario Stream Assessment Protocol (Stanfield 2017)
1 – No surface Water (dry)
2 – Standing Water
3 – Interstitial Flow
4 – Surface Flow Minimal (<0.5 L/s)
5 – Surface Flow Substantial (>0.5 L/s)

FT – Feature Type Codes from Ontario Stream Assessment Protocol (Stanfield 2017)
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

Table 4: Ecological Land Classification Community Types

ELC TYPE	COMMUNITY DESCRIPTION	S-RANK / G-RANK (NHIC 2021)
FOREST		
Deciduous Forest		
FOD7 Fresh-Moist Lowland Deciduous Forest	• Young remnant stand composed of many tree species with no evident dominant. • Most interior trees are smaller in size, with larger ones at the edge. • Canopy species include Green Ash (*Fraxinus pennsylvanica*), Pin Oak (*Quercus palustris*), Swamp White Oak (*Q. bicolor*), Red Oak (*Q. rubra*), Black Walnut (*Juglans nigra*) and White Pine (*Pinus strobus*). • Well developed understorey with Multiflora Rose (*Rosa multiflora*), Riverbank Grape (*Vitis riparia*), Grey Dogwood (*Cornus foemina*), Starved Aster (*Symphyotrichum lateriflorum*), Enchanter's Nightshade (*Circaea lutetiana*) and White Avens (*Geum canadense*).	NA
SWAMP		
Deciduous Swamp		
SW3-2 Silver Maple Mineral Deciduous Swamp	• Small stand of Silver Maple (*Acer saccharinum*), with associates of Green Ash, Pin Oak and Swamp White Oak. • Grey dogwood was the leading tall shrub. Understory now regularly maintained. • Herbaceous layer composed of Straw Sedge (*Carex tenera*), followed by Reed-canary Grass (*Phalaris arundinacea*) and Fowl Meadow Grass (*Poa palustris*).	S5
CULTURAL		
CUW Cultural Woodland	• Open, narrow woodland of Swamp White Oak, Pin Oak, Green Ash, Trembling Aspen (*Populus tremuloides*), Shagbark Hickory (*Carya ovata*) and White Oak (*Quercus alba*). • The understorey has been recently cleared, but it consisted of Multiflora Rose, Tartarian Honeysuckle (*Lonicera tatarica*), Tall Goldenrod (*Solidago altissima*), White Avens, Kentucky Bluegrass (*Poa pratensis*), Garlic Mustard (*Alliaria petiolata*), and many others.	NA
CUM1-1/DIST	• Open field covered by regenerating vegetation of mostly weeds and other exotics, for example Orchard Grass (*Dactylis glomerata*), Redtop (*Agrostis gigantea*), English Plantain (*Plantago lanceolata*), St. John's-	NA

Table 4: Ecological Land Classification Community Types

ELC TYPE	COMMUNITY DESCRIPTION	S-RANK / G-RANK (NHIC 2021)
Old Field Meadow	wort (*Hypericum perforatum*), Red Clover (*Trifolium pratense*), New England Aster (*Symphyotrichum novae-angliae*), Horseweed (*Conyza canadensis*), Hemp Dogbane (*Apocynum cannabinum*) and Tall Goldenrod (*Solidago altissima*). • Area now regularly mowed.	

Table 5: Vascular Plant List

Latin Name	Latin Synonym	Common Name	Coefficient of Conservatism	Wetness Index	Weediness Index	Provincial Status S-Rank	OMNR Status	COSEWIC Status	Global Status G-Rank	Local Status Niagara	Authority
Dryopteridaceae		**Wood Fern Family**									
Matteuccia struthiopteris var. *pensylvanica*		Ostrich Fern	5	-3		S5			G5T5	C	(L.) Tod.
Cupressaceae		**Cedar Family**									
Thuja occidentalis		Eastern White Cedar	4	-3		S5			G5	U	L.
Chamaecyparis sp.		Cedar species	N/A	N/A	N/A	NT			NT	C	
Pinaceae		**Pine Family**									
Picea abies		Norway Spruce		5	-1	SNA			G5	IC	(L.) Karsten
Picea glauca		White Spruce	6	3		S5			G5	IU	(Moench) Voss
Picea rubens		Red Spruce	7	3		S3			G5	IC	
Pinus nigra		Austrian Pine		-5	-1	SNA			GNA	IR	Arnold
Pinus strobus		Eastern White Pine	4	3		S5			G5	C	L.
Pinus sylvestris		Scots Pine		5	-3	SNA			GNA	IC	L.
Tsuga canadensis		Eastern Hemlock	7	3		S5			G5	C	(L.) Carrière
Pseudotsuga menziesii		Doulgas Fir	N/A	N/A	N/A	NT			NT	I	
Larix lacricina		Tamarack	7	-3		S5			G5	R	
Aceraceae		**Maple Family**									
Acer negundo		Manitoba Maple	0	-2		S5			G5	C	L.
Acer platanoides		Norway Maple		5	-3	SNA			GNA	IC	L.
Acer pseudoplatanus		Sycamore Maple		5	-1	SNA			GNA	IR	L.
Acer saccharinum		Silver Maple	5	-3		S5			G5	C	L.
Acer saccharum ssp. saccharum		Sugar Maple	4	3		S5			G5T5	C	Marshall
Acer Rubrum		Red Maple	4	0		S5			G5	C	
Amaranthaceae		**Amaranth Family**									
Amaranthus retroflexus		Red-root Amaranth		2	-1	SNA			G5	IC	L.
Anacardiaceae		**Sumac or Cashew Family**									
Rhus typhina		Staghorn Sumac	1	5		S5			G5	C	L.
Toxicodendron radicans ssp. negundo	*Rhus radicans ssp. negundo*	Climbing Poison Ivy	5	-1		S5			G5T5	C	L.
Apiaceae		**Carrot or Parsley Family**									
Aegopodium podagraria		Goutweed		0	-3	SNA			GNR	IR	L.
Daucus carota		Wild Carrot		5	-2	SNA			GNR	IC	L.
Apocynaceae		**Dogbane Family**									
Apocynum cannabinum var. cannabinum		Hemp Dogbane		1		S5			G5T5	C	L.
Asclepiadaceae		**Milkweed Family**									
Asclepias syriaca		Common Milkweed	0	5		S5			G5	C	L.
Asteraceae		**Composite or Aster Family**									
Ambrosia artemisiifolia		Annual Ragweed	0	3		S5			G5	C	L.
Bidens frondosa		Devil's Beggaticks	3	-3		S5			G5	C	L.
Cirsium arvense		Canada Thistle		3	-1	SNA			GNR	IC	(L.) Scop.
Cirsium vulgare		Bull Thistle		4	-1	SNA			GNR	IC	(Savi) Ten.
Conyza canadensis	*Erigeron canadensis*	Horseweed	0	1		S5			G5	C	(L.) Cronquist

Table 5: Vascular Plant List

Latin Name	Latin Synonym	Common Name	Coefficient of Conservatism	Wetness Index	Weediness Index	Provincial Status S-Rank	OMNR Status	COSEWIC Status	Global Status G-Rank	Local Status Niagara	Authority
Erechtites hieraciifolius		Eastern Burnweed	2	3		S5			G5	C	(L.) Raf. ex DC.
Erigeron annuus		Annual Fleabane				S5			G5	C	(L.) Pers.
Erigeron philadelphicus ssp. philadelphicus		Philadelphia Fleabane	1	-3		S5			G5T5	C	L.
Erigeron strigosus		Daisy Fleabane	0	1		S5			G5	R	Muhlenb. ex Willd.
Eurybia macrophylla	*Aster macrophyllus*	Large-leaved Aster	5	5		S5			G5	C	L.
Euthamia graminifolia	*Solidago graminifolia*	Grass-leaved Goldenrod	2	-2		S5			G5	C	(L.) Nutt.
Galinsoga quadriradiata		Fringed Galinsoga		5	-1	SNA			GNR	IR	Rúiz, Lopez & Pavón
Lactuca serriola		Prickly Lettuce		0	-1	SNA			GNR	IC	L.
Lapsana communis		Common Nipplewort		5	-2	SNA			GNR	IC	L.
Leucanthemum vulgare	*Chrysanthemum leucanthemum*	Oxeye Daisy		5	-1	SNA			GNR	IC	L.
Rudbeckia laciniata		Cut-leaved Coneflower	7	-4		S5			G5	R	L.
Senecio vulgaris		Common Ragwort		5	-1	SNA			GNR	IU	L.
Solidago altissima		Tall Goldenrod	1	3		S5			G5	C	L.
Sonchus arvensis ssp. *arvensis*		Field Sow-thistle				SNA			SNRTN	IC	L.
Sonchus asper		Prickly Sow-thistle		0	-1	SNA			GNR	IC	(L.) Hill
Symphyotrichum lanceolatum var. lanceolatum	*Aster lanceolatus ssp. lanceolatus*	White Panicled Aster	3	-3		S5			G5T5	C	Willd.
Symphyotrichum lateriflorum	*Aster lateriflorus*	Starved Aster	3	-2		S5			G5	C	(L.) Britton
Symphyotrichum novae-angliae	*Aster novae-angliae*	New England Aster	2	-3		S5			G5	C	L.
Taraxacum officinale		Common Dandelion		3	-2	SNA			G5	IC	G. Weber
Balsaminaceae		**Touch-me-not Family**									
Impatiens capensis		Spotted Jewelweed	4	-3		S5			G5	C	Meerb.
Berberidaceae		**Barberry Family**									
Berberis thunbergii		Japanese Barberry		4	-3	SNA			GNR	IC	DC.
Berberis vulgaris		European Barberry		3	-2	SNA			GNR	IC	L.
Podophyllum peltatum		May Apple	5	3		S5			G5	C	L.
Betulaceae		**Birch Family**									
Ostrya virginiana		Eastern Hop-hornbeam	4	4		S5			G5	C	(Miller) K. Koch
Betula papyrifera		Paper Birch									
Boraginaceae		**Borage Family**									
Myosotis scorpioides		True Forget-me-not		0	-1	SNA			G5	IU	L.
Brassicaceae		**Mustard Family**									
Alliaria petiolata	*Alliaria officinalis*	Garlic Mustard		0	-3	SNA			GNR	IC	(M. Bieb.) Cavara & Grande
Sinapis arvensis	*Brasica kaber*	Corn Mustard		5	-1	SNA			GNR	IR	L.
Campanulaceae		**Bellflower Family**									
Campanula rapunculoides		Creeping Bellflower		5	-2	SNA			GNR	IR	L.
Caprifoliaceae		**Honeysuckle Family**									
Lonicera tatarica		Tartarian Honeysuckle		3	-3	SNA			GNR	IC	L.
Viburnum lantana		Wayfaring-tree		5	-1	SNA			GNR	IU	L.
Viburnum opulus		Cranberry Viburnum		0	-1	S5			G5	IC	L.
Caryophyllaceae		**Pink Family**									

Table 5: Vascular Plant List

Latin Name	Latin Synonym	Common Name	Coefficient of Conservatism	Wetness Index	Weediness Index	Provincial Status S-Rank	OMNR Status	COSEWIC Status	Global Status G-Rank	Local Status Niagara	Authority
Cerastium fontanum	*Cerastium vulgatum*	Common Mouse-ear Chickweed		3	-1	SNA			GNR	IC	Baumg.
Dianthus armeria		Deptford-pink		5	-1	SNA			GNR	IC	L.
Celastraceae		**Staff-tree Family**									
Celastrus orbiculatus		Oriental Bittersweet		5	-1	SNA			GNR	IR	Thunb.
Chenopodiaceae		**Goosefoot Family**									
Chenopodium album var. *album*	*Chenopodium album*	White Goosefoot		1	-1	SNA			G5TNR	IC	L.
Cornaceae		**Dogwood Family**									
Cornus alternifolia		Alternate-leaf Dogwood	6	5		S5			G5	C	L. f.
Cornus foemina	*Cornus racemosa*	Grey Dogwood	2	-2		S5			GNR	C	Miller
Cornus florida		Eastern Flowering Dogwood	7	3		S2?			G5	U	
Euphorbiaceae		**Spurge Family**									
Acalypha rhomboidea		Three-seeded Mercury	0	3		S5			G5	C	L.
Euphorbia maculata	*Chamaesyce maculata*	Spotted Spurge		4	-1	SNA			G5?	IU	(L.) Small
Fabaceae		**Pea Family**									
Cercis canadensis		Eastern Redbud	8	3		SX			G5	IR	L.
Gleditsia triacanthos		Honey-locust	3	0		S2?			G5	R	L.
Medicago lupulina		Black Medic		1	-1	SNA			GNR	IC	L.
Robinia pseudoacacia		Black Locust	N/A	3		SNA			GNR	IC	L.
Trifolium hybridum		Alsike Clover		1	-1	SNA			GNR	IC	L.
Trifolium pratense		Red Clover		2	-2	SNA			GNR	IC	L.
Fagaceae		**Beech Family**									
Fagus sylvatica		European Beech									L.
Quercus alba		White Oak	6	3		S5			G5	C	L.
Quercus bicolor		Swamp White Oak	8	-4		S4			G5	C	Willd.
Quercus macrocarpa		Bur Oak	5	1		S5			G5	U	Michx.
Quercus palustris		Pin Oak	9	-3		S4			G5	C	Muenchh.
Quercus robur		English Oak				SNA			GNR		L.
Quercus rubra		Northern Red Oak	6	3		S5			G5		L.
Quercus velutina		Black Oak	8	5		S4			G5	U	Lam.
Gentianaceae		**Gentian Family**									
Centaurium erythraea	*Centaurium umbellatum*	Common Centaury		-4	-1	SNA			GNR	IH	Rafn.
Geraniaceae		**Geranium Family**									
Geranium robertianum		Herb-robert		5	-2	SNA			G5	IC	L.
Geranium canadense		Spotted Geranium	2	3		S5			G5	C	L.
Grossulariaceae		**Currant Family**									
Ribes rubrum		Northern Red Currant		5	-2	SNA			G4G5	IC	L.
Guttiferae		**St. John's-wort Family**									
Hypericum perforatum		Common St. John's-wort		5	-3	SNA			GNR	IC	L.
Hippocastanaceae		**Buckeye Family**									

Table 5: Vascular Plant List

Latin Name	Latin Synonym	Common Name	Coefficient of Conservatism	Wetness Index	Weediness Index	Provincial Status S-Rank	OMNR Status	COSEWIC Status	Global Status G-Rank	Local Status Niagara	Authority
Aesculus glabra		Ohio Buckeye	10	-1		S1			G5	IR	Willd.
Juglandaceae		**Walnut Family**									
Carya cordiformis		Bitternut hickory	6	0		S5			G5	C	(Wangenh.) K. Koch
Carya ovata		Shagbark Hickory	6	3		S5			G5	C	(Miller) K. Koch
Juglans nigra		Black Walnut	5	3		S4?			G5	C	L.
Juglans regia		English Walnut	N/A	5		SNR			GNR	N/A	L.
Carya glabra		Pignut Hickory	9	3		S3			G5	U	L.
Lamiaceae		**Mint Family**									
Glechoma hederacea		Ground Ivy		5	-2	SNA			GNR	IC	L.
Lycopus uniflorus		Northern Bugleweed	5	-5		S5			G5	C	Michx.
Melissa officinalis		Garden Balm		5	-1	SNA			GNR	IR	L.
Nepeta cataria		Catnip		1	-2	SNA			GNR	IC	L.
Prunella vulgaris ssp. *vulgaris*		Self-heal		0	-1	SNA			G5TU		L.
Lauraceae		**Laurel Family**									
Sassafras albidum		Sassafras	6	3		S4			G5	C	L.
Malvaceae		**Mallow Family**									
Malva neglecta		Dwarf Cheeseweed		5	-1	SNA			GNR	IU	Wallr.
Menispermaceae		**Moonseed Family**									
Menispermum canadense		Canada Moonseed	7	0		S4			G5	U	L.
Moraceae		**Mulberry Family**									
Morus alba		White Mulberry		0	-3	SNA			GNR	IC	L.
Oleaceae		**Olive Family**									
Fraxinus americana		White Ash	6	3		S4			G4	C	L.
Fraxinus pennsylvanica		Red Ash	3	-3		S5			G5	C	Marshall
Ligustrum vulgare		European Privet		1	-2	SNA			GNR	IC	L.
Onagraceae		**Evening-primrose Family**									
Circaea lutetiana	*Circaea canadensis ssp. canadensis*	Enchanter's Nightshade	3	3		S5			G5	C	L.
Epilobium ciliatum ssp. *ciliatum*		Hairy Willow-herb	3	3		S5			G5T5	C	Raf.
Epilobium parviflorum		Small-flower Willow-herb		3	-1	SNA			GNR	IU	Schreb.
Oxalidaceae		**Wood Sorrel Family**									
Oxalis stricta		Upright Yellow Wood-sorrel	0	3		S5			G5	C	L.
Phytolaccaceae		**Pokeweed Family**									
Phytolacca americana		Common Pokeweed	3	1		S4			G5	C	L.
Platanaceae		**Plane-Tree Family**									
Platanus occidentalis		American Sycamore	8	-3		S4			G5	U	L.
Plantaginaceae		**Plantain Family**									
Plantago lanceolata		English Plantain		0	-1	SNA			G5	IC	L.

Table 5: Vascular Plant List

Latin Name	Latin Synonym	Common Name	Coefficient of Conservatism	Wetness Index	Weediness Index	Provincial Status S-Rank	OMNR Status	COSEWIC Status	Global Status G-Rank	Local Status Niagara	Authority
Plantago major		Common Plantain		-1	-1	SNA			G5	IC	L.
Polygonaceae		**Smartweed Family**									
Persicaria maculosa	*Polygonum persicaria*	Lady's-thumb		-3	-1	SNA			G3G5	IC	L.
Persicaria virginiana	*Polygonum virginianum*	Virginia Knotweed	6	0		S4			G5	C	L.
Rumex crispus		Curly Dock		-1	-2	SNA			GNR	IC	L.
Rumex obtusifolius		Bitter Dock		-3	-1	SNA			GNR	IU	L.
Primulaceae		**Primrose Family**									
Lysimachia nummularia		Moneywort		-4	-3	SNA			GNR	IC	L.
Ranunculaceae		**Buttercup Family**									
Ranunculus acris		Tall Buttercup			-2	SNA			G5	IC	L.
Rhamnaceae		**Buckthorn Family**									
Rhamnus cathartica		Common Buckthorn		3	-3	SNA			GNR	IC	L.
Rosaceae		**Rose Family**									
Agrimonia gryposepala		Tall Hairy Groovebur	2	2		S5			G5	C	Wallr.
Crataegus monogyna		English Hawthorn		5	-1	SNA			G5		Jacq.
Crataegus species		Hawthorn species									
Fragaria virginiana		Virginia Strawberry	2	1		S5			G5	C	Miller
Geum canadense		White Avens	3	0		S5			G5	C	Jacq.
Physocarpus opulifolius		Ninebark	5	-2		S5			G5		(L.) Maxim.
Potentilla simplex		Old-field Cinquefoil	3	4		S5			G5	C	Michx.
Prunus avium		Sweet Cherry		5	-2	SNA			GNR	IC	(L.) L.
Prunus serotina		Black Cherry	3	3		S5			G5	C	Ehrh.
Rosa multiflora		Multiflora Rose		3	-3	SNA			GNR	IC	Thunb. ex Murray
Rubus occidentalis		Black Raspberry	2	5		S5			G5	C	L.
Rubiaceae		**Madder Family**									
Asperula arvensis		Blue Woodruff				SNA			G5		L.
Salicaceae		**Willow Family**									
Populus deltoides ssp. *deltoides*		Eastern Cottonwood	4	-1		S5			G5T5	C	Bartram ex Marshall
Populus alba		White Poplar	N/A	5		SNR			G5	IU	L.
Populus tremuloides		Trembling Aspen		0		S5			G5	C	Michx.
Salix x rubens		Reddish Willow		-4	-3	SNA			GNA		Schrank
Sapindaceae		**Soapberry Family**									
Aesculus hippocastanum		Horsechestnut	0	N/A		SE2			GNA	IU	L.
Scrophulariaceae		**Figwort Family**									
Verbascum blattaria		Moth Mullein		4	-1	SNA			GNR	IU	L.
Verbascum thapsus		Common Mullein		5	-2	SNA			GNR	IC	L.
Simaroubaceae		**Ailanthus Family**									
Ailanthus altissima		Tree-of-heaven		5	-1	SNA			GNR	IR	(Miller) Swingle

Table 5: Vascular Plant List

Latin Name	Latin Synonym	Common Name	Coefficient of Conservatism	Wetness Index	Weediness Index	Provincial Status S-Rank	OMNR Status	COSEWIC Status	Global Status G-Rank	Local Status Niagara	Authority
Solanaceae		**Nightshade Family**									
Solanum dulcamara		Climbing Nightshade		0	-2	SNA			GNR	IC	L.
Tiliaceae		**Linden Family**									
Tilia americana		American Basswood	4	3		S5			G5	C	L.
Tilia cordata		Small Leaf Linden				SNA			GNR	IH	Miller
Ulmaceae		**Elm Family**									
Ulmus americana		White Elm	3	-2		S5			G5	C	L.
Verbenaceae		**Vervain Family**									
Verbena urticifolia		White Vervain	4	-1		S5			G5	C	L.
Violaceae		**Violet Family**									
Viola sororia	*Viola sororia var. affinis*	Woolly Blue Violet				S5			G5	C	Willd.
Vitaceae		**Grape Family**									
Parthenocissus inserta	*Parthenocissus vitacea*	Inserted Virginia-creeper	3	3		S5			G5	C	(A. Kern.) Fritsch
Vitis riparia		Riverbank Grape	0	-2		S5			G5	C	Michx.
Cyperaceae		**Sedge Family**									
Carex bromoides		Bromelike Sedge	7	-4		S5			G5	C	Schkuhr ex Willd.
Carex cristatella		Crested Sedge	3	-4		S5			G5	U	Britton
Carex gracillima		Graceful Sedge	4	3		S5			G5	C	Schwein.
Carex radiata		Eastern Star Sedge	4	5		S5			G5	C	(Wahlenb.) Small
Carex stipata		Awl-fruited Sedge	3	-5		S5			G5	C	Muhlenb. ex Willd.
Carex tenera		Straw Sedge	4	-1		S5			G5	C	Dewey
Carex vulpinoidea		Fox Sedge	3	-5		S5			G5	C	Michx.
Scirpus pendulus		Lined Bulrush	3	-5		S5			G5	U	Muhlenb. ex Willd.
Juncaceae		**Rush Family**									
Juncus dudleyi		Dudley's Rush	1	0		S5			G5	C	Wiegelb
Juncus effusus var. effusus	*Juncus effusus* var. *solutus, Juncus effusus*	Soft Rush	4	-5		SNA			GNR	C	L.
Juncus tenuis		Path Rush	0	0		S5			G5	C	Willd.
Liliaceae		**Lily Family**									
Asparagus officinalis		Garden Asparagus		3	-1	SNA			G5?	IC	L.
Hemerocallis fulva		Orange Day-lily		5	-3	SNA			GNA	IC	(L.) L.
Poaceae		**Grass Family**									
Agrostis gigantea		Redtop		0	-2	SNA			G4G5	IC	Roth
Agrostis stolonifera		Redtop		-3		S5			G5	C	L.
Dactylis glomerata		Orchard Grass		3	-1	SNA			GNR	IC	L.
Digitaria ischaemum		Small Crabgrass		3	-1	SNA			GNR	IU	(Schreb. ex Schwein.) Schreb. ex Muhlenb.
Elymus repens		Quack Grass		3	-3	SNA			GNR	IC	(L.) Gould
Festuca rubra ssp. *rubra*		Red Fescue		1	-1	SNA			G5T5	IC	L.

Latin Name	Latin Synonym	Common Name	Coefficient of Conservatism	Wetness Index	Weediness Index	Provincial Status S-Rank	OMNR Status	COSEWIC Status	Global Status G-Rank	Local Status Niagara	Authority
Glyceria grandis		Tall Mannagrass	5	-5		S5			G5	C	S. Watson
Glyceria striata		Fowl Meadow Grass	3	-5		S5			G5	C	(Lam.) A. Hitchc.
Panicum capillare		Witch Grass	0	0		S5			G5	C	L.
Phalaris arundinacea var. arundinacea	*Phalaris arundinacea*	Reed Canary Grass	0	-4		S5			GNR	C	L.
Phleum pratense		Timothy		3	-1	SNA			GNR	IC	L.
Phragmites australis ssp. australis		European Reed				SNR			GNR		(Cav.) Trin. ex Steud.
Poa compressa		Canada Blue Grass	0	2		SNA			GNR	IC	L.
Poa palustris		Fowl Meadow Grass	5	-4		S5			G5	C	L.
Poa pratensis ssp. pratensis		Kentucky Bluegrass	0	1		SNA			G5T5	IC	L.
Schedonorus pratensis	*Festuca pratensis, Lolium pratense*	Meadow Fescue		4	-1	SNA			G5	IC	Hudson
Setaria pumila	*Setaria glauca*	Yellow Foxtail		0	-1	SNA			GNR	IC	(Poir.) Schult.

STATISTICS

Species Richness

Total Number of Species:	175	
Native Species:	93	53%
Exotic Species:	82	47%
S1-S3 Species:	5	5%
S4 Species:	10	11%
S5 Species:	77	84%

Floristic Quality Indices

Mean Co-efficient of Conservatism (CC)	3.8	
CC 0 - 3 = lowest sensitivity	44	48%
CC 4 - 6 = moderate sensitivity	33	36%
CC 7 - 8 = high sensitivity	11	12%
CC 9 - 10 = highest sensitivity	3	3%
Floristic Quality Index (FQI)	36	

Weedy and Invasive Species

Mean Weediness Index:	-1.6	
-1 = low potential invasiveness	39	56%
-2 = moderate potential invasiveness	17	24%
-3 = high potential invasivenss	14	20%

Wetland Species

Mean Wetness Index	1.2	
upland	34	21%
facultative upland	51	31%
facultative	41	25%
facultative wetland	31	19%
obligate wetland	8	5%

EXPLANATION OF TERMINOLOGY

Botanical and Common Name: From Brouillet et. al, 2010+. Species requiring confirmation noted (cf).
Co-efficient of Conservatism: This value, ranging from 0 (low) to 10 (high), is based on a species tolerance of disturbance and fidelity to a specific habitat integrity.

Wetness Index: This value, ranging from -5 (obligate wetland) to 5 (upland) provides the probability of a species occurring in wetland or upland habitats.
Weediness Index: This value, ranging from -1 (low) to -3 (high) quantifies the potential invasiveness of non-native plants. In combination with the percentage of non-native plants, it can be used as an indicator of disturbance.

Provincial Status: Provincial ranks are used by the NHIC to set protection priorities for rare species and natural communities. These ranks are not legal designations. S4 and S5 species are generally uncommon to common in the province. Species ranked S1-S3 are considered to be rare in Ontario.

Status in Niagara Regional Municipality (Oldham 2010)

R: Rare, 10 or fewer post 1980 records

RH: Rare Historic, no records post 1980

U: Uncommon, 11-20 post 1980 records

C: Common, more than 20 post 1980 records

DD: Data deficient, further work needed to determine status

I: Introduced

hyb: hybrid, no Niagara status assigned

FACW (Facultative Wetland): usually occurs in wetlands, but occasionally found in non-wetlands (estimated 67-99% probability)

FAC (Facultative): equally likely to occur in wetlands or non-wetlands (estimated 34-66% probability)

FACU (Facultative Upland): occasionally occurs in wetlands, but usually occurs in non-wetlands (estimated 1-33% probability)

UPL (Upland): occurs almost never in wetlands under natural conditions (estimated <1% probability)

Further refinement of the Facultative categories are denoted by a "+" or "-" to express exaggerated tendencies for those species. The "+" denotes a greater estimated probability occurring in wetlands than species in the general indicator category, but a lesser probability than species occurring in the next higher category. The "-" denotes a lesser estimated probability of occurring in wetlands than species in the general indicator category, but a greater probability than species occurring in the next lower general category.

Each wetland category has been assigned a numerical value to facilitate the quantification of the wetness index. The wetland categories and their corresponding values are as follows:

OBL : -5

FACW+: -4

FACW: -3

FACW-: -2

FAC+: -1

FAC: 0

FAC-: 1

FACU+: 2

FACU: 3

FACU-: 4

UPL: 5

Provincial Status

Provincial ranks are used by the NHIC to set protection priorities for rare species and natural communities. These rankings are based on the total number of extant Ontario populations and the degree to which they are potentially or actively threatened with destruction. The ranks are:

S1: Critically Imperiled - Critically imperiled in the nation or state/province because of extreme rarity (often 5 or fewer occurrences) or because of some factor(s) such as very steep declines making it especially vulnerable to extirpation from the state/province.
S2: Imperiled - Imperiled in the nation or state/province because of rarity due to very restricted range, very few populations (often 20 or fewer), steep declines, or other factors making it very vulnerable to extirpation from the nation or state/province.
S3: Vulnerable - Vulnerable in the nation or state/province due to a restricted range, relatively few populations (often 80 or fewer), recent and widespread declines, or other factors making it vulnerable to extirpation.

S4: Apparently Secure - Uncommon but not rare; some cause for long-term concern due to declines or other factors.

S5: Secure - Common, widespread, and abundant in the nation or state/province.

SH: Possibly Extirpated (Historical)—Species or community occurred historically in the nation or state/province, and there is some possibility that it may be rediscovered. Its presence may not have been verified in the past 20-40 years. A species or community could become NH or SH without such a 20-40 year delay if the only known occurrences in a nation or state/province were destroyed or if it had been extensively and unsuccessfully looked for. The NH or SH rank is reserved for species or communities for which some effort has been made to relocate occurrences, rather than simply using this status for all elements not known from verified extant occurrences.

SR: Reported in Ontario, but without persuasive documentation.
SX: Presumed Extirpated—Species or community is believed to be extirpated from the nation or state/province. Not located despite intensive searches of historical sites and other appropriate habitat, and virtually no likelihood that it will be rediscovered.
SE: Exotic; not believed to be a native component of Ontario's flora. Numerical rankings after SE follow designations described above for native species.

SNA: Unranked — Status not assigned.

SU: Unranked — Nation or state/province conservation status not yet assessed.

Rank ranges, e.g. S2S3, indicate that the rank is either S2 or S3, but that current information is insufficient to differentiate.

"**?**" following a rank indicates uncertainty about the assigned rank.
Q: Questionable taxonomy — Taxonomic distinctiveness of this entity is questionable; resolution of this uncertainty may result in change from a species to a subspecies or hybrid, or the inclusion of this taxon in another taxon, with the resulting taxon having a lower-priority conservation status.

Table 6: Breeding Bird Survey Results

Common Name	Scientific Name	Provincial Status (S Rank)	Global Status (G Rank)	COSSARO (MNRF)	COSEWIC (Federal)	Highest Breeding Evidence	Round 1 PC 1	Round 1 PC 2	Round 1 PC 3	Round 1 PC 4	Incidental Round 1	Off Site Round 1	Round 2 PC 1	Round 2 PC 2	Round 2 PC 3	Round 2 PC 4	Incidental Round 2	Off Site Round 2	Round 3 PC 1	Round 3 PC 4	Incidental Round 3	Off Site Round 3
Mourning Dove	*Zenaida macroura*	S5	G5			PR-T	1	1	3	1		2	1		2	3	2					1
European Starling	*Sturnus vulgaris*	SNA	G5			CO-CF	2	1		1		2	3		1				4			
Ring-billed Gull	*Larus delawarensis*	S5B,S4N	G5			OB-X	3	1	3					1	1				2			
Carolina Wren	*Thryothorus ludovicianus*	S4	G5			PR-T						1						1				
Gray Catbird	*Dumetella carolinensis*	S4B	G5			CO-CF	1		1				2	1	1							
Northern Cardinal	*Cardinalis cardinalis*	S5	G5			CO-CF	2	3	2	3		6	2		1	2		1	2	4		4
Song Sparrow	*Melospiza melodia*	S5B	G5			CO-CF	1	3	2			1	2	1		2		1	1	1		
American Goldfinch	*Spinus tristis*	S5B	G5			PR-P	3	1	1				2						4	2		
Eastern Wood-Pewee	*Contopus virens*	S4B	G5	SC	SC	PO-S						1									1	
Blue Jay	*Cyanocitta cristata*	S5	G5			CO-FY	2	2		1		2	3	4	2				2			5
American Robin	*Turdus migratorius*	S5B	G5			CO-FY	1	4	6	5		1	5	3	5	4		4	1	2		
Downy Woodpecker	*Picoides pubescens*	S5	G5			PR-T				1		1	1			1		1				
Hairy Woodpecker	*Picoides villosus*	S5	G5			PR-T						1			1			1				
Red-winged Blackbird	*Agelaius phoeniceus*	S4	G5			PR-P		3				1	1	1	2	2			1	1		
House Wren	*Troglodytes aedon*	S5B	G5			PR-T		2	2	2				1	1	1				2		
Killdeer	*Charadrius vociferus*	S5B, S5N	G5			CO-FY		1	5					1	8						1	
Common Grackle	*Quiscalus quiscula*	S5B	G5			CO-FS		3	2	2			4	3	5	2			6			
Northern Flicker	*Colaptes auratus*	S4B	G5			CO-CF		1							1				1	1		2
Baltimore Oriole	*Icterus galbula*	S4B	G5			CO-CF		1							2							
Barn Swallow	*Hirundo rustica*	S4B	G5	SC	SC	OB-X							1									
Chimney Swift	*Chaetura pelagica*	S4B, S4N	G5	THR	THR	OB-X			3										1			
American Crow	*Corvus brachyrhynchos*	S5B	G5			OB-X							1									
Great Blue Heron	*Ardea herodias*	S4	G5			OB-X			1													
Warbling Vireo	*Vireo gilvus*	S5B	G5			PO-S				1												
House Sparrow	*Passer domesticus*	SNA	G5			PR-P				2										2		
Great Crested Flycatcher	*Myiarchus crinitus*	S4B	G5			PO-S												1			2	
Red-bellied Woodpecker	*Melanerpes carolinus*	S4	G5			PO-S												1				
Black-capped Chickadee	*Poecile atricapillus*	S5	G5			PO-H																
Savannah Sparrow	*Passerculus sandwichensis*	S4B	G5			PO-S								1								
Double-crested Cormorant	*Phalacrocorax auritus*	S5B	G5			OB-X									1							
White-breasted Nuthatch	*Sitta carolinensis*	S5	G5			PO-S																1
Sandhill Crane	*Grus canadensis*	S5B	G5			OB-X														2		
House Finch	*Carpodacus mexicanus*	SNA	G5			PR-T														1		

Species Common Name and Scientific Name:	Consistent with the American Ornithologists' Union. 2016. 57th Check-list Supplement of North American Birds. Accessed November 30, 2016. Available online: http://americanornithology.org/content/aou-checklist-north-and-middle-american-birds-7th-edition-and-supplements/
Species Code:	Consistent with the American Ornithologists' Union. 2016. Species 4-Letter-Codes. Accessed May 25, 2012. Available online: 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). 2012. Breeding Evidence Codes. Accessed January 25, 2014. Available online: http://www.birdsontario.org/dataentry/codes.jsp?page=breeding/. Several different types of breeding evidence are often recorded for any given species over the course of surveys - this table reports only the highest level of breeding evidence
S ranks:	Provincial ranks are from the Natural Heritage Information Centre; S1 (critically imperiled), S2 (imperlied), S3 (vulnerable), S4 (apparently secure), S5 (secure); ranks were updated using NHIC species list 2025
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 2025
COSSARO (MNRF):	Ontario Species at Risk as listed by the Committee on the Status of Species at Risk in Ontario (from Ontario Regulation 230/08 Species at Risk in Ontario website: 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: http://www.cosewic.gc.ca/eng/sct1/searchform_e.cfm/); END - Endangered, THR - Threatened, SC - Special Concern, NAR - Not at Risk

Table 7: Amphibian Call Count Survey Results

SURVEY ROUND	STATION ID	SPECIES CODE													WATER	
		NOAM	CHFR	PIFR	TLSA	AMTO	SPPE	NLFR	CHFR	WOFR	GRTR	BULL	GRFR	MIFR	Present (Y/N)	Depth (CM)
2018																
1	AMC1					2(10)									Y	14
2	AMC1	X													Y	8
3	AMC1	X													N	
1	AMC2	X													Y	6
2	AMC2					1(2)									Y	6
3	AMC2	X													N	
1	AMC3					3(30)									Y	8
2	AMC3	X													Y	5
3	AMC3	X													N	
2026																
1	AMC1	X													Y	15
1	AMC2	X													Y	8
1	AMC3	X													Y	14
1	AMC4	X													Y	12

SPECIES CODES	COMMON NAME	SCIENTIFIC NAME
CHFR	Western Chorus Frog	*Pseudacris triseriata*
PIFR	Pickerel Frog	*Lithobates palustris*
AMTO	American Toad	*Anaxyrus americanus*
SPPE	Spring Peeper	*Pseudacris crucifer*
NLFR	Northern Leopard Frog	*Lithobates pipiens*
WOFR	Wood Frog	*Lithobates sylvatica*
GRTR	Gray Treefrog	*Hyla versicolor*
BULL	American Bullfrog	*Lithobates catesbeiana*
GRFR	Northern Green Frog	*Lithobates clamitans*
MIFR	Mink Frog	*Lithobates septentrionalis*

CALL CODES	
X	No amphibians heard
1	Calls can be counted without error
2	Calls overlap but can be reliably estimated
3	Calls overlap too much to estimate number

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 8: Snake Transect and Area Search Survey Results

DATE SURVEYED	SURVEY ROUND	TRANSECT OR STATION NUMBER	SPECIES CODE														
			NOSN	EAGA	MISN	BRSN	RBSN	NWSN	RISN	BLRA	BUGA	FOSN	HOSN	MASS	RNSN	SGSN	QUSN
01-MA-18	1	T1	X														
01-MA-18	1	T2	X														
01-MA-18	1	T3	X														
01-MA-18	1	AS1	X														
01-MA-18	1	AS2	X														
14-MA-18	2	T1	X														
14-MA-18	2	T2	X														
14-MA-18	2	T3	X														
14-MA-18	2	AS1	X														
14-MA-18	2	AS2	X														
17-MA-18	3	T1	X														
17-MA-18	3	T2	X														
17-MA-18	3	T3	X														
17-MA-18	3	AS1	X														
17-MA-18	3	AS2	X														

LEGEND:

SPECIES CODE	COMMON NAME	SCIENTIFIC NAME
NOSN	No Snakes	No snakes despite survey effort
EAGA	Eastern Gartersnake	*Thamnophis sirtalis sirtalis*
MISN	Eastern Milksnake	*Lampropeltis triangulum*
BRSN	DeKay's Brownsnake	*Storeria dekayi*
RBSN	Northern Red-bellied Snake	*Storeria occipitomaculata occipitomaculata*
NWSN	Northern Watersnake	*Nerodia sipedon sipedon*
RASN	Gray Ratsnake	*Pantherophis spiloides*
RISN	Eastern Ribbonsnake	*Thamnophis sauritus*
BLRA	Blue Racer	*Coluber constrictor foxii*
BUGA	Butler's Gartersnake	*Thamnophis butleri*
FOSN	Eastern Foxsnake	*Pantherophis gloyd*
HOSN	Eastern Hog-nosed Snake	*Heterodon platifhinos*

DATE	
MONTH	CODE
January	JA
February	FE
March	MR
April	AP
May	MA
June	JN
July	JL
August	AU
September	SE
October	OC
November	NO
December	DE

Table 8: Snake Transect and Area Search Survey Results

MASS	Massassauga	*Sistrusus catenatus catenatus*
RNSN	Ring-necked Snake	*Diadophis punctatus*
SGSN	Smooth Greensnake	*Opheodrys vernalis*
QUSN	Queensnake	*Regina septemvittata*

Table 9: Bat Acoustic Survey Results

SM3 Monitoring Station	ELC Community	Low Frequency Calls					High Frequency Calls								Total
		Hoary Bat	Big Brown Bat	Silver-haired Bat	Unidentified Calls	Total Low Frequency Calls	Eastern Red Bat	Eastern Small-footed Myotis	Northern Myotis	Little Brown Myotis	Tri-colored Bat	Unidentified Calls with Myotis characteristics	Unidentified Calls without Myotis characteristics	Total High Frequency Calls	
8034A	SWD3-2	4	340	22	990	1356	2	0	0	0	0	0	14	16	1372
8034B	CUW/DIST	3	339	17	1657	2016	6	2	0	1	0	7	73	89	2105
8034C	CUW/DIST	33	376	45	2537	2991	3	0	0	0	0	0	30	33	3024
Total		40	1055	84	5184	6363	11	2	0	1	0	7	117	140	6503

Table 10: Significant Wildlife Habitat Assessment (Eco-Region 7E)

SIGNIFICANT WILDLIFE HABITAT 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					
Waterfowl Stopover and Staging Areas (terrestrial)	No – CUM present, but substantial flooding not present in spring	N/A	No	N/A	No
Waterfowl Stopover and Staging Areas (aquatic)	Yes – SWD is present	No – small SWD is isolated from other surface water features and considered unsuitable to support large numbers of waterfowl	No	N/A	No
Shorebird Migratory Stopover Areas	Yes – MAM present	No – no muddy and unvegetated shoreline habitats present adjacent to MAM	No	N/A	No
Raptor Wintering Areas	Yes – FOD and CUM present on Subject Lands	No – size criteria not met	No	N/A	No
Bat Hibernacula	No	N/A	No	N/A	No
Bat Maternity Colonies	Yes – FOD and SWD present on Subject Lands	No – forested communities did not contain snag trees at sufficient density	No	N/A	No
Turtle Wintering Areas	Yes –SW ELC community present	No – SWD does not provide overwintering habitat (no permanent pool)	No	N/A	No
Reptile Hibernaculum	Yes	No – no suitable hibernaculum features present	No	N/A	No
Colonial Bird Nesting Sites (bank/cliff)	No	N/A	No	N/A	No
Colonial Bird Nesting Sites (tree/shrubs)	Yes – SWD present	No – SWD community is too small (0.23 ha) to provide significant habitat	No	N/A	No
Colonial Bird Nesting Sites (ground)	No – CUM present, but are heavily managed	N/A	No	N/A	No
Migratory Butterfly Stopover Areas	Yes – CUM and FOD are present	No – minimum size criteria not met	No	N/A	No

Table 10: Significant Wildlife Habitat Assessment (Eco-Region 7E)

SIGNIFICANT WILDLIFE HABITAT 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
Migratory Landbird Stopover Areas	Yes – FOD and SWD present	No – Minimum size criteria for woodlands not met	No	N/A	No
Deer Winter Congregation Areas	Yes – FOD present	No – Minimum size criteria for woodlands not met	No	N/A	No
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 – no rare vegetation types present	N/A	No	N/A	No
Other Rare Vegetation Types (S1 to S3 communities)	No – no other rare vegetation types present	N/A	No	N/A	No
2b. Specialized Wildlife Habitat					
Waterfowl Nesting Area	Yes – SWD and upland habitats present	No – wetland area does not meet criteria (i.e., cluster of 3 or more wetlands <0.5 ha)	No	N/A	No
Bald Eagle and Osprey Habitats	Yes – FOD and SWD present	No – habitat is not suitable to provide nesting and foraging habitat for these species	No	N/A	No
Woodland Raptor Nesting Habitat	Yes – FOD and SWD present	No – forested area does not meet minimum size criteria	No	N/A	No
Turtle Nesting Areas	No	N/A	No	N/A	No
Seeps and Springs	No	N/A	No	N/A	No
Woodland Amphibian Breeding Habitats (within or < 120m from woodland)	Yes – FOD and SWD present on Subject Lands	Yes – wetland and vernal pool located within 120 m of a woodland	Yes	No – Indicator amphibian species not present (only American Toad was found to be breeding on the Subject Lands)	No

Table 10: Significant Wildlife Habitat Assessment (Eco-Region 7E)

SIGNIFICANT WILDLIFE HABITAT 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
Wetland Amphibian Breeding Habitats (wetland >120m from woodland)	No – No MA on Subject Lands located >120 m from woodland	N/A	No	N/A	No
Woodland Area-Sensitive Bird Breeding Habitat	Yes – FOD and SWD present	No – no interior forest habitat present and minimum size criteria not met	No	N/A	No
3. SPECIES OF CONSERVATION CONCERN					
Marsh Bird Breeding Habitat	Yes –SW present	Yes	Yes	No – Indicator species not present	No
Open Country Bird Breeding Habitat	Yes – CUM present	No – minimum size criteria not met	No	N/A	No
Shrub/Early Successional Bird Breeding Habitat	Yes – CUW present	No – minimum size criteria not met	No	N/A	No
Terrestrial Crayfish	Yes –SWD present	Yes	Yes	No – No evidence of Terrestrial crayfish observed during field investigations	No
Special Concern and Rare Wildlife Species					
i. Black Gum (S3)	Yes – SWD is present	Yes	Yes	No – species not observed during botanical inventory	No
ii. Southern Ladies' Tresses (S1)	Yes – moist areas are present	Yes	Yes	No – species not observed during botanical inventory	No
iii. White-tinged Sedge (S3)	Yes – wet woodlands are present	Yes	Yes	No – species not observed during botanical inventory	No
iv. Reflexed Sedge (S2)	Yes – woodlands are present	Yes	Yes	No – species not observed during botanical inventory	No
v. Slightly Hirsute Sedge (S3)	Yes – woodlands are present	Yes	Yes	No – species not observed during botanical inventory	No

Table 10: Significant Wildlife Habitat Assessment (Eco-Region 7E)

SIGNIFICANT WILDLIFE HABITAT 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
vi. Biennial Gaura (S3)	Yes – meadows and abandoned fields are present	Yes	Yes	No – species not observed during botanical inventory	No
vii. Eggert's Thorn (S2)	Yes – woodlands are present	Yes	Yes	No – species not observed during botanical inventory	No
viii. Sundial Lupine (S2S3)	Yes – meadows and abandoned fields are present	Yes	Yes	No – species not observed during botanical inventory	No
ix. Broad Beech Fern (Special Concern)	No – suitable wet forest conditions not present	No	No	N/A	No
x. Common Hop Tree (Threatened, S3)	No – sandy soil areas not present	No	No	N/A	No
xi. Green Dragon (Special Concern)	Yes – damp deciduous forest is present in the SWD area on the Subject Lands	Yes	Yes	No – species not observed during botanical inventory	No
xii. Shumard Oak (Special Concern)	Yes – Deciduous forests with clay soils are present	Yes	Yes	No – species not observed during botanical inventory	No
xiii. Swamp Rose-mallow (Special Concern)	Yes – drainage ditch areas are present	Yes	Yes	No – species not observed during botanical inventory	No
xiv. Eastern Ribbonsnake (Special Concern)	No – Suitable habitat for this species not present	No	No	N/A	No
xv. Snapping Turtle (Special Concern)	No overwintering habitat or suitable nesting habitat present	No	No	N/A	No
xvi. Northern Map Turtle (Special Concern)	No overwintering habitat or suitable nesting habitat present	No	No	N/A	No

Table 10: Significant Wildlife Habitat Assessment (Eco-Region 7E)

SIGNIFICANT WILDLIFE HABITAT 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
xvii. Eastern Wood-pewee (Special Concern)	Yes – Deciduous forest with limited understory is present	Yes	Yes	No – This species was not observed on the Subject Lands (it was observed in a woodland offsite, on the other side of John Street East)	No
xviii. Bald Eagle (Special Concern)	No- small woodland size and habitat not close to large waterbodies	No	No	N/A	No
xix. Canada Warbler (Special Concern)	No – suitable wet forest with dense shrub layer not present	No	No	N/A	No
xx. Common Nighthawk (Special Concern)	Recently forested areas (circa May 2016) are present, but meadow regeneration has limited suitability for these species	No	No	N/A	No
xxi. Peregrine Falcon (Special Concern)	No – suitable habitat not present for this species	No	No	N/A	No
xxii. Red-Headed Woodpecker (Special Concern)	Yes – suitable habitat for this species is present on the Subject Lands	Yes	Yes	No – species was not observed during breeding bird studies	No
xxiii. Wood Thrush (Special Concern)	No – Forested areas on Subject Lands do not contain well developed understory layers	No	No	N/A	No
xxiv. Monarch (Special Concern)	Yes – Meadows with Milkweed are present on the Subject Lands	Yes	Yes	Yes – Monarch adults were present on the Subject Lands in early 2018. Area currently managed. Therefore, this habitat is not considered to be Significant.	No
xxv. West Virginia White (Special Concern)	No – Two-leaved Toothwort not present	No	No	N/A	No
4. ANIMAL MOVEMENT CORRIDORS					
Amphibian Movement Corridors	No – Significant Amphibian Breeding Habitat is not present	N/A	No	N/A	No

Appendix C Meander Belt Assessment

March 20, 2026
Project No. 2600786

Two Sisters Resorts Corp.
122 Romina Drive
Concord, Ontario L4K 4Z7

Attention: Blake Lyon, Group CEO

Re: Fluvial Geomorphic Assessment for 144, 176, 200 John Street East, and 588 Charlotte Street Niagara-on-the-Lake, Ontario

Dear Mr. Lyon:

GEI Consultants Canada Ltd. (GEI) was retained by Two Sisters Resorts Corp. to complete a geomorphic assessment for the purposes of characterizing One Mile Creek as it exists on and in the vicinity of 144, 176 and 200 John Street East, and 588 Charlotte Street, in Niagara-on-the-Lake, Ontario (herein referred to as the Subject Lands). The Subject Lands are proposed to be redeveloped as part of a residential and hotel complex and are located southeast of the intersection of John Street and Charlotte Street. Two tributaries of One Mile Creek traverse the Subject Lands, and confluence within the Subject Lands, before flowing towards Charlotte Street.

Schaeffers Consulting Engineers (Schaeffers) has prepared overall civil engineering designs and the SWM plan for the proposed development. A SWM pond is proposed to provide erosion, quality and quantity controls for the proposed residential development, while an underground storage tank will provide treatment for runoff from the hotel development. Outflows from the pond will be directed via an outlet pipe towards One Mile Creek on the 144 John Street East property. GEI previously completed a fluvial geomorphic study to quantify an erosion threshold for One Mile Creek in order to inform the stormwater management plan.

The present study seeks to delineate the meander belt for One Mile Creek, to assist in determining environmental constraint limits. The following activities were completed as part of this assessment:

- Background review of available materials, including topographic, soil, and geology mapping, as well as a review of pertinent watershed reports, and historic aerial imagery;
- A desktop approach to delineating reaches based on geomorphic form and processes;
- A historical assessment, reviewing past aerial imagery of the Subject Lands and its vicinity;
- A field assessment consisting of a Rapid Geomorphic Assessment (RGA) to characterize existing conditions and document active channel processes, to inform channel stability and erosion sensitivity; and
- Meander belt delineation for all higher-order streams situated within the Subject Lands.

Background Review

A background review was completed for the Subject Lands to gain an understanding of the watercourse and a general context of the Subject Lands.

Watershed Characteristics

One Mile Creek is located in the jurisdiction of the Niagara Peninsula Conservation Authority (NPCA). It is a small watershed, with a total drainage area of 5.2 km^2, and drains towards Lake Ontario (NPCA 2005). The One Mile Creek Watershed Strategy report, prepared by Aquafor Beech (NPCA 2005) notes that the majority of One Mile Creek would be characterized as a first order stream, possibly becoming a second order stream downstream of Nassau Street, nearer to Lake Ontario. The report also notes that upstream of King Street, the watercourse lacks valley characteristics and has poorly defined bed and banks. Channel characteristics have historically been altered by straightening, widening, and in some cases, relocation. The One Mile Creek Watershed Strategy report also notes that most of the reaches in the upper portions of One Mile Creek are intermittent (NPCA 2005).

Climate and Geology

Climate and geology play an important role in influencing the form and processes of a watercourse. Geological influences on patterns and rates of river change include landscape configuration, material availability, and erodibility of the substrate. Climatic fluctuations influence water balance and vegetation patterns, which impact flow regimes and the production, supply, and transport of sediment. The following sections provide an understanding of the physical setting of One Mile Creek and provide context to the active fluvial geomorphological processes in the Subject Lands.

The Subject Lands lie within the Iroquois Plain (Chapman & Putnam 2007). This is a shallow lacustrine sand deposit associated with the shoreline of the glacial Lake Iroquois. Physiographic landforms consist of sand plains. The surficial geology consists of coarse textured glaciolacustrine deposits (i.e., sand). These sands are typically characterized by a higher infiltration rate. A review of available soil mapping identified that soils within the channel are “Not Mapped” (Ontario Soil Mapping), but adjacent to Tavistock (glaciolacustrine brunisolic luvisol) and Beverley soils (gleyed brunisolic luvisol).

Precipitation was calculated from climate normals (1981-2010) recorded at the St Catharines Airport (Environment Canada Climate ID 615HMAK), approximately 9 km southwest of the study area. Precipitation averaged 68 mm in the winter (November to February, inclusive) and 78 mm in summer (June to August, inclusive; Environment Canada 2023). For most streams in Southern Ontario, the highest instream flows typically occur during the spring freshet due to snowmelt, as well as rain-on-snow events. Convective thunderstorms are likely to be the cause of higher amounts of precipitation in the summer. Typically, these events do not result in extreme flow events, unless when sustained intense rainstorms occur.

Existing Conditions

Reach Delineation

Reaches are defined as sections of river along which boundary conditions are sufficiently uniform such that the river maintains a near consistent structure (Brierley and Fryirs 2005). Reaches are typically delineated based on changes in channel planform, gradient, valley form, physiography, land cover, flow inputs, channel disturbances, and past channel modifications. Due to spatial variability in the modifying and controlling influences of channel form, two reaches situated immediately upstream or downstream of each other could show a marked difference in planform (TRCA 2004).

Based on a desktop assessment, there are three distinct reaches that cross the Subject Lands. Reach 1, which flows onto 200 John Street East from 210 John Street East, Reach 2 (the Tributary of One Mile Creek), which flows in a northerly direction from the Promenade residential development, and Reach 3, which flows in a northerly direction from the confluence of the two tributaries towards the intersection of John Street and Charlotte Street.

Historical Record

Historical aerial photographs of the watercourse in the vicinity of the Subject Lands were reviewed, to determine changes to the channel and surrounding land use and land cover. Historic analyses provide insight into how past channel adjustments and modifications have contributed to current channel form and processes.

Aerial photographs from 1971 and 1990, obtained from the National Air Photo Library, were compared with open-source imagery from 1954 provided by the University of Toronto, and digital imagery from 2002, 2010, and 2023, obtained from First Base Solutions. A historical record showing the imagery can be found in **Appendix B**.

In 1954, the property existed in a state very similar to present day. The Subject Lands contain mainly trees and large residential properties connected with walkways. Evidence of One Mile Creek traversing the lands is faintly visible, entering the property under John Street East and flowing from east to west across the site, through an online historic pond. The Subject Lands are situated to the south of Fort George National Historic Site, while a railroad runs along the southern boundary of the Subject Lands.

By 1971, some additional residential properties had been constructed in the vicinity of the Subject Lands, with no changes observed within the Subject Lands.

Between 1971 and 1990, several new residential homes had been constructed along Christopher Street, a small cul-de-sac to the west of the Subject Lands, while a large neighbourhood was constructed to the south of the railroad tracks. Riparian vegetation along the main branch of One Mile Creek appears to have become more established during this period.

Apart from the construction of new residences to the northwest of the Subject Lands, no notable changes were observed between 1990 and 2002.

No notable changes were observed between 2002 and 2010.

By 2023, some structures within the Subject Lands had been demolished, along with their associated walkways. The hedgerow surrounding the upstream portion of Reach 2 had also been removed.

Field Investigation

Methods

Field assessments were previously completed for the reaches of One Mile Creek on November 16, 2021, and August 12, 2022. The field assessments consisted of a Rapid Geomorphic Assessment (RGA) and a Detailed Geomorphic Assessment. A photo record has been included in **Appendix C.**

The RGA (MOE, 2003) documents observed indicators of channel instability. Observations made during the field investigation are quantified using an index that identifies channel sensitivity based on evidence of aggradation, degradation, channel widening, and planform adjustment. The index produces values that indicate whether the channel is stable/in regime (score <0.20), stressed/transitional (score 0.21 0.40), or adjusting (score >0.41).

A detailed geomorphic assessment was completed for the downstream receiving watercourse (i.e., Reach 3), and consisted of documentation of bed and bank materials, as well as instream measurements of longitudinal profile. Due to the limited channel morphology observed during the field visit, topographic information included within the NPCA's HEC-RAS model was relied upon to determine flows within the channel, and field measurements consisted of a confirmation of the cross-sectional geometry within the model. The detailed geomorphic assessment was used to inform the erosion threshold. The reader is referred to GEI's previous fluvial geomorphic assessment (2024) for further details.

Rapid Assessment Results

Reach 1

Reach 1 was an intermittent feature, poorly defined, and with no distinct valley form. No flow was noted at the time of the site visit, but some pockets of standing water were observed. Due to the poorly defined nature of the reach, an RGA could not be performed, as there were limited geomorphic processes observed.

Reach 2

Reach 2 was an intermittent feature, confined between revetment walls at the rear yards of adjacent properties. It appeared to be relatively straight, flowing as a ditch. Both banks exist as constructed revetments. Slight flow was noted at the time of the assessment. Due to the lack of natural geomorphic processes observed on this reach, an RGA was not performed.

Reach 3

Reach 3 represents the main branch of One Mile Creek, downstream of the confluence between Reaches 1 and 2. The channel was intermittently defined and was well-vegetated throughout with grasses. At the time of the site visit, low flow was observed within the upper end of the reach, and very slow flow through a low gradient wider area at the downstream extent of the reach.

The RGA produced a score of 0.07, which indicates that the reach was in regime, or stable. Minor evidence of aggradation (siltation in pools, and poor longitudinal sorting of materials) was observed.

Meander Belt Delineation

Streams and rivers are dynamic features on the landscape, and their configuration and position on the floodplain changes as part of meander evolution, development and migration processes. When development or other activities are contemplated near a watercourse, it is desirable to designate a corridor that is intended to contain the channel. The space that a meandering watercourse occupies on its floodplain, and in which all these natural processes occur, is referred to as the meander belt (TRCA 2004). In the case of unconfined systems, the erosion hazard allowance consists of the meander belt and an access allowance. In the case of confined systems, the erosion hazard allowance consists of the stable slope allowance and toe erosion allowance, in addition to the access allowance.

Given the limited form and function in Reaches 1 and 2, a meander belt could not be delineated for these reaches. Therefore, it was concluded that these reaches would be considered 'low constraint' watercourses with limited form. These reaches likely do provide a geomorphic function through the conveyance of flow and sediment but lack significant erosion hazards.

In a condition where the watercourse has been historically straightened and / or does not flow through a natural meandering planform, as is the case for Reach 3 within the Subject Lands, a hypothetical meander belt for the proposed channel can be established. A suite of empirical relationships relating bankfull width (W_b) were used to determine the meander belt (B_w), including those outlined by Williams (1986 – equation 1), Ward et al. (2002 – equation 2), Lorenz et al. (1985 – equation 3), and a linear model presented by Howett (2017 – equation 4).

$$B_w = 1.2 \times (4.3 \times {W_b}^{1.12} + W_b) \quad \text{[Eq. 1]}$$

$$B_w = 6 \times {W_b}^{1.12} \quad \text{[Eq. 2]}$$

$$B_w = 7.53 \times {W_b}^{1.01} \quad \text{[Eq. 3]}$$

$$B_w = 6.89 \times W_b \quad \text{[Eq. 4]}$$

As Reach 3 is believed to have been historically altered as a result of past landscaping, an empirical analysis was deemed appropriate. **Table 1** provides a breakdown of the meander belt widths calculated for each method.

Table 1. Selected Measured and Calculated Channel Parameters, Reach 3

Method	Reach 3
Williams (1986)	20.9 m
Ward et. al. (2002)	26.2 m
Lorenz et al. (1985)	25.4 m
Howett (2017)	23.3 m
Average	24.0 m

As such, a meander belt width of 24 m was delineated for Reach 3. This meander belt width is shown in **Figure 1, Appendix A.**

Closing

If you have any questions, please feel free to contact the undersigned.

Sincerely,
GEI Consultants Canada Ltd.

Lukas Mueller, M.A.Sc., P.Eng.
River Engineer

Ahmed Siddiqui, M.Sc., P.Geo. (Limited)
Senior Fluvial Geomorphologist

Appendices

Appendix A	Figures
Appendix B	Historical Record
Appendix C	Photographic Record

References

Brierley, G.J. and Fryirs, K.A. 2005. Geomorphology and River Management: Applications of the River Styles Framework.

Chapman, L.J. and Putnam, D.F. 2007. Physiography of Southern Ontario; Ontario Geological Survey, Miscellaneous Release – Data 228.

Environment Canada. 2026. Canadian Climate Normals 1981-2010. Available online at: https://climate.weather.gc.ca/climate_normals/index_e.html

Howett, J. 2017. Meander belt delineation: Developing a predictive model for meander belt width. Electronic Thesis and Dissertation Repository, 4915, The University of Western Ontario.

Lorenz, J.C., Heinze, D.M., Clark, J.A., Searls, C.A. 1985. Determination of Widths of Meander-Belt Sandstone Reservoirs from Vertical Downhole Data, Mesaverde Group, Piceance Creek Basin, Colorado. American Association of Petroleum Geologists.

Niagara Peninsula Conservation Authority (NPCA). 2005. One Mile Creek Watershed Strategy Final Report. Prepared by Aquafor Beech Ltd. & LURA Consulting Ltd.

NPCA. 2022. NPCA Policy Document: Policies for Planning and Development in the Watersheds of the Niagara Peninsula Conservation Authority. November 18, 2022 Consolidation.

Ontario Geological Survey (OGS). 2010. Surficial Geology of Ontario; Ontario Geological Survey, Miscellaneous Release – Data 128-REV.

Ontario Ministry of Environment (MOE). 2003. Revised Stormwater Management Guidelines Draft Report.

Toronto and Region Conservation Authority (TRCA). 2004. Belt Width Delineation Procedures. Prepared by Parish Geomorphic Ltd.

Ward, A., Mecklenburg, D., Mathews, J., Farver, D. 2002. Sizing Stream Setbacks to Help Maintain Stream Stability. The Society for engineering in agricultural, food, and biological systems.

Williams, G.W. 1986. River Meanders and Channel Size. Journal of Hydrology

Appendix A Figures

Subject Lands
Highway
Road
Watercourse (LIO)
Watercourse (GEI)
Reclassified as Headwater Drainage Feature (GEI)
Breaks
Empirical Meander Belt

Reference(s):
1. Coordinate System: NAD 1983 CSRS UTM Zone 17N.
2. Base features produced under license with the Ontario Ministry of Natural Resources and Forestry © King's Printer for Ontario, 2026.
3. Orthoimagery © First Base Solutions, 2026. Imagery taken in 2023.

Figure 01
Meander Belt Delineation

Project Name:
Randwood EIS
Fluvial

Client Name:
Two Sisters Resort Corp
(Ontario, Canada)

GEI Consultants Canada

Last Updated: February 2026
Document ID: 2600786

Document Path: \\bos-pzcc-1\Data_Storage\Working\TWO SISTERS RESORTS CORP\2600786 Randwood EIS\01_GIS\APRX\2026-02-20_fluvial.aprx

Appendix B Historical Record

Subject Lands

Reference(s):
1. Coordinate System: NAD 1983 CSRS UTM Zone 17N.
2. Base features produced under license with the Ontario Ministry of Natural Resources and Forestry © King's Printer for Ontario, 2026.
3. Airphoto source: Univeristy of Toronto

Appendix B
Historical Records
1954

Project Name:
Randwood EIS
Fluvial

Client Name:
Two Sisters Resort Corp
(Ontario, Canada)

GEI Consultants Canada

Last Updated: February 2026
Document ID: 2600786

Document Path: \\bos-pzcc-1\Data_Storage\Working\TWO SISTERS RESORTS CORP\2600786 Randwood EIS\01_GIS\APRX\2026-02-20_fluvial.aprx

Subject Lands

Watercourse Trace (GEI)

Reference(s):

1. Coordinate System: NAD 1983 CSRS UTM Zone 17N.
2. Base features produced under license with the Ontario Ministry of Natural Resources and Forestry © King's Printer for Ontario, 2026.
3. Airphoto source: National Air Photo Library

Appendix B
Historical Records
1971

Project Name:
Randwood EIS
Fluvial

Client Name:
Two Sisters Resort Corp
(Ontario, Canada)

GEI Consultants Canada

Last Updated: February 2026
Document ID: 2600786

Subject Lands

Reference(s):
1. Coordinate System: NAD 1983 CSRS UTM Zone 17N.
2. Base features produced under license with the Ontario Ministry of Natural Resources and Forestry © King's Printer for Ontario, 2026.
3. Airphoto source: National Air Photo Library

Appendix B
Historical Records
1990

Project Name:
Randwood EIS
Fluvial

Client Name:
Two Sisters Resort Corp
(Ontario, Canada)

GEI Consultants Canada

Last Updated: February 2026
Document ID: 2600786

Document Path: \\bos-pzcc-1\Data_Storage\Working\TWO SISTERS RESORTS CORP\2600786 Randwood EIS\01_GIS\APRX\2026-02-20_fluvial.aprx

Subject Lands

Watercourse Trace (GEI)

Reference(s):

1. Coordinate System: NAD 1983 CSRS UTM Zone 17N.
2. Base features produced under license with the Ontario Ministry of Natural Resources and Forestry © King's Printer for Ontario, 2026.
3. Airphoto source: First Base Solutions

Appendix B
Historical Records
2002

Project Name:
Randwood EIS
Fluvial

Client Name:
Two Sisters Resort Corp
(Ontario, Canada)

GEI Consultants Canada

Last Updated: February 2026
Document ID: 2600786

Document Path: \\bos-pzcc-1\Data_Storage\Working\TWO SISTERS RESORTS CORP\2600786 Randwood EIS\01_GIS\APRX\2026-02-20_fluvial.aprx

Subject Lands

Watercourse Trace (GEI)

Reference(s):

1. Coordinate System: NAD 1983 CSRS UTM Zone 17N.
2. Base features produced under license with the Ontario Ministry of Natural Resources and Forestry © King's Printer for Ontario, 2026.
3. Airphoto source: First Base Solutions

Appendix B
Historical Records
2010

Project Name:
Randwood EIS
Fluvial

Client Name:
Two Sisters Resort Corp
(Ontario, Canada)

GEI Consultants Canada

Last Updated: February 2026
Document ID: 2600786

Document Path: \\bos-pzcc-1\Data_Storage\Working\TWO SISTERS RESORTS CORP\2600786 Randwood EIS\01_GIS\APRX\2026-02-20_fluvial.aprx

Subject Lands

Watercourse Trace (GEI)

Reference(s):

1. Coordinate System: NAD 1983 CSRS UTM Zone 17N.
2. Base features produced under license with the Ontario Ministry of Natural Resources and Forestry © King's Printer for Ontario, 2026.
3. Airphoto source: First Base Solutions

Appendix B
Historical Records
2023

Project Name:
Randwood EIS
Fluvial

Client Name:
Two Sisters Resort Corp
(Ontario, Canada)

GEI Consultants Canada

Last Updated: February 2026
Document ID: 2600786

Document Path: \\bos-pzcc-1\Data_Storage\Working\TWO SISTERS RESORTS CORP\2600786 Randwood EIS\01_GIS\APRX\2026-02-20_fluvial.aprx

Appendix C Photographic Record

Photographic Record

Photo 1 – Upstream extent of Reach 1, in the eastern corner of the Subject Lands near John Street East.

Photo 2 – Reach 1 flows through historical pond, with inlets on upstream and downstream ends.

Photo 3 – Several historic pedestrian crossings exist along Reach 1 within the Subject Lands.

Photo 4 – Downstream extent of Reach 1, where it joins with Reach 2 before flowing into Reach 3.

APPENDIX C – PHOTOGRAPHIC RECORD

FLUVIAL GEOMORPHIC ASSESSMENT

144, 176, AND 200 JOHN STREET EAST

REACH 1

NOVEMBER 16, 2021, AND AUGUST 12, 2022

GEI Consultants Canada

Photo 5 – Upstream extent of Reach 2, depicting a straight flow path between residences.

Photo 6 – Reach 2 presents as a heavily altered drainage feature, reinforced with revetments.

Photo 7 – Debris, both natural and manmade, exists at high densities throughout the reach.

Photo 8 – Reach 2 exits the section with revetments and flows along a plant bed before joining with Reach 1.

APPENDIX C – PHOTOGRAPHIC RECORD

FLUVIAL GEOMORPHIC ASSESSMENT

144, 176, AND 200 JOHN STREET EAST

REACH 2

NOVEMBER 16, 2021, AND AUGUST 12, 2022

GEI Consultants Canada

Photo 9 – Upstream extent of Reach 3, shortly downstream of the Reach 1 and 2 confluence.

Photo 10 – The feature flows through a sparsely vegetated corridor with minimal definition.

Photo 11 – Reach 3 shortly south of the downstream extent, near John Street East.

Photo 12 – Downstream extent of Reach 3, where it flows under a wall, under John Street East, and into a roadside ditch.

APPENDIX C – PHOTOGRAPHIC RECORD

FLUVIAL GEOMORPHIC ASSESSMENT

144, 176, AND 200 JOHN STREET EAST

REACH 3

NOVEMBER 16, 2021, AND AUGUST 12, 2022

GEI Consultants Canada

Appendix D Site Plan

KEY PLAN

SCALE : NOT TO SCALE

LEGEND

SITE WORKS

PERIMETER OF BUILDING PERIMETER OF COVERED (DASHED)	BUILDING
STRUCTURE PERIMETER OF COVERED (DASHED)	STRUCTURE (UNENCLOSED)
	EXISTING BUILDING
▨	PAVERS
▨	ASPHALT
▨	CONCRETE
○	POOL
—	CONCRETE CURB

UNHATCHED AREAS TO BE GRASS or LANDSCAPE
ALL SITE WORK NEW UNLESS NOTED OTHERWISE

(##) PARKING SPACES

MASTER SITE CONCEPT PLAN

SCALE : 1:750

Peter J. Lesdow
architect
4465 Drummond Road, Unit 11, Niagara Falls, Ontario L2E 6C5
telephone: 905-357-1112 e-mail: plesdow@cogeco.net

MASTER SITE CONCEPT PLAN
144, 176 & 200 John St, 856 Charlotte St

DATE	REVISIONS	DATE	REVISIONS
Apr. 02/ 26	FOR REZONING		
Apr. 10/ 26	FOR COORDINATION		

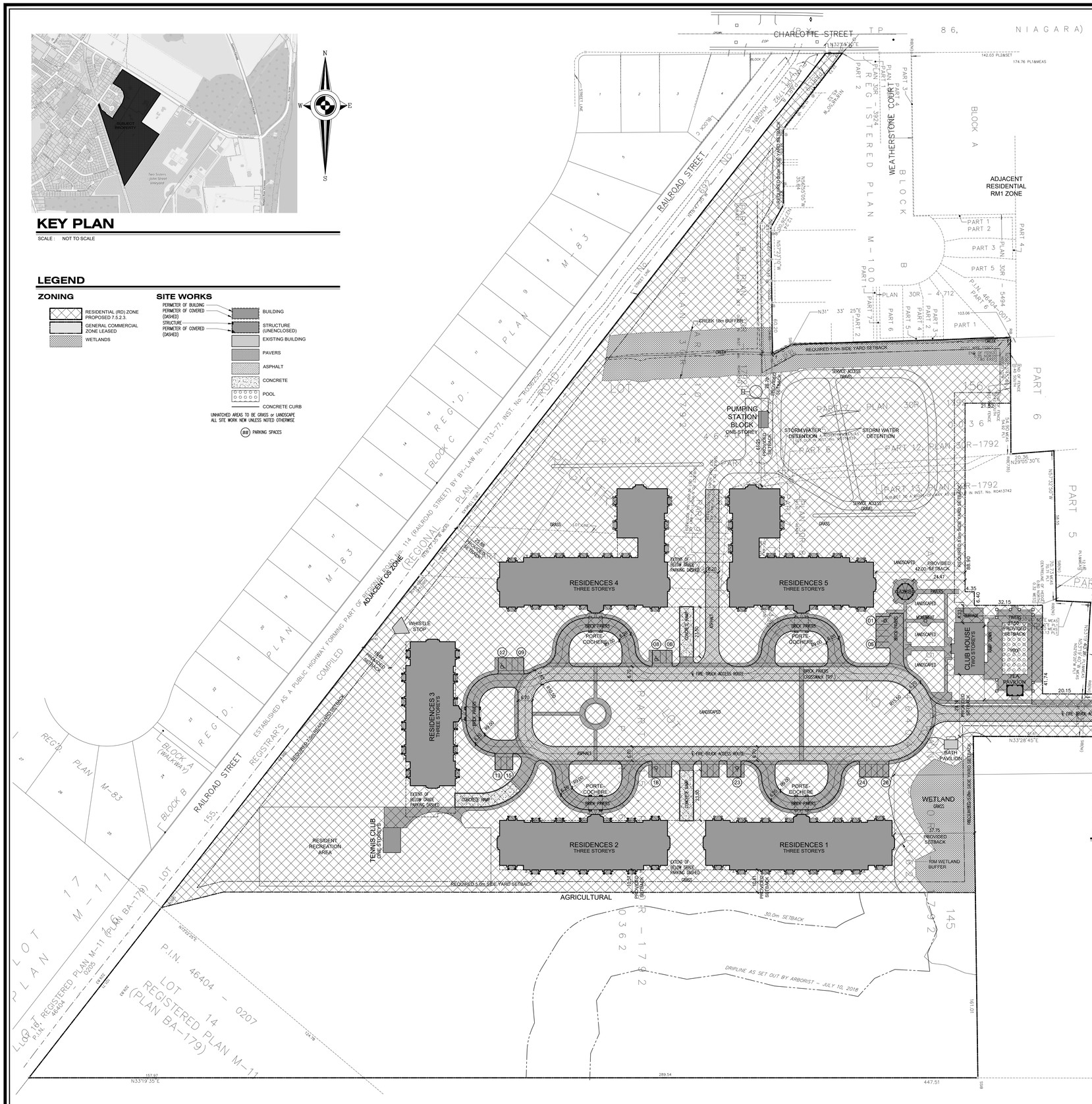
RITZ-CARLTON DEVELOPMENT

144, 176 & 200 John St, 856 Charlotte St
Niagara-on-the-Lake

DATE: Nov. 18/ 22
SCALE: 1:750
DRAWN BY: MRW
CHECK BY: PJL

22 – 13

A101



KEY PLAN

SCALE : NOT TO SCALE

LEGEND

ZONING

- ▨ RESIDENTIAL (RD) ZONE PROPOSED 7.5.2.3.
- ☐ GENERAL COMMERCIAL ZONE LEASED
- ▒ WETLANDS

SITE WORKS

- PERIMETER OF BUILDING / PERIMETER OF COVERED (DASHED) — ■ BUILDING
- STRUCTURE / PERIMETER OF COVERED (DASHED) — ■ STRUCTURE (UNENCLOSED)
- ■ EXISTING BUILDING
- ▩ PAVERS
- ▨ ASPHALT
- ▒ CONCRETE
- ○ POOL
- — CONCRETE CURB

UNHATCHED AREAS TO BE GRASS or LANDSCAPE
ALL SITE WORK NEW UNLESS NOTED OTHERWISE

(##) PARKING SPACES

SITE STATISTICS

Residence Site
586 Charlotte Street
200 John Street East

PROPERTY AREA

			Proposed
Property Area			123,501.69 m²
Subtract	- Leased Lands to General Commercial 144 & 176 John Street to be named General Commercial	- 4,456.88 m²	
	- Agricultural Zone	- 36,045.56 m²	
	- Wetland Area 1	- 1,603.23 m²	
	- Wetland Area 2	- 3,077.55 m²	
	- Wetland Area 3	- 187.47 m²	
Total to be Zoned Medium Density Residential			78,131.10 m²

BUILDING GROUND COVER

Residence 1	2,122.92 m²	
Residence 2	1,915.45 m²	
Residence 3	1,645.57 m²	
Residence 4	2,581.18 m²	
Residence 5	2,311.24 m²	
Tennis Club	92.80 m²	
Carriage Club House	500.45 m²	
Pumping Station	33.36 m²	
Total Building Ground Cover		11,202.96 m²

BUILDING GROSS FLOOR AREAS

Residence 1	8,569.95 m²	
Residence 2	7,874.37 m²	
Residence 3	6,863.39 m²	
Residence 4	10,593.88 m²	
Residence 5	9,615.01 m²	
Tennis Club	92.80 m²	
Club House	819.69 m²	
Pumping Station Block	33.36 m²	
Total Gross Floor Building Area		44,643.66 m²

SITE STATISTICS

Full Property	123,501.69 m²
Gross Building Ground Cover 9.1% of Property	11,202.96 m²
Landscape Area 86.5% of Property	106,840.33 m²
Asphalt Area 4.4% of Property	5,458.40 m²
Lands Zoned Residential	78,131.10 m²
Gross Building Ground Cover 14.3% of Residential Zone	11,245.56 m²
Landscape Area 78.7% of Residential Zone	61,469.74 m²
Asphalt Area 7.0% of Residential Zone	5,458.40 m²

Number of Residence Units	Official Plan Allows 30 units per hectare Zoned Lands are 7.81 hectares x 30 units	234 units

PARKING REQUIREMENTS

1 space per Unit x 234 Units= 234 spaces		234 spaces
PARKING PROVIDED		
Surface	Barrier Free	5 spaces
	Standard 2.75 x 6 m	23 spaces
Underground	Barrier Free	10 spaces
	Standard 2.75 x 6 m	254 spaces
Total Parking Provided		292 spaces

CURRENT RESIDENTIAL DEVELOPMENT (RD) DESIGNED TO RESIDENTIAL MULTIPLE (RM1) ZONE - 7.5.2.3 APARTMENT BUILDING ZONING RELIEF TABLE

BY-LAW 7.9.2.	BY-LAW REQUIREMENT	PROVIDED		BY-LAW RELIEF REQUESTED
a) Minimum lot frontage	25.0 m	20.12 m		5.0 m
b) Minimum lot area	912 m²	123,501.69 m²		None
c) Maximum lot coverage	50 %	9.1 %		None
d) Minimum landscape open space	25 %	86.5 %		None
e) Minimum front yard setback	7.5 m	286.15 m		None
f) Minimum interior side yard setback	5 m	5.6 m		None
g) Minimum exterior side yard setback	7.5 m	Not Applicable		None
h) Minimum rear yard setback	7.5 m	15.69 m		None
i) Minimum dwelling unit floor area				
1) Bachelor unit	37 m²	Not Applicable		None
2) 1 bedroom unit	55.7 m²	77.1 m²		None
3) 2 bedroom unit	69 m²	104.6 m²		None
4) 3 bedroom unit	80 m²	Not Applicable		None
j) Maximum Building height	12.0 m	12.0	Average	
		15.1	Architectural Features/Mechanical	3.5 m
k) Minimum accessory building yard setback	1.5 m	5.56		None
l) Minimum accessory building exterior side yard setback (as amended by 4316Y-12)	4.5 m	Not Applicable		None

ZONING SITE PLAN - RESIDENTIAL

SCALE : 1:750

Peter J. Lesdow
architect
4465 Drummond Road, Unit 11, Niagara Falls, Ontario L2E 6C5
telephone: 905-357-1112 e-mail: plesdow@cogeco.net

ZONING PLAN
RESIDENTIAL
200 John St &
856 Charlotte St

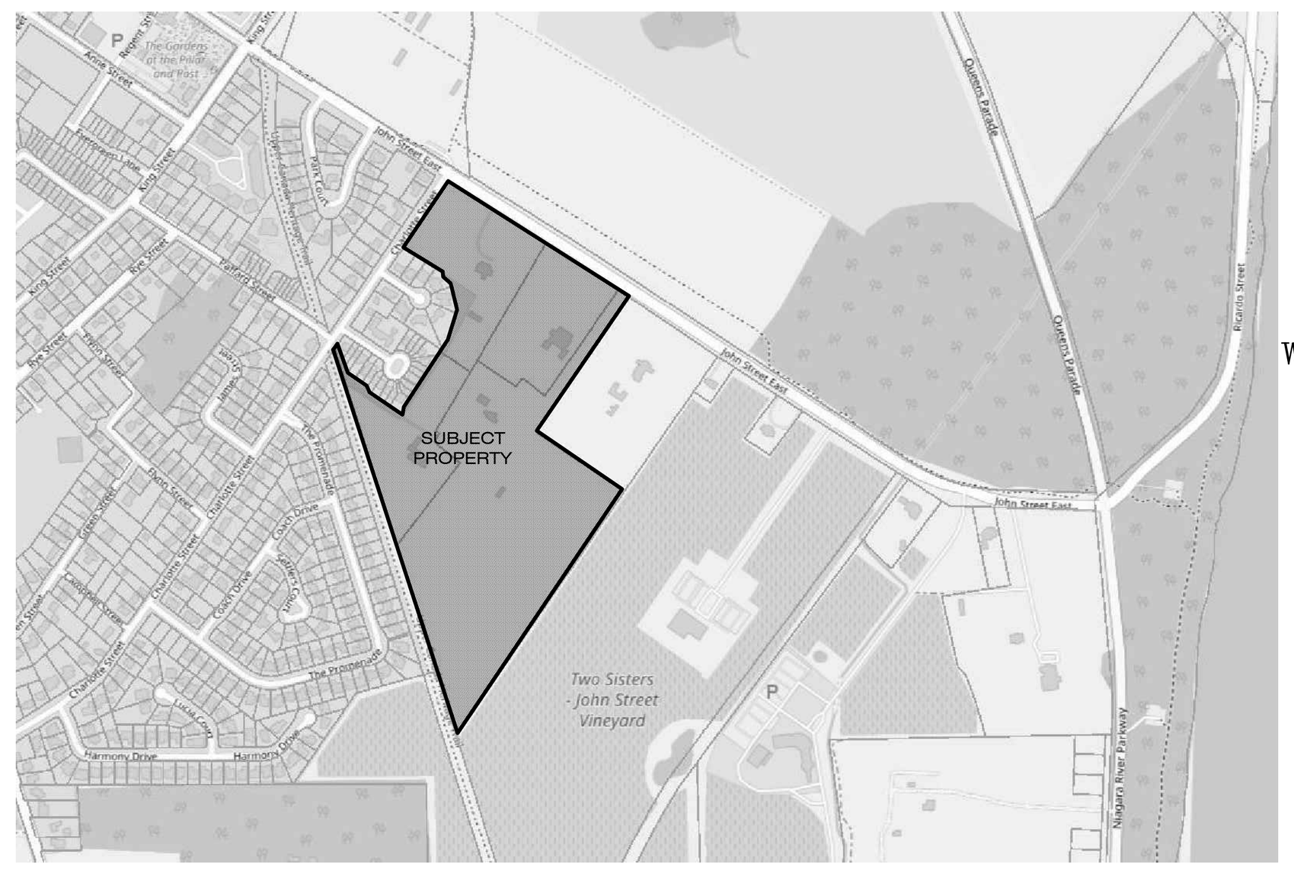
DATE	REVISIONS	DATE	REVISIONS
Apr. 02/ 26	FOR REZONING		
Apr. 10/ 26	FOR COORDINATION		

RITZ-CARLTON DEVELOPMENT
144, 176 & 200 John St, 856 Charlotte St
Niagara-on-the-Lake

DATE: Nov. 18/ 22
SCALE: 1:750
DRAWN BY: MRW
CHECK BY: PJL

22 – 13

A102



KEY PLAN

SCALE : NOT TO SCALE

LEGEND

ZONING

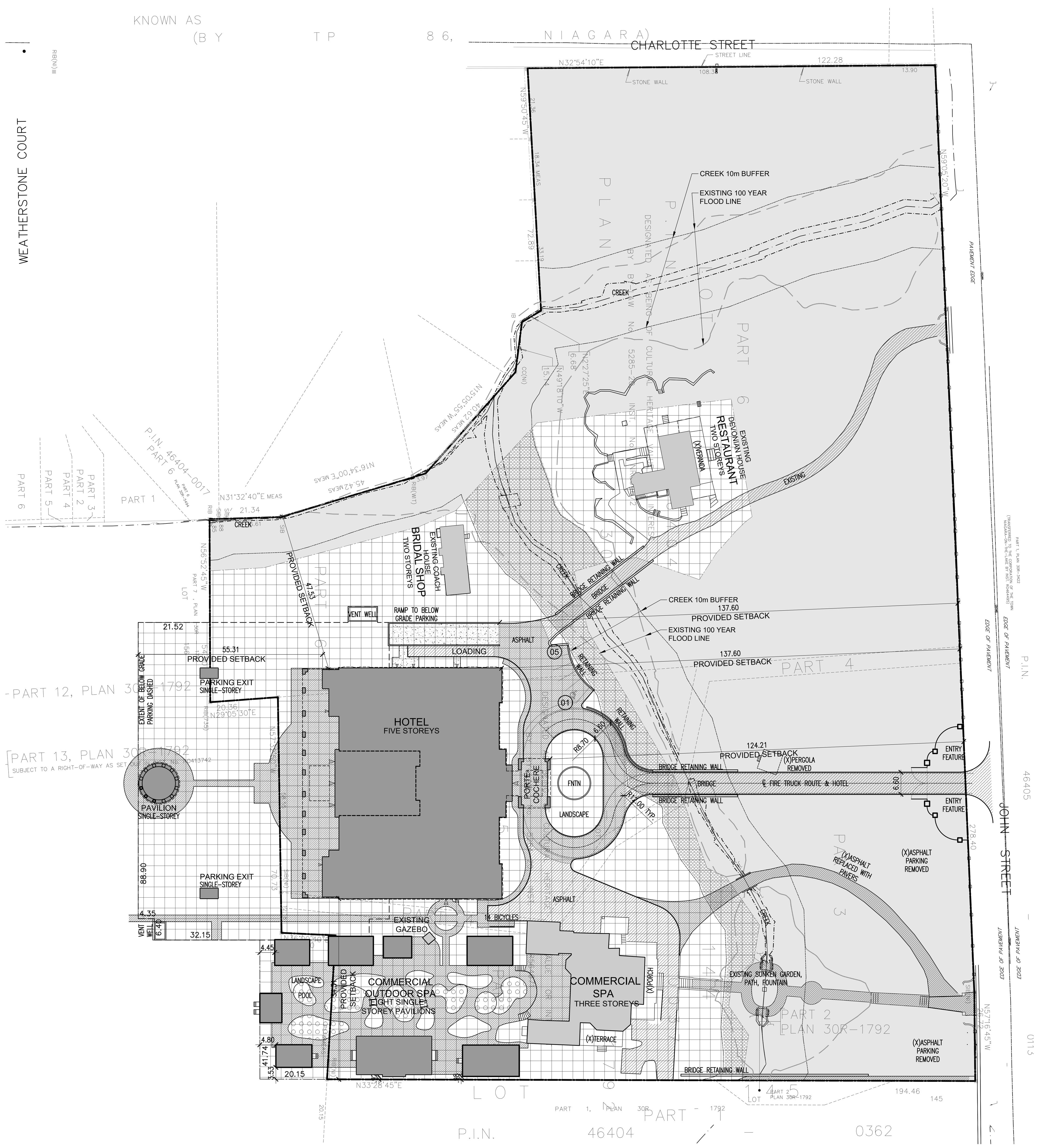
- GENERAL COMMERCIAL (GC) ZONE
- OPEN SPACE (OS) ZONE / RESIDENTIAL (RD) ZONE PROPOSED 7.5.2.3.
- GENERAL COMMERCIAL / OPEN SPACE (OS) ZONE ZONE LEASED
- GENERAL COMMERCIAL / WETLANDS ZONE LEASED
- WETLANDS

SITE WORKS

- PERIMETER OF BUILDING / PERIMETER OF COVERED (DASHED) — BUILDING
- STRUCTURE / PERIMETER OF COVERED (DASHED) — STRUCTURE (UNENCLOSED)
- EXISTING BUILDING
- PAVERS
- ASPHALT
- CONCRETE
- POOL
- CONCRETE CURB

UNHATCHED AREAS TO BE GRASS or LANDSCAPE
ALL SITE WORK NEW UNLESS NOTED OTHERWISE

(##) PARKING SPACES



ZONING SITE PLAN - GENERAL COMMERCIAL & OPEN SPACE

SCALE : 1:750

SITE STATISTICS

Ritz Carlton Hotel / Spa Site
144 and 176 John Street

				Proposed
PROPERTY AREA				
Property Area		53,262.42 m²		
Commercial Zoned Area				
Plus	Lease Lands from Ritz Carlton Residences Long Term 583 Charlotte Street and 200 John Street East		+4,751.56 m²	
Minus	Existing Open Space Zone		- 30,564.84 m²	
Total to be Zoned General Commercial Area				27,449.14 m²
BUILDING GROUND COVER				
	Ritz Carlton Hotel	3,587.73 m²		
	Rand Spa	769.57 m²		
	Outdoor Spa Pavilions	938.00 m²		
	Coach House	146.6 m²		
	Devonian House	253.73 m²		
Total Building Ground Cover				5,695.63 m²
BUILDING GROSS AREAS				
Ritz Carlton Hotel	Basement	2,350.71 m²		
	Underground Parking	7,159.17 m²		
	Ground Floor	3,587.73 m²		
	Second Floor	2,880.33 m²		
	Third Floor	2,880.33 m²		
	Fourth Floor	2,880.33 m²		
	Fifth Floor	2,927.77 m²		
	Mechanical Penthouse			
	Total			24,659.43 m²
Rand Spa Existing Building	Basement	880.56 m²		
	Ground Floor	769.57 m²		
	Second Floor	329.7 m²		
	Third Floor	312.85 m²		
	Widow's Walk	27.25 m²		
	Total			2319.93 m²
Outdoor Spa Pavilions		938 m²		
Coach House Existing Building	Ground Floor	146.6 m²		
	Second Floor	102.4 m²		
Total				249 m²
Devonian House Existing Building	Ground Floor	253.73 m²		
	Second Floor	253.73 m		
Total				507.46 m²
Total Gross Building Area				28,680.8 m²

SITE STATISTICS

Full Property	
Gross Building Ground Cover 10.7% of Property	5,695.63 m²
Landscaped Area 84.6% of Property	45,085.06 m²
Asphalt Area 4.7% of Property	2,481.73 m²
Lands Zoned General Commercial	
Gross Building Ground Cover 20.7% of G.C. Zone	5,695.63 m²
Landscaped Area 73.8% of G.C. Zone	20,249.68 m²
Asphalt Area 5.5% of G.C. Zone	1,503.83 m²

PARKING REQUIREMENTS

		Seats	Area	VEHICLE PARKING REQUIRED		BICYCLE PARKING REQUIRED	
HOTEL COMPONENTS							
Hotel Rooms			111	1 per guestroom in addition to other uses	111 spaces	No requirements	0 spaces
Restaurants	River View Restaurant	99	288.48 m²				
	Upper Banquet Room	240	336.45 m²				
	Grand Salon	39	169.57 m²				
	Private Lounge	34	40.9 m²				
	Lower Restaurant	118	87.3 m²				
	Lower Banquet Room	266	349.16 m²				
	Subtotal	738	1,271.86 m²	1 per 9m² GFLA	141 spaces	Restaurants (375.78 m²) 2 per 100 m² GFLA	7.52 spaces
Restaurant - Outdoor Patio		Seats 104	414.46 m²	1 per 30 m² GFLA of Outdoor Patio Area in addition to the requirements for a restaurant or take-out restaurant.	14 spaces	No requirements	0 spaces
Conference Rooms on Areas Used in Conjunction with Other uses	Meeting Room A		94.52 m²				
	Meeting Rooms B, C, D & E		187.99 m²				
	Conference Room		43.46 m²				
	Subtotal		325.97 m²	1 per 18.5 m² GFLA	18 spaces	No requirements	0 spaces
Office	Front Reception		69.26 m²				
	Human Resources		85.19 m²				
	Management and Marketing		231.04 m²				
	Accounting		84.13 m²				
	Subtotal		469.62 m²	1 per 28 m² GFLA	17 spaces	Offices 1 per 250 m² GFLA	1.88 spaces
Retail Sales	Wine Shop		38.20 m²				
	Gift Shop		25.70 m²				
	Subtotal		63.9 m²	1 per 18.5 m² GFLA	4 spaces	Commercial 1 per 200 m² GFLA	0.32 spaces
PROPERTY COMPONENTS							
Existing Rand Mansion - Conversion to Spa	Total GFLA of Mansion		2,086.43 m²				
	Area of to be Used as Spa (Other Areas Unoccupied)		1,260.86 m²	1 per 15 m² GFLA	85 spaces	No requirements	0 spaces
Outdoor Spa Pavilions	Combined Area of Pavilions		980.64 m²	1 per 15 m² GFLA	66 spaces	No requirements	0 spaces
Existing Devonian House - Ground Floor Conversion to Restaurant (Remainder Unoccupied)	Dining Area		178.50 m²	1 per 9 m² GFLA	20 spaces	Restaurant 2 per 100 m² GFLA	3.57 spaces
	Outdoor Covered Porch Area		188.27 m²	1 per 30 m² GFLA of Outdoor Patio Area	6 spaces	No requirements	0 spaces
Existing Coach House - Ground Floor Conversion to Bridal Shop (Remainder Unoccupied)	Ground Floor to be Used Only (Second Storey Unoccupied)		135 m²	1 per 18.5 m² GFLA	8 spaces	Commercial 1 per 200 m² GFLA	0.68 spaces
TOTAL PARKING REQUIRED					484 spaces		14 spaces

PARKING PROVIDED

Surface	Barrier Free	1 spaces
	Standard 2.75x6.0 m	4 spaces
Underground	Barrier Free	8 spaces
	Standard 2.75x6.0 m	209 spaces
TOTAL PARKING PROVIDED		222 spaces

BICYCLE PARKING 14 Provided

EXISTING SITE-SPECIFIC GENERAL COMMERCIAL 7.14.56 ZONING RELIEF TABLE

BY-LAW 7.14.56	BY-LAW REQUIREMENT	PROVIDED		BY-LAW RELIEF REQUESTED
a) Minimum Lot Frontage	300.0 m	305.12		None
b) Minimum Lot Depth	120 m	121 m		None
c) Minimum Landscaped Open Space	50%	73.8 %		None
d) Maximum Lot Coverage	12%	20.7 %		None
e) Minimum main building setbacks in accordance with Figure 7.14.56Fii	93.75 m	137.6 m		None
f) Minimum vehicular access ramp setback	30.48 m	137.6 m		None
				8.09 m
g) Maximum building height	17.35 m	24.74 m		
h) Maximum seating capacity for restaurant	200 seats	99 seats	River View Restaurant	
		240 seats	Upper Banquet Room	
		39 seats	Grand Salon	
		34 seats	Private Lounge	
		118 seats	Lower Restaurant	
		266 seats	Lower Banquet Room	
		786 seats	Total	600 seats
i) Maximum number of rooms for the hotel	106	111		5 rooms
j) Maximum ground floor area of all buildings in the commercial zone	4,181 m²	5,695.6 m²		1,600 m²
k) Maximum floor area of the spa	185.8 m²	1,707.6 m²		400 m²
l) Maximum ground floor area of Arts & Learning Center	1250 m²	Not Applicable		None
m) Devonian House: No other commercial use shall be permitted except for a maximum of 8 guest rooms associated as part of the hotel use		Restaurant		Restaurant Use to be permitted

Peter J. Lesdow
architect
4465 Drummond Road, Unit 11, Niagara Falls, Ontario L2E 6C5
telephone 905-357-1112 e-mail: plesdow@cogeco.net

ZONING PLAN
GENERAL COMMERCIAL & OPEN SPACE
144 & 176 John St

DATE	REVISIONS	DATE	REVISIONS
Apr. 02/ 26	FOR REZONING		
Apr. 10/ 26	FOR COORDINATION		

RITZ-CARLTON DEVELOPMENT
144, 176 & 200 John St, 856 Charlotte St
Niagara-on-the-Lake

DATE:	Nov. 18/ 22
SCALE:	1:100
DRAWN BY:	MRW
CHECK BY:	PJL

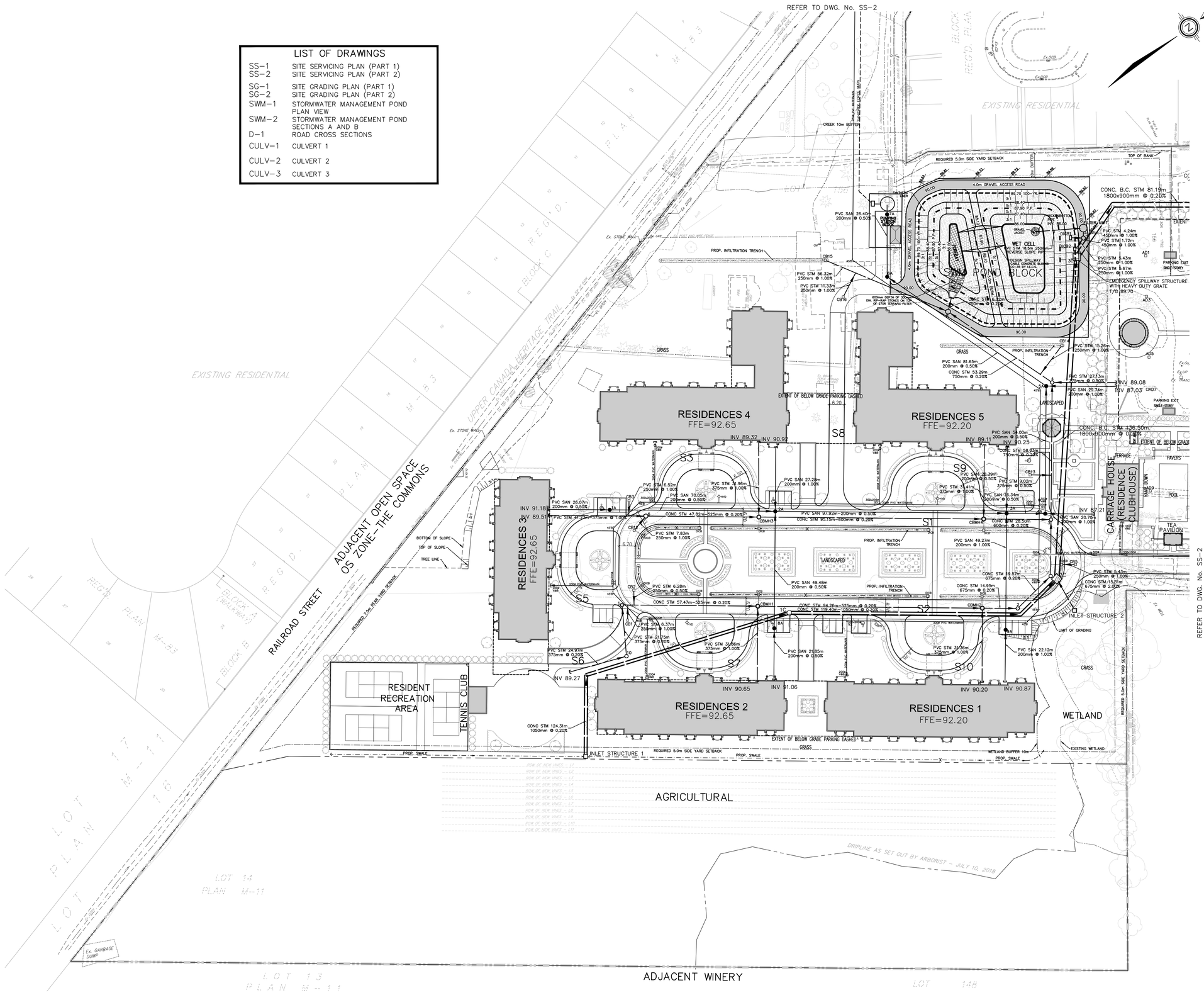
22 – 13

A103

Appendix E FSR Drawings (Schaeffers, 2026)

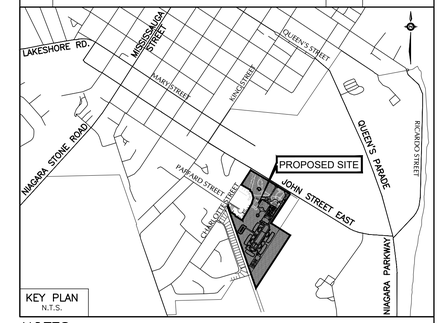
LIST OF DRAWINGS

SS-1	SITE SERVICING PLAN (PART 1)
SS-2	SITE SERVICING PLAN (PART 2)
SG-1	SITE GRADING PLAN (PART 1)
SG-2	SITE GRADING PLAN (PART 2)
SWM-1	STORMWATER MANAGEMENT POND PLAN VIEW
SWM-2	STORMWATER MANAGEMENT POND SECTIONS A AND B
D-1	ROAD CROSS SECTIONS
CULV-1	CULVERT 1
CULV-2	CULVERT 2
CULV-3	CULVERT 3



REVISIONS

No.	DESCRIPTION	By	Date



KEY PLAN
N.T.S.

NOTES

1. THE LOCATION OF ALL UNDERGROUND AND ABOVE GROUND UTILITIES AND STRUCTURES ARE NOT NECESSARILY SHOWN ON CONTRACT DRAWINGS, AND WHERE SHOWN THE ACCURACY OF THE LOCATION AND ELEVATION OF SUCH UTILITIES AND STRUCTURES ARE NOT GUARANTEED. PRIOR TO COMMENCING CONSTRUCTION, THE CONTRACTOR SHALL VERIFY EXACT LOCATION AND ELEVATION OF SUCH UTILITIES AND STRUCTURES AND SHALL ASSUME ALL LIABILITIES OF DAMAGE.
2. ALL AREAS DISTURBED DURING CONSTRUCTION OF SEWERS AND WATERMAINS SHALL BE RESTORED TO ORIGINAL CONDITION OR BETTER, TO THE SATISFACTION OF THE TOWN OF NIAGARA-ON-THE-LAKE AND NIAGARA REGION ENGINEERING DEPARTMENT. GRASSED AREAS TO BE TOPPED WITH 100mm TOPSOIL AND SODDED AS PER OPSD 218.01. ALL EXISTING SERVICES SHALL BE ADJUSTED TO SUIT NEW GRADES.

LEGEND:

- DENOTES VALVE AND CHAMBER
- DENOTES HYDRANT
- DENOTES SINGLE CATCHBASIN
- DENOTES DOUBLE CATCHBASIN
- DENOTES SANITARY MANHOLE
- DENOTES STORM MANHOLE
- DENOTES STORM CATCHBASIN MANHOLE
- DENOTES PROPERTY LINE
- DENOTES INFILTRATION TRENCH
- DENOTES TREE PROTECTION BARRIER
- DENOTES Ex. TREE TO BE PROTECTED

BENCHMARK No.

ELEVATIONS ARE BASED ON THE CANADIAN GEODETIC DATUM AND WERE DERIVED FROM BENCH MARK 63U3536, HAVING A PUBLISHED ELEVATION OF 87.59 metres.

No.	Date	Issued for

PROFESSIONAL ENGINEER LICENSED F. TCHOURKINE APR. 13, 2026 PROVINCE OF ONTARIO

SOLMAR DEVELOPMENT CORPORATION
RITZ CARLTON HOTEL, SPA & RESIDENCES
144 JOHN STREET EAST,
NIAGARA ON THE LAKE, ONTARIO

SCHAEFFERS
CONSULTING ENGINEERS
SCHAEFFER & ASSOCIATES LTD.
6 Ronrose Drive, Concord, Ontario L4K 4R3
Tel: (905) 738-6100
Fax: (905) 738-6875
E-mail: design@schaeffers.com

PROJECT No. 2026-5625 | DRAWING No. SS-1

Niagara-on-the-Lake EST.1791

OPERATIONS DEPARTMENT APPROVAL

SIGNATURE | DATE
DOUG KERR (NAME) | MANAGER OF PUBLIC WORKS (POSITION)

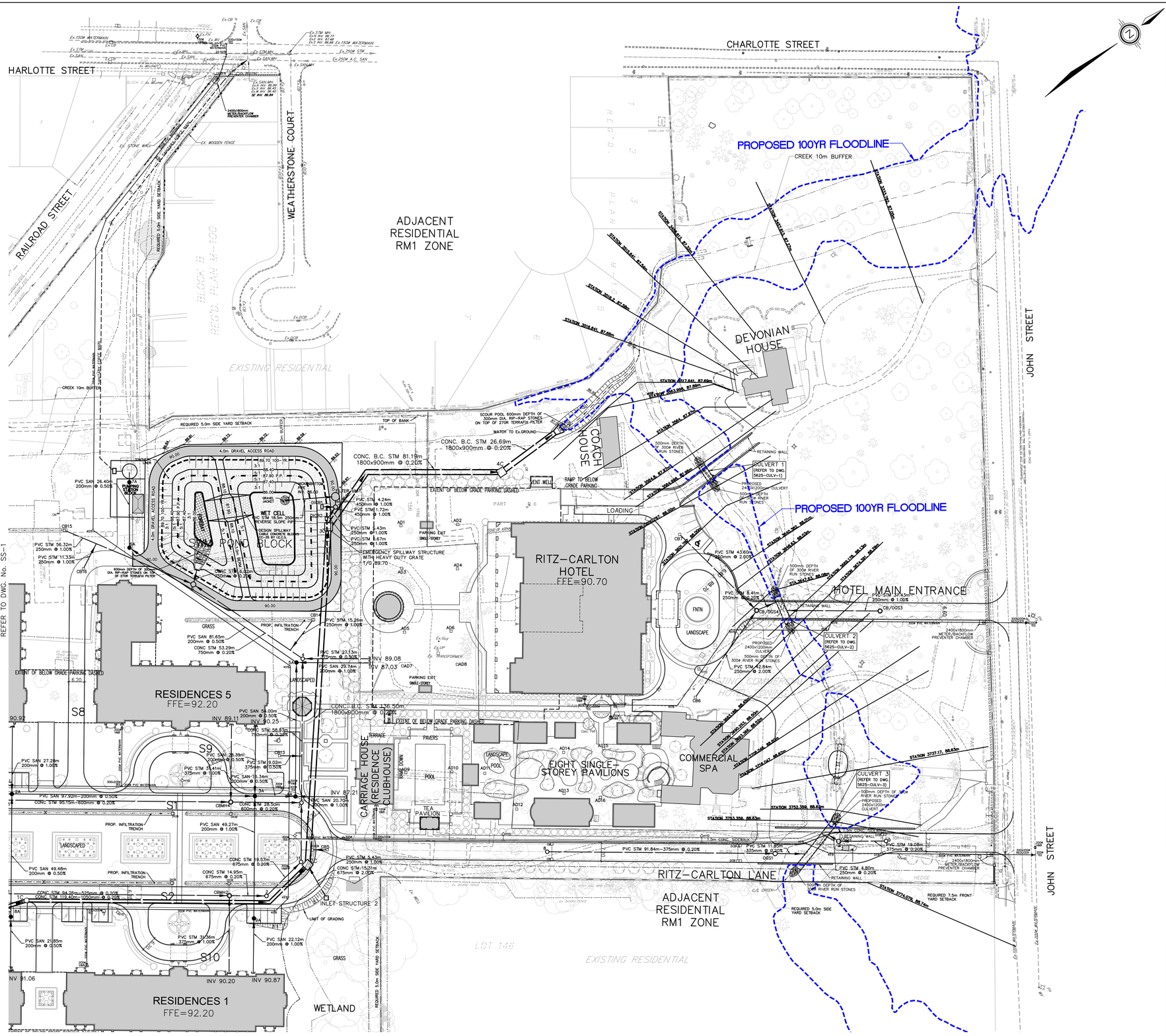
FIRE DEPARTMENT APPROVAL

SIGNATURE | DATE
ALEX BURBIDGE (NAME) | FIRE CHIEF (POSITION)

SITE SERVICING PLAN
(PART 1)

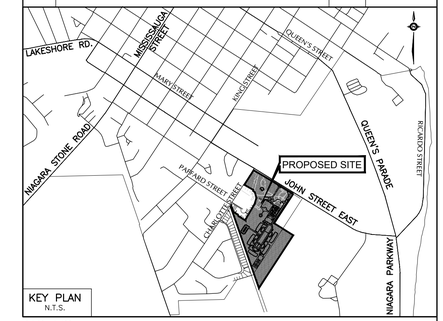
DESIGNED BY: F.T.	DATE: FEBRUARY 2026	CHECKED BY: F.T.
DRAWN BY : T.K.		APPROVED BY: P.S.

SCALE 1: 750 0 15 30 45 60 75m



REVISIONS

No.	DESCRIPTION	By	Date



NOTES

1. THE LOCATION OF ALL UNDERGROUND AND ABOVE GROUND UTILITIES AND STRUCTURES ARE NOT NECESSARILY SHOWN ON CONTRACT DRAWINGS, AND WHERE SHOWN THE ACCURACY OF THE LOCATION AND ELEVATION OF SUCH UTILITIES AND STRUCTURES ARE NOT GUARANTEED. PRIOR TO COMMENCING CONSTRUCTION, THE CONTRACTOR SHALL VERIFY EXACT LOCATION AND ELEVATION OF SUCH UTILITIES AND STRUCTURES AND SHALL ASSUME ALL LIABILITIES OF DAMAGE.
2. ALL AREAS DISTURBED DURING CONSTRUCTION OF SEWERS AND WATERMAINS SHALL BE RESTORED TO ORIGINAL CONDITION OR BETTER, TO THE SATISFACTION OF THE TOWN OF NIAGARA-ON-THE-LAKE AND NIAGARA REGION ENGINEERING DEPARTMENT. GRASSED AREAS TO BE TOPPED WITH 100mm TOPSOIL AND SODDED AS PER OPSD 218.01. ALL EXISTING SERVICES SHALL BE ADJUSTED TO SUIT NEW GRADES.

LEGEND:

- DENOTES VALVE AND CHAMBER
- DENOTES HYDRANT
- DENOTES SINGLE CATCHBASIN
- DENOTES DOUBLE CATCHBASIN
- DENOTES SANITARY MANHOLE
- DENOTES STORM MANHOLE
- DENOTES STORM CATCHBASIN MANHOLE
- DENOTES PROPERTY LINE
- DENOTES INFILTRATION TRENCH
- DENOTES TREE PROTECTION BARRIER
- DENOTES Ex. TREE TO BE PROTECTED

BENCHMARK No.

ELEVATIONS ARE BASED ON THE CANADIAN GEODETIC DATUM AND WERE DERIVED FROM BENCH MARK 63J3536, HAVING A PUBLISHED ELEVATION OF 87.59 metres.

No.	Date	Issued for

PROFESSIONAL ENGINEER — F. TCHOURKINE — APR 14 2026 — PROVINCE OF ONTARIO

SOLMAR DEVELOPMENT CORPORATION
RITZ CARLTON HOTEL, SPA & RESIDENCES
144 JOHN STREET EAST,
NIAGARA ON THE LAKE, ONTARIO

SCHAEFFERS
CONSULTING ENGINEERS
SCHAEFFER & ASSOCIATES LTD.
6 Ronrose Drive, Concord, Ontario L4K 4R3
Tel: (905) 738-6100
Fax: (905) 738-6875
E-mail: design@schaeffers.com

PROJECT No. 2026-5625 | DRAWING No. SS-2

Niagara-on-the-Lake EST.1781

OPERATIONS DEPARTMENT APPROVAL

SIGNATURE | DATE
NAME: DOUG KERR | POSITION: MANAGER OF PUBLIC WORKS

FIRE DEPARTMENT APPROVAL

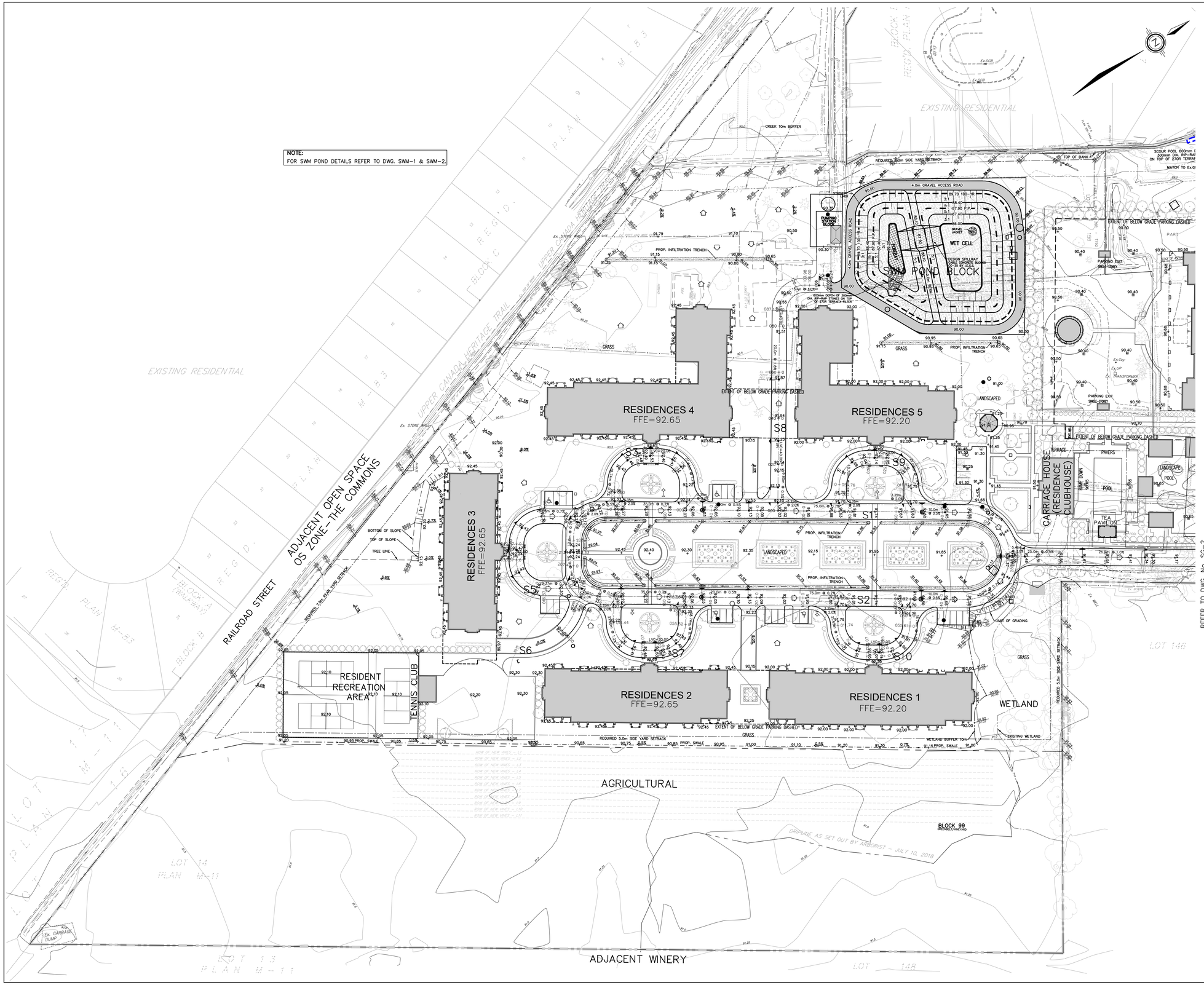
SIGNATURE | DATE
NAME: ALEX BURBIDGE | POSITION: FIRE CHIEF

SITE SERVICING PLAN
(PART 2)

DESIGNED BY: F.T.	DATE: FEBRUARY 2026	CHECKED BY: F.T.
DRAWN BY : T.K.		APPROVED BY: P.S.

SCALE 1:750 — 0 15 30 45 60 75m

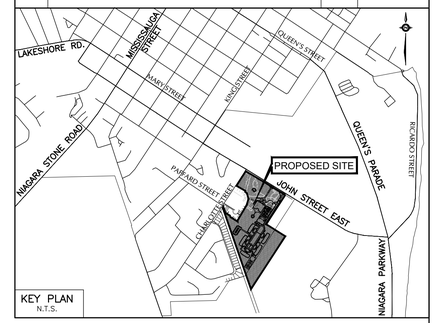
NOTE:
FOR SWM POND DETAILS REFER TO DWG. SWM-1 & SWM-2.



REFER TO DWG. No. SG-2

REVISIONS

No.	DESCRIPTION	By	Date



LEGEND

- DENOTES VALVE AND CHAMBER
- DENOTES HYDRANT
- DENOTES SINGLE CATCHBASIN
- DENOTES SANITARY MANHOLE
- DENOTES STORM MANHOLE
- × 181.50 DENOTES PROPOSED ELEVATION
- 188.50 DENOTES EXISTING CONTOUR
- DENOTES OVERLAND FLOW ROUTE
- DENOTES NATURAL OVERLAND FLOW ROUTE
- DENOTES INFILTRATION TRENCH
- DENOTES PROPERTY LINE
- DENOTES Ex. TREE TO BE PROTECTED

BENCHMARK No.

ELEVATIONS ARE BASED ON THE CANADIAN GEODETIC DATUM AND WERE DERIVED FROM BENCH MARK 63U3536, HAVING A PUBLISHED ELEVATION OF 87.59 metres.

No.	Date	Issued for

PROFESSIONAL ENGINEER — LICENCE — F. TCHOURKINE — APR. 13, 2026 — PROVINCE OF ONTARIO

SOLMAR DEVELOPMENT CORPORATION
RITZ CARLTON HOTEL, SPA & RESIDENCES
144 JOHN STREET EAST,
NIAGARA ON THE LAKE, ONTARIO

SCHAEFFERS
CONSULTING ENGINEERS
SCHAEFFER & ASSOCIATES LTD.
6 Ronrose Drive, Concord, Ontario L4K 4R3
Tel: (905) 738-6100
Fax: (905) 738-6875
E-mail: design@schaeffers.com

PROJECT No. 2026-5625 | DRAWING No. SG-1

Niagara-on-the-Lake EST.1781

OPERATIONS DEPARTMENT APPROVAL

SIGNATURE — DOUG KERR (NAME) — DATE — MANAGER OF PUBLIC WORKS (POSITION)

FIRE DEPARTMENT APPROVAL

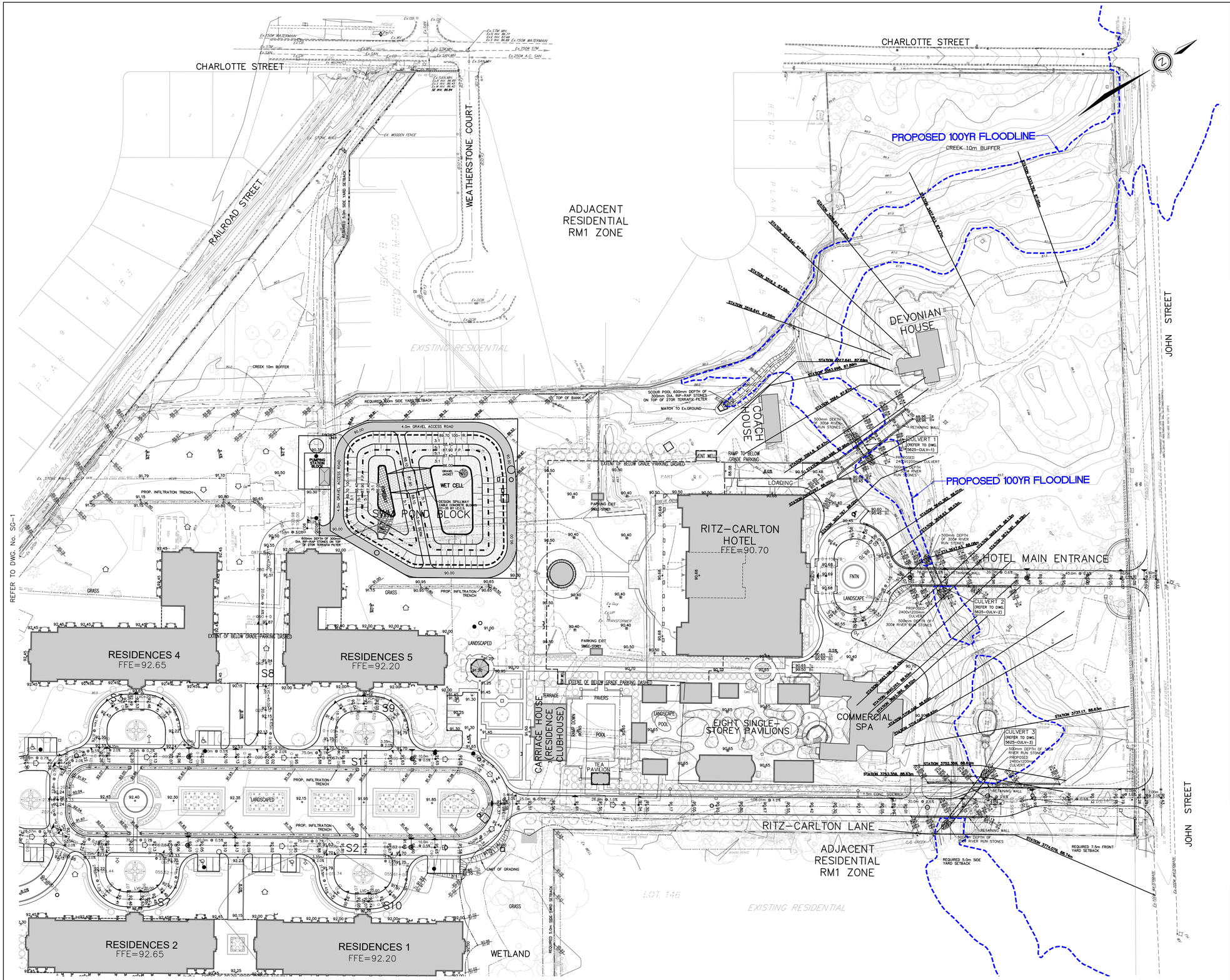
SIGNATURE — ALEX BURBIDGE (NAME) — DATE — FIRE CHIEF (POSITION)

SITE GRADING PLAN

(PART 1)

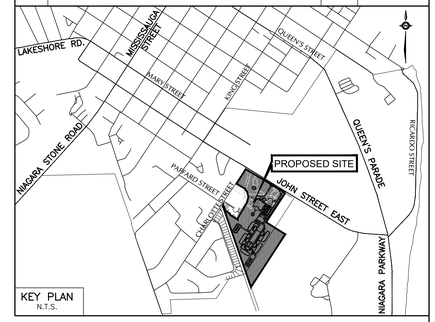
DESIGNED BY: F.T.	DATE: FEBRUARY 2026	CHECKED BY: F.T.
DRAWN BY : T.K.		APPROVED BY: P.S.

SCALE 1: 750 — 0 15 30 45 60 75m



REVISIONS

No.	DESCRIPTION	By	Date



LEGEND

- DENOTES VALVE AND CHAMBER
- DENOTES HYDRANT
- DENOTES SINGLE CATCHBASIN
- DENOTES SANITARY MANHOLE
- DENOTES STORM MANHOLE
- × 181.50 DENOTES PROPOSED ELEVATION
- 188.50 DENOTES EXISTING CONTOUR
- DENOTES OVERLAND FLOW ROUTE
- DENOTES NATURAL OVERLAND FLOW ROUTE
- DENOTES INFILTRATION TRENCH
- DENOTES PROPERTY LINE
- DENOTES Ex. TREE TO BE PROTECTED

BENCHMARK No.

ELEVATIONS ARE BASED ON THE CANADIAN GEODETIC DATUM AND WERE DERIVED FROM BENCH MARK 63U3536, HAVING A PUBLISHED ELEVATION OF 87.59 metres.

No.	Date	Issued for

PROFESSIONAL ENGINEER — F. TCHOURKINE — APR. 13, 2026 — PROVINCE OF ONTARIO

SOLMAR DEVELOPMENT CORPORATION
RITZ CARLTON HOTEL, SPA & RESIDENCES
144 JOHN STREET EAST,
NIAGARA ON THE LAKE, ONTARIO

SCHAEFFERS
CONSULTING ENGINEERS
SCHAEFFER & ASSOCIATES LTD.
6 Ronrose Drive, Concord, Ontario L4K 4R3
Tel: (905) 738-6100
Fax: (905) 738-6875
E-mail: design@schaeffers.com

PROJECT No. 2026-5625 | DRAWING No. SG-2

Niagara-on-the-Lake EST.1791

OPERATIONS DEPARTMENT APPROVAL

SIGNATURE — DOUG KERR (NAME) — DATE — MANAGER OF PUBLIC WORKS (POSITION)

FIRE DEPARTMENT APPROVAL

SIGNATURE — ALEX BURBIDGE (NAME) — DATE — FIRE CHIEF (POSITION)

SITE GRADING PLAN

(PART 2)

DESIGNED BY: F.T.	DATE: FEBRUARY 2026	CHECKED BY: F.T.
DRAWN BY : T.K.		APPROVED BY: P.S.

SCALE 1: 750 — 0 15 30 45 60 75m

Appendix F Wetland Water Balance Calculations

Project Information				
Project Number:	2600786			
Project Name:	Rand Estate Redevelopment			
Project Location:	Niagara-on-the-Lake, Ontario			
Type of Water Balance:	Pre- to Post-Development Feature-Based Water Balance			
Preparer Initials:	BG			
Reviewer Intials:	KP			
Date:	March 2026			
Latitude:	43 °	14 '	32.59 "	
Longitude:	79 °	4 '	16.72 "	
Closest Climate Station:	VINELAND		6139143/6139148	1991-2020

Pre-Development Water Holding Capacity #1:	300
Pre-Development Water Holding Capacity #2:	75
Post-Development Water Holding Capacity #1:	300
Post-Development Water Holding Capacity #2:	75

MONTHLY AND YEARLY WATER BALANCE COMPONENTS

		JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YEAR
Potential Evapotranspiration Calculation	Average Temperature: T (^{o}C)	-3.3	-2.9	1.4	7.0	13.3	19.1	22.2	21.4	17.6	11.3	5.2	0.1	9.4
	Heat Index: i=(T/5)$^{1.514}$	0.00	0.00	0.15	1.66	4.40	7.61	9.55	9.04	6.72	3.44	1.06	0.00	43.6
	Unadjusted Daily Potential Evapotranspiration: U (mm)	0.0	0.0	4.2	28.0	59.8	91.8	109.7	105.1	83.4	49.3	19.7	0.2	551.3
	Adjusting Factor for U (Latitude 43 degrees N)	0.82	0.82	1.02	1.12	1.26	1.27	1.29	1.20	1.04	0.95	0.81	0.77	-
	Adjusted Potential Evapotranspiration: PET (mm)	0.0	0.0	4.3	31.4	75.4	116.6	141.6	126.1	86.7	46.9	16.0	0.1	645.0
	Precipitation: P (mm)	71.1	52.4	62.1	82.8	69.8	78.1	74.2	68.7	68.7	76.7	71.8	61.6	838.0
	Potential Surplus: P - PET (mm)	71.1	52.4	57.8	51.4	-5.6	-38.5	-67.4	-57.4	-18.0	29.8	55.8	61.5	193.0
	Accumulated Potential Water Loss (mm)					-5.6	-44.2	-111.5	-168.9	-186.9				-
Pre-Development Pervious Components: Fine Sandy Loam / Mature Forests	Soil Moisture Storage (Max. 300 mm)	300.0	300.0	300.0	300.0	294.0	259.0	206.0	170.0	160.0	189.8	245.7	300.0	-
	Soil Moisture Storage Including Snow (mm)	371.1	423.5	300.0	300.0	294.0	259.0	206.0	170.0	160.0	189.8	245.7	300.0	-
	Change in Soil Moisture Storage (mm)	0.0	0.0	0.0	0.0	-6.0	-35.0	-53.0	-36.0	-10.0	29.8	55.8	54.3	-
	Actual Evapotranspiration (mm)	0.0	0.0	4.3	31.4	75.8	113.1	127.2	104.7	78.7	46.9	16.0	0.1	598.1
	Moisture Surplus, Undistributed (mm)	71.1	52.4	57.8	51.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	7.1	239.9
	Water Surplus Available for Infiltration or Runoff (mm)	71.1	52.4	57.8	51.4	0.4	0.0	0.0	0.0	0.0	0.0	0.0	7.1	240.3
	Snowmelt Runoff (mm)	0.1	0.1	12.4	55.6	27.8	13.9	6.9	3.5	1.7	0.9	0.4	0.2	123.4
	Surplus Accounting for Snowmelt (mm)	0.1	0.1	70.2	107.0	28.2	13.9	6.9	3.5	1.7	0.9	0.4	7.3	240.3
Pre-Development Pervious Components: Fine Sandy Loam / Urban Lawns/Shallow Rooted Crops	Soil Moisture Storage (Max. 75 mm)	75.0	75.0	75.0	75.0	69.0	40.0	16.0	7.0	6.0	35.8	75.0	75.0	-
	Soil Moisture Storage Including Snow (mm)	146.1	198.5	75.0	75.0	69.0	40.0	16.0	7.0	6.0	35.8	75.0	75.0	-
	Change in Soil Moisture Storage (mm)	0.0	0.0	0.0	0.0	-6.0	-29.0	-24.0	-9.0	-1.0	29.8	39.2	0.0	-
	Actual Evapotranspiration (mm)	0.0	0.0	4.3	31.4	75.8	107.1	98.2	77.7	69.7	46.9	16.0	0.1	527.1
	Moisture Surplus, Undistributed (mm)	71.1	52.4	57.8	51.4	0.0	0.0	0.0	0.0	0.0	0.0	16.7	61.5	310.9
	Water Surplus Available for Infiltration or Runoff (mm)	71.1	52.4	57.8	51.4	0.4	0.0	0.0	0.0	0.0	0.0	16.7	61.5	311.3
	Snowmelt Runoff (mm)	0.1	0.1	12.4	55.6	27.8	13.9	6.9	3.5	1.7	0.9	0.4	0.2	123.4
	Surplus Accounting for Snowmelt (mm)	0.1	0.1	70.2	107.0	28.2	13.9	6.9	3.5	1.7	0.9	17.1	61.7	311.3
Post-Development Pervious Components: Fine Sandy Loam / Mature Forests	Soil Moisture Storage (Max. 300 mm)	300.0	300.0	300.0	300.0	294.0	259.0	206.0	170.0	160.0	189.8	245.7	300.0	-
	Soil Moisture Storage Including Snow (mm)	371.1	423.5	300.0	300.0	294.0	259.0	206.0	170.0	160.0	189.8	245.7	300.0	-
	Change in Soil Moisture Storage (mm)	0.0	0.0	0.0	0.0	-6.0	-35.0	-53.0	-36.0	-10.0	29.8	55.8	54.3	-
	Actual Evapotranspiration (mm)	0.0	0.0	4.3	31.4	75.8	113.1	127.2	104.7	78.7	46.9	16.0	0.1	598.1
	Moisture Surplus, Undistributed (mm)	71.1	52.4	57.8	51.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	7.1	239.9
	Water Surplus Available for Infiltration or Runoff (mm)	71.1	52.4	57.8	51.4	0.4	0.0	0.0	0.0	0.0	0.0	0.0	7.1	240.3
	Snowmelt Runoff (mm)	0.1	0.1	12.4	55.6	27.8	13.9	6.9	3.5	1.7	0.9	0.4	0.2	123.4
	Surplus Accounting for Snowmelt (mm)	0.1	0.1	70.2	107.0	28.2	13.9	6.9	3.5	1.7	0.9	0.4	7.3	240.3
Post-Development Pervious Components: Fine Sandy Loam / Urban Lawns/Shallow Rooted Crops	Soil Moisture Storage (Max. 75 mm)	75.0	75.0	75.0	75.0	69.0	40.0	16.0	7.0	6.0	35.8	75.0	75.0	-
	Soil Moisture Storage Including Snow (mm)	146.1	198.5	75.0	75.0	69.0	40.0	16.0	7.0	6.0	35.8	75.0	75.0	-
	Change in Soil Moisture Storage (mm)	0.0	0.0	0.0	0.0	-6.0	-29.0	-24.0	-9.0	-1.0	29.8	39.2	0.0	-
	Actual Evapotranspiration (mm)	0.0	0.0	4.3	31.4	75.8	107.1	98.2	77.7	69.7	46.9	16.0	0.1	527.1
	Moisture Surplus, Undistributed (mm)	71.1	52.4	57.8	51.4	0.0	0.0	0.0	0.0	0.0	0.0	16.7	61.5	310.9
	Water Surplus Available for Infiltration or Runoff (mm)	71.1	52.4	57.8	51.4	0.4	0.0	0.0	0.0	0.0	0.0	16.7	61.5	311.3
	Snowmelt Runoff (mm)	0.1	0.1	12.4	55.6	27.8	13.9	6.9	3.5	1.7	0.9	0.4	0.2	123.4
	Surplus Accounting for Snowmelt (mm)	0.1	0.1	70.2	107.0	28.2	13.9	6.9	3.5	1.7	0.9	17.1	61.7	311.3
Impervious Components	Precipitation: P (mm)	71.1	52.4	62.1	82.8	69.8	78.1	74.2	68.7	68.7	76.7	71.8	61.6	838.0
	Actual Evapotranspiration (mm)	0.0	0.0	1.4	10.7	25.6	39.7	48.1	42.9	29.5	15.9	5.4	0.0	219.3
	Surplus from Snow (mm)	0.1	0.1	24.7	152.6	76.3	38.2	19.1	9.5	4.8	2.4	1.2	0.6	329.6
	Potential Surface Water Runoff: P - PE (mm)	71.1	52.4	60.7	72.1	44.2	38.4	26.1	25.8	39.2	60.8	66.4	61.6	618.7
	Surplus Accounting for Snowmelt (mm)	0.1	0.1	85.4	224.8	120.5	76.6	45.1	35.4	44.0	63.1	67.6	0.6	763.2

Notes

1. Both potential infiltration and surface water runoff are independent of temperature
2. Assumption is in January maximum soil moisture storage value is present
3. Water Holding Capacity & Infiltration Factors taken from Table 3.1 of MOE SWMPDM, 2003
4. Average Temp. and Precip. taken from Environment Canada station:
   VINELAND
5. Adjusting Factor for U based on Lorente, 1961

YEARLY WATER BALANCE

		Total Land Area (m^2)	Impervious Factor	Pervious Area (m^2)	Impervious Area (m^2)	Infiltration Factor	Runoff Factor	Infiltration (m^3/year)	Runoff (m^3/year)
Existing Land Use (Pre-Development)	Swamp	2331.4	0%	2331.412	0.00	0.90	0.10	504	56
	Woodland	4317.3	0%	4317.26	0.00	0.90	0.10	934	104
	Meadow	2277.0	0%	2277.03	0.00	0.80	0.20	567	142
	Lawn	3714.8	0%	3714.82	0.00	0.80	0.20	925	231
	Agriculture	2628.9	0%	2628.91	0.00	0.80	0.20	655	164
	TOTAL	**15,269**	**0%**	**15,269**	**0**	**0.84**	**0.16**	**3,584**	**696**
Proposed Land Use (Post-Development)	Swamp	2331.4	0%	2331.412	0.00	0.90	0.10	504	56
	Woodland	4317.3	0%	4317.26	0.00	0.90	0.10	934	104
	Buffer & Swale Drainage	2426.3	0%	2426.33	0.00	0.80	0.20	604	151
	Lawn	3481.2	0%	3481.19	0.00	0.80	0.20	867	217
	Agriculture	2628.9	0%	2628.91	0.00	0.80	0.20	655	164
	TOTAL	**15,185**	**0%**	**15,185**	**0**	**0.84**	**0.16**	**3,563**	**691**

Notes
1. Both potential infiltration and surface water runoff are independent of temperature
2. Water Holding Capacity & Infiltration Factors taken from Table 3.1 of MOE SWMPDM, 2003
3. Average Temp. and Precip. taken from Environment Canada station:
VINELAND

MONTHLY INFILTRATION (m^3)

		JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YEAR
Existing Land Use (Pre-Development)	Swamp	0.2	0.1	147.3	224.5	59.1	29.2	14.6	7.3	3.6	1.8	0.9	15.4	504.1
	Woodland	0.42	0.21	272.76	415.82	109.50	53.98	26.99	13.50	6.75	3.37	1.69	28.52	933.5
	Meadow	0.20	0.10	127.88	194.94	51.33	25.31	12.65	6.33	3.16	1.58	31.15	112.35	567.0
	Lawn	0.32	0.16	208.62	318.04	83.75	41.29	20.65	10.32	5.16	2.58	50.82	183.29	925.0
	Agriculture	0.23	0.11	147.64	225.07	59.27	29.22	14.61	7.31	3.65	1.83	35.96	129.71	654.6
	TOTAL	**1.4**	**0.7**	**904.2**	**1378.4**	**363.0**	**179.0**	**89.5**	**44.7**	**22.4**	**11.2**	**120.5**	**469.3**	**3584.2**
Proposed Land Use (Post-Development)	Swamp	0.2	0.1	147.3	224.5	59.1	29.2	14.6	7.3	3.6	1.8	0.9	15.4	504.1
	Woodland	0.42	0.21	272.76	415.82	109.50	53.98	26.99	13.50	6.75	3.37	1.69	28.52	933.5
	Buffer & Swale Drainage	0.21	0.11	136.26	207.73	54.70	26.97	13.48	6.74	3.37	1.69	33.19	119.72	604.2
	Lawn	0.30	0.15	195.50	298.03	78.48	38.69	19.35	9.67	4.84	2.42	47.62	171.76	866.8
	Agriculture	0.23	0.11	147.64	225.07	59.27	29.22	14.61	7.31	3.65	1.83	35.96	129.71	654.6
	TOTAL	**1.4**	**0.7**	**899.5**	**1371.2**	**361.1**	**178.0**	**89.0**	**44.5**	**22.3**	**11.1**	**119.4**	**465.1**	**3563.2**

Notes
1. Both potential infiltration and surface water runoff are independent of temperature
2. Water Holding Capacity & Infiltration Factors taken from Table 3.1 of MOE SWMPDM, 2003
3. Average Temp. and Precip. taken from Environment Canada station:
VINELAND

MONTHLY RUNOFF (m^3)

		JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YEAR
Existing Land Use (Pre-Development)	Swamp	0.0	0.0	16.4	24.9	6.6	3.2	1.6	0.8	0.4	0.2	0.1	1.7	56.0
	Woodland	0.05	0.02	30.31	46.20	12.17	6.00	3.00	1.50	0.75	0.37	0.19	3.17	103.7
	Meadow	0.05	0.02	31.97	48.74	12.83	6.33	3.16	1.58	0.79	0.40	7.79	28.09	141.7
	Lawn	0.08	0.04	52.16	79.51	20.94	10.32	5.16	2.58	1.29	0.65	12.70	45.82	231.2
	Agriculture	0.06	0.03	36.91	56.27	14.82	7.31	3.65	1.83	0.91	0.46	8.99	32.43	163.7
	TOTAL	**0.3**	**0.1**	**167.7**	**255.7**	**67.3**	**33.2**	**16.6**	**8.3**	**4.1**	**2.1**	**29.8**	**111.2**	**696.4**
Proposed Land Use (Post-Development)	Swamp	0.0	0.0	16.4	24.9	6.6	3.2	1.6	0.8	0.4	0.2	0.1	1.7	56.0
	Woodland	0.05	0.02	30.31	46.20	12.17	6.00	3.00	1.50	0.75	0.37	0.19	3.17	103.7
	Buffer & Swale Drainage	0.05	0.03	34.07	51.93	12.83	6.33	3.16	1.58	0.79	0.40	7.79	28.09	151.0
	Lawn	0.08	0.04	48.87	74.51	20.94	10.32	5.16	2.58	1.29	0.65	12.70	45.82	216.7
	Agriculture	0.06	0.03	36.91	56.27	14.82	7.31	3.65	1.83	0.91	0.46	8.99	32.43	163.7
	TOTAL	**0.3**	**0.1**	**166.5**	**253.9**	**67.3**	**33.2**	**16.6**	**8.3**	**4.1**	**2.1**	**29.8**	**111.2**	**691.1**

Notes
1. Both potential infiltration and surface water runoff are independent of temperature
2. Water Holding Capacity & Infiltration Factors taken from Table 3.1 of MOE SWMPDM, 2003
3. Average Temp. and Precip. taken from Environment Canada station:
VINELAND