GEI Consultants

Mayfield Tullamore Local Subwatershed Study

Phase 1 – Subwatershed Characterization and Integration Report
Town of Caledon, Peel Region, Ontario

Submitted to:

Mayfield Tullamore Landowner Group Inc.
c/o Development Collective
Attn: Kim Beckman, MTLOG Group Manager

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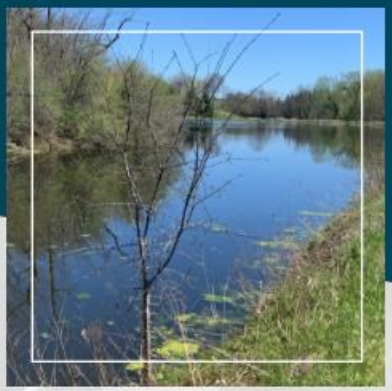
Project 2400278





In collaboration with: SCS consulting group ltd

Issues and Revisions Registry

Identification	Date	Description of Issued and/or Revision
1st Submission	August 2024	Issued for Agency Review

Statement of Conditions

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Executive Summary

The Mayfield Tullamore Secondary Plan Area has been identified as a New Urban Area in the Town of Caledon, based on the results of a Settlement Area Boundary Expansion Area (SABE) Study, completed as part of the Region of Peel's recent Municipal Comprehensive Review (Region of Peel Official Plan, Adopted 2022). The Mayfield Tullamore Secondary Plan Area lands are approximately 612 ha in size (including Bramalea Road) and generally bounded to the south by Mayfield Road and to the north by Old School Road; and located west of Torbram Road and east of Dixie Road.

The Town of Caledon's Council has since approved an updated Official Plan (Future Caledon Official Plan, 2024), which is currently pending provincial approval (as per Bill 185) to conform with the Regional Official Plan's New Urban Areas and the most current Provincial policies.

Prior to any development, the preparation and approval of a secondary plan, is required to determine detailed land use designations for the recently identified new community area. To support the future development of the Study Area, an Official Plan Amendment (OPA) is required to bring these New Urban Areas into the Town's Settlement Area, to redesignate them for urban land uses in alignment with Region of Peel OP (2022) Section 5.6.20.14, and the Town of Caledon's OP (Future Caledon OP, 2024) Section 21.3.

As part of the SABE, a Scoped Subwatershed Study (Scoped SWS, Wood et. al., 2022) was completed to inform the New Urban Area (New Community Areas and New Employment Areas) within the SABE. This Scoped SWS provided a preliminary natural heritage system comprised of Natural Features and Areas, Supporting Features and Areas, potential linkages, and potential enhancement areas. As part of the Secondary Plan process, a local subwatershed study is required to provide a more detailed assessment of existing conditions, potential impacts due to land use changes, and recommendations to support a robust natural heritage and water resource system within the Secondary Plan Area. The local SWS is intended to refine and implement the recommendations of the Scoped SWS (Wood et al.,2022). The requirements for a local SWS are detailed in Section 13.9 "Natural Environment System in New Community Areas and New Employment Areas".

GEI Consultants Canada Inc. (GEI) and SCS Consulting (SCS) have been retained to deliver a comprehensive local SWS for the Mayfield Tullamore Land Owner Group.

The scope of work for this local SWS has been designed in alignment with Terms of Reference for Local Subwatershed Studies (Town of Caledon, 2024), and a Terms of Reference for the project was submitted to the Town of Caledon in May 2024.

Based on these two documents, the local SWS has been separated into three (3) phases.

- Phase 1 includes the characterization of existing conditions, including the natural heritage features, hydrologic features, and surface and groundwater systems;
- Phase 2 includes the analysis, impact assessment, mitigation, and recommendations; and

- Phase 3 consists of a comprehensive implementation plan, monitoring plan, and adaptive management plan.

The following summarizes the Phase 1 Local SWS key findings and recommendations and notes where additional discussion/details are provided in the local SWS for each topic noted:

- The Mayfield Tullamore Secondary Plan Area is located within the West Humber River watershed with Tributaries of Campbell's Cross Creek and the West Humber River traversing the Study Area;
- Ecological field investigations were completed to characterize existing conditions (**Section 3.1.2**). At this time, summer and fall ecological investigations are still outstanding and will be incorporated into a subsequent Phase 1 submission;
- Based on the ecological scope of work, the following Natural Heritage Features have been identified within the Study Area:
    - Provincially Significant Wetlands and Other Wetlands;
    - Significant Woodlands and Non-significant Woodlands;
    - Significant Valleylands and Non-significant Valleylands;
    - Significant Wildlife Habitat:
        - Confirmed within Participating properties:
            - Turtle Wintering Area;
            - Springs and Seep;
            - Species of Special Concern;
            - Terrestrial Crayfish (Confirmed);
            - Barn Swallow (Confirmed);
            - Eastern Wood Pewee (Confirmed);
            - Snapping Turtle (Confirmed); and
            - Monarch (Candidate).
        - Candidate SWH within the Greenbelt Plan Area & non-participating properties (see **Section 3.1.4.5**).
    - Fish Habitat (direct and indirect);
    - Habitat of Endangered and Threatened Species:
        - Butternut;
        - Redside Dace (occupied and contributing);
        - Eastern Meadowlark;
        - Bobolink; and
        - Species at Risk Bats (candidate habitat).

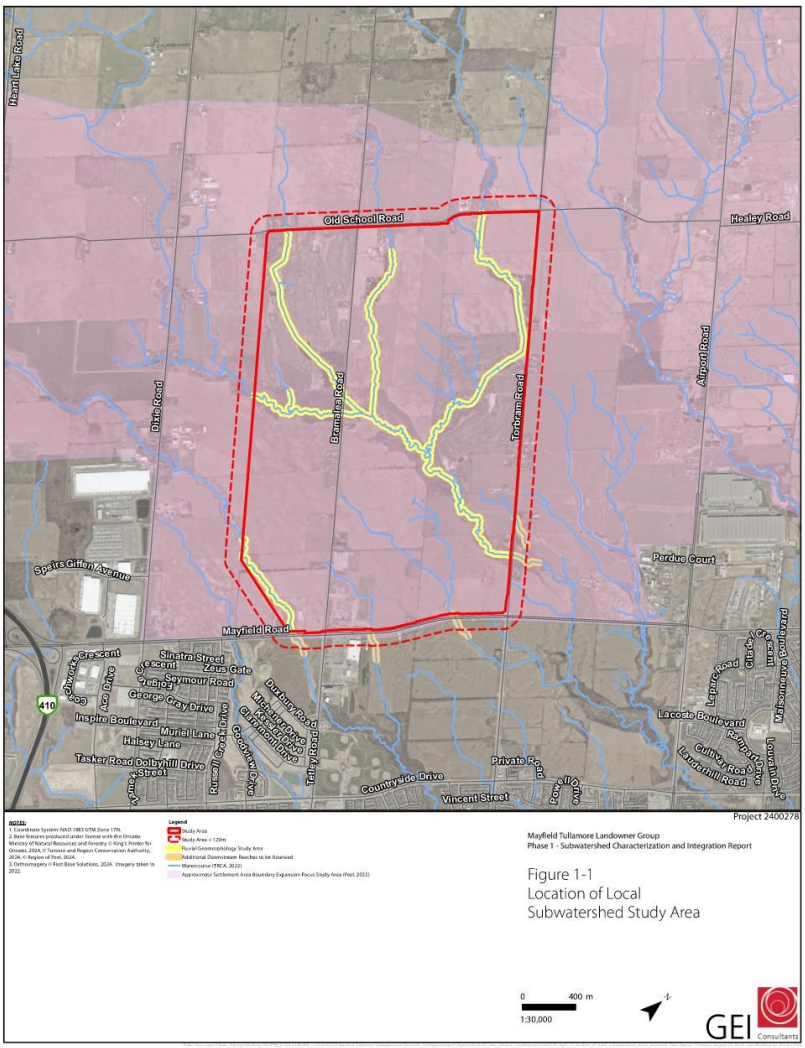
- There are a number of features identified outside of the core NHS that may be further refined to support the future NHS, these features include the following:
    - Non-significant ("Unevaluated") Wetlands;
    - Non-significant Woodlands; and
    - Non-significant Valleylands associated with medium constraint watercourses.
- Based on the fluvial geomorphic assessment, the delineation of reaches from the Scoped SWS for the SABE was generally maintained with minor revisions as detailed in **Section 3.2.4**; Rapid assessments were performed on each reach, consisting of a RGA, RSAT, and the Down's method. The RGA results ranged from 0.07 (in regime) to 0.43 (in adjustment). The RSAT results for the reaches ranged between 27 (good) and 35 (excellent). Meander belt delineation was completed for the Study Area; which also helps define the habitat limits for occupied Redside Dace;
- Existing storm drainage boundaries were delineated for the Secondary Plan and surrounding area; catchment parameters of affected catchments of the Humber River Hydrology Model were modified to reflect the revised areas. In general, the peak flows of the catchments that were modified did not change significantly throughout the Study Area (**Section 3.3.3)**. No updates to downstream floodlines are warranted and any impacts to downstream flood vulnerable areas will be negligible based on the slight increase in peak flows. Stormwater runoff control criteria have been established based on the requirements of relevant design guidelines and standards (**Section 2.3**);
- Based on subsurface investigations, the underlying soil and groundwater conditions and site geology was characterized (**Section 3.2.3**) and used to support the hydrogeological study. In general, a regional deposit of stiff to hard cohesive glacial till was encountered across the Study Area, underlain at depth in some boreholes by very dense cohesionless glacial till. Underlying the glacial till, many boreholes encountered various cohesionless deposits of typically compact to dense sands and silts. Gravel deposits were locally encountered at depth in some of the boreholes advanced in the northern part of the Study Area, and locally in the eastern part of the Study Area. Based on the background review and regional stratigraphic units (discussed in **Section 2.5**), the upper glacial till deposits are deduced to be the Halton Till formation, forming the Halton Aquitard. The deeper deposits of cohesionless glacial till underlying the upper cohesive till or the sands, silts, and gravels are deduced to be Newmarket Till, forming the Newmarket Aquitard. The deposits of sands and silts could be part of the Oak Ridges Aquifer Complex (ORAC), or where thinner, could be part of the Halton or Newmarket Till formations. The local gravels and gravelly deposits are deduced to be part of the ORAC.
- When assessing groundwater flow directions, Study Area data was relatively consistent with the SABE Scoped SWS reporting. However, groundwater level monitoring to date has been limited and continued monitoring of monitoring well locations will provide better insight on these systems. Surface water monitoring will also continue into 2025 to confirm Groundwater/Surface Water Connections, preliminary results are found in **Section 3.5**.

- Preliminary water balance calculations for existing (pre-development) conditions found the average annual runoff volume ranged from about 12,302 to 151,856 m^3/year for the participating properties, and the average annual infiltration volume ranged from about 16,500 to 103,400 m^3/year for the participating properties. The total yearly target for infiltration across the Study Area (including participating and non-participating properties) is 935,451 m^3/year.
- A preliminary slope stability study was completed which estimates that the LTSTOS position ranged from coinciding with the existing top of slope to being set back 23.8 m from the top of slope (**Section 3.4.7**); GEMTEC provided slope stability setbacks specific to Properties 9 and 10. Slope stability has been used to support valleyland limits and setbacks for the Natural Heritage System (**Section 4.1**).
- Adaptive management strategies that consider the impacts of climate change are proposed to support resilience and conservation of the built and natural environment;
- The Phase 1 Subwatershed Characterization and Integration Report has reviewed and confirmed the extent of the preliminary NHS proposed in the SABE Scoped SWS for the Study Area. A series of analyses were completed to identify natural hazards, natural features and functions that meet the definition of NHS components as described in the Provincial Policy Statement, Town of Caledon Official Plan and Region of Peel Official Plan. The preliminary NHS includes valley and stream corridors, wetlands, woodlands, significant wildlife habitat, habitat of endangered and threatened species, fish habitat, and minimum VPZs. Phase 2 will include a more detailed review of potential restoration and enhancement areas, ecological compensation and linkages as the local SWS progresses;
- Next steps for all disciplines for Phase 2 of the local SWS are explored further in **Section 5.1** of this report; and
- Phase 3 (Implementation and Management Strategies) will follow the Phase 2 report and will finalize the evaluation of the proposed land use scenarios and recommend management strategies and direction for their implementation to support the goals and targets outlined in the SABE SWS and Phase 1 and 2 Local SWS reports.

1. Introduction

GEI Consultants Canada Ltd. (GEI) and SCS Consulting Group Ltd. (SCS) are working on behalf of the Mayfield Tullamore Landowner Group Inc. (MTLOG) in support of their privately initiated Secondary Plan and Official Plan Amendment to the Town of Caledon's Official Plan (OP). The Mayfield Tullamore Secondary Plan Area is located within Peel Region, in the Town of Caledon. The MTLOG Secondary Plan Area is within the Peel Region's Settlement Area Boundary Expansion (SABE) Study Area, which outlines areas for future settlement and urban development. The Secondary Plan Area lands are approximately 612 ha in size (including Bramalea Road) and generally bounded to the south by Mayfield Road and to the north by Old School Road; and is located west of Torbram Road and east of Dixie Road in the Town of Caledon, Ontario (the Secondary Plan area is herein referred to as the Study Area; **Figure 1-1**).

Figure 1-1: Location of the Study Area



The purpose of a Local Subwatershed Study (SWS) is to assist in developing a sustainable development plan for the subject growth area in Caledon by ensuring protection and benefits to the natural and human environments. The local SWS will identify an appropriate NHS and water resource management approach that will protect, restore, and enhance the natural and water-based environments within the Secondary Plan Area, herein referred to as Study Area and the surrounding lands in the subwatershed. The scope of the SWS will generally focus on characterization of the area, subwatershed impact analysis and mitigation strategies for future land use scenarios.

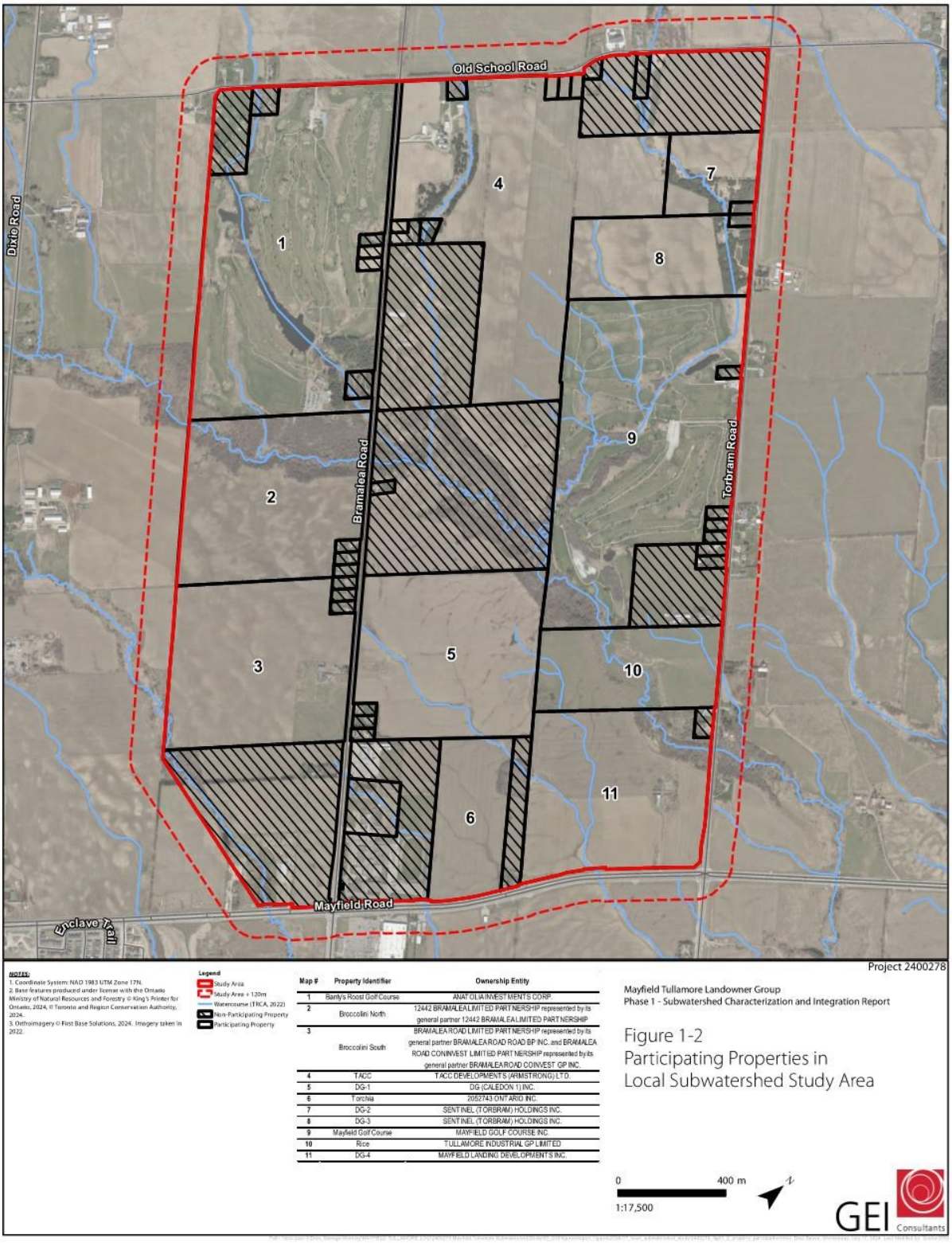
The Secondary Plan Area is predominantly agricultural, with some residential dwellings, and a variety of candidate natural heritage features including woodlands and wetland in the central and southwestern portions of the Study Area; most of these associated with the Tributaries of the West Humber River that run in various directions across the Study Area. One branch of Campbell's Cross Creek (also a tributary of the West Humber River) is also present within the southwest corner of the Study Area. Many of these features are located within the Greenbelt Plan Area.

There are several study components that have study areas that extend beyond the Study Area as defined as the boundaries of the Secondary Plan Area, the disciplines that have Study Areas that differ from the Secondary Plan Area are as follows:

- Natural heritage Study Area will consist of the Secondary Plan Area plus the 120 m adjacent lands, as shown on Figure 1-1. The 120 m adjacent lands allow for the assessment of potential negative impacts on significant features.
- Stream morphology Study Area: The geomorphic assessment will be undertaken for watercourses within the Secondary Plan Area, as well as receiving watercourses for a distance of approximately 250 m downstream of the Study Area as shown on Figure 1-1. The assessment for the downstream reaches will be used to assess the impacts of the proposed development to these reaches, from a geomorphic perspective. Recognizing that these reaches flow on lands that are not participating in the current study, where appropriate, these geomorphic assessments will be completed within the road right-of-way, or through desktop-based methods.
- Hydraulics and hydrology Study Area: The Hydrologic Study Area (HSA) will encompass the Secondary Plan Area, in addition to external drainage from lands upstream that flow through the Secondary Plan Area. Existing peak flows at key flow nodes downstream of the Study Area to Lake Ontario will be calculated and utilized to compare post development flows to pre-development flows for impact and mitigation assessment within the Secondary Plan. Given the scale of the HSA, it is not shown on Figure 1-2 as it would be difficult to illustrate the Study Areas for the other disciplines. Instead the HSA is presented within **Appendix D-4**.

Within the Study Area, the participating landowners make up approximately 438 ha, which is approximately 71.5% of the total Secondary Plan Area; participating properties are outlined on **Figure 1-2**. Each participating parcel has been assigned a number to assist with site specific references.

Figure 1-2: Participating Properties within the Secondary Plan Area



Where relevant, this report may refer to the Study Area, participating properties, non-participating properties, discipline specific Study Areas, and/or the Greenbelt Plan Area.

This SWS necessarily includes discussion related to non-participating lands. Access to non-participating lands has not been made available; therefore certain assumptions have been made as to the characterization of these lands, through use of air photos, background secondary source information and surveys from publicly accessible areas. It should be noted that data identified on non-participating properties will require site-specific confirmation and further site characterization beyond what is presented within this local SWS.

The SWS has identified the non-participating landowners and provides an outline of additional works/studies that may be necessary should changes to land use be proposed in those areas (**Section 5.2**).

1.1 Study Overview and Team

The Region of Peel undertook a SABE study as part of their Region of Peel Official Plan (Peel OP) updates (Adopted 2022) to determine appropriate locations for future community and employment growth in the Town of Caledon; inclusive of the lands within the Study Area.

The Town of Caledon's Council has since approved an updated OP (Future Caledon Official Plan, 2024), pending provincial approval (as per Bill 185) to conform with the Regional Official Plan's SABE and the most current Provincial policies.

To support the future development of the Study Area, an Official Plan Amendment (OPA) is required to bring these New Urban Areas into the Town's Settlement Area, to redesignate them for urban land uses, and will be further supported by a comprehensive Secondary Plan in alignment with Region of Peel OP (2022) Section 5.6.20.14, and the Town of Caledon's OP (Future Caledon OP, 2024) Section 21.3.

The Future Caledon Draft OP (2024) outlines requirements for a Local SWS for the new community areas (Section 13.9.1) as part of the integrated planning process for Secondary Plan areas.

This Local SWS is separated into three phases, each with an associated report, these include:

- **Phase 1:** Subwatershed Characterization and Integration;
- **Phase 2:** Impact Assessment; and
- **Phase 3:** Implementation and Management Strategies.

The local SWS is intended to address the following items:

- Address relevant natural features and functions as identified in relevant planning policies and legislation;
- Provide the foundation for the Secondary Plan by defining and delineating items such as the NHS and the location of stormwater management facilities;

- Follow the direction and guidance of the Region of Peel SABE SWS (Part A, B & C; Wood et. al., 2022) confirming targets and criteria; and
- Inform required work for future planning stages.

This Phase 1 report will focus on identifying, characterizing and assessing natural heritage features, water resources, and natural hazards within the Study Area. This report will identify key features and functions and propose a preliminary Natural Heritage System (NHS) for the Secondary Plan.

This local SWS is being undertaken under the guidance of a SWS Technical Advisory Committee (TAC), which includes representatives from the Region of Peel, Town of Caledon and Toronto and Region Conservation Authority (TRCA).

The following individuals represent the principal authors and technical leads for this SWS:

- Natural Heritage: Shelley Lohnes, Olivia Robinson, Holly Stemberger (GEI Canada);
- Fluvial Geomorphology: Ahmed Siddiqui (GEI Canada);
- Geotechnical, Hydrogeology and Surface Water: Russell Wiginton, Alexander Winkelmann and Bethany Gruber (GEI Canada);
- Hydraulics and Stormwater Management: Nick McIntosh (SCS); and
- Climate Change: Shelley Hazen (GEI Canada).

1.2 Goals and Objectives

Overview

Goals and objectives have been established for the Mayfield Tullamore Secondary Plan Area at a sub-watershed level based on the most current information and approaches for sub-watershed level studies within the Town of Caledon, specifically as it relates to the SABE Local SWS (Wood et al., 2022).

The goals for the SABE NHS include the following, as outline in the Part A Scoped SWS:

- “Develop a system (NHS) that balances policy direction, emerging science and natural heritage planning best practices;
- Establish a robust, connected and ecologically resilient system (NHS) for the long-term benefit of environmental and public health, well-being and safety; and
- Provide opportunities and direction for the enhancement of the NHS to establish a sustainable system in a changing landscape matrix and that supports climate change resilience.”

The goals and objectives related to four critical areas of the local SWS (Natural Heritage, Natural Hazards, Water Resources and Stormwater Management) are set out in the following sections.

Natural Heritage

Goal:
To protect, restore or, where appropriate, enhance the biodiversity, connectivity and ecological functions of the natural heritage features and areas throughout the Study Area for the long term.

Objectives:

- Through the net gain mitigation hierarchy, ensure that natural heritage features and their ecological and hydrological functions are protected from potential adverse and cumulative impacts of development within the Study Area;
- To ensure that buffers, corridors and linkages between natural features and areas, surface water features and groundwater features are maintained, restored or, where possible, improved through the establishment of the NHS;
- Establish environmental targets to maintain, restore and enhance existing conditions;
- To establish development standards and land use controls that will ensure future development does not negatively impact the NHS;
- To consider climate change mitigation and adaptation measures as part of the development of natural heritage management strategies;
- To establish a healthy and diverse NHS that compliments and enhances the ecological functions of existing habitat types;
- Recommend monitoring and adaptive management opportunities for the NHS;
- Provide direction for implementation that will support future stages of land use planning and decision-making in achieving net benefit outcomes for the NHS; and
- To develop integrated stormwater management plans to help manage water balance with the intent to maintain both hydrological and ecological function of features within the adjacent NHS.

Natural Hazards

Goal:
To prevent, eliminate or minimize the risks to life and property caused by natural hazards such as flooding and erosion hazards and ensure existing hazards are managed.

Objectives:

- To ensure land use changes do not increase the frequency and intensity of flooding, the rate of natural stream erosion or increase slope instability;
- To establish development standards, land use planning and engineering practices that ensure future development is located outside of, and appropriately setback from, flooding and erosion hazards;
- To ensure that proposed land use changes explore appropriate mitigation measures in order to avoid adverse impacts to natural features and areas as it relates to natural hazards; and

- To consider climate change adaptation measures as part of flooding and erosion management strategies.

Water Resources

Goal:
To protect, improve and/or restore the quality and quantity of water resources within, adjacent to and downstream of the Study Area, including their associated ecological and hydrologic / hydrogeologic functions.

Objectives:

- To ensure fluvial processes and stream morphology are maintained or improved to support important habitat attributes (pools, riffles, etc.), dynamic channel form and diversity which will contribute to maintaining a sustainable NHS;
- To prevent nutrient enrichment and contamination of surface and groundwater resources from proposed land use changes;
- To ensure surface and groundwater features and their hydrologic functions are protected, improved or restored;
- To maintain important linkages and related functions among groundwater features, functional groundwater recharge, surface water features, hydrologic functions, and natural heritage features and areas; and
- To consider climate change mitigation and adaptation measures as part of establishing management strategies.

Stormwater Management

Goal:
To mitigate negative impacts related to the quality and quantity of stormwater within, adjacent to, and downstream of the Study Area

Objectives:

- To maintain/enhance baseflow to the receiving regulated watercourses to maintain existing hydrologic function;
- To ensure that quantity control criteria is achieved for all storm events (2 year to 100 year) and including the Regional Storm event;
- To mitigate changes to existing flow-duration exceedance characteristics and other erosion indicators in the receiving regulated watercourses;
- To ensure that the treatment of runoff mitigates surface water quality impacts due to development in accordance with Ministry of the Environment, Conservation and Parks guidelines, to an enhanced standard;
- To mitigate thermal impacts from stormwater runoff to the extent possible;

- To consider Low Impact Development (LID), Green Infrastructure and BMPs to treat stormwater at its source, to the extent possible; and
- To consider climate change mitigation and adaptation measures as part of establishing stormwater management strategies.

1.3 Report Overview

This Phase 1: Subwatershed Characterization and Integration report summarizes available background information (**Section 2**), establishes a baseline inventory (**Section 3**), and provides an overview of how these findings have been integrated into the conceptual NHS (**Section 4**). At the time of submission, certain field investigations were still ongoing. These are described further in **Section 3** and will be provided in subsequent reporting for the SWS.

Phase 1 of the local SWS will inform the identification of the overall NHS for the subwatershed Study Area and will inform monitoring programs proposed as part of the overall natural heritage scope of work. These will be explored further in subsequent local SWS report phases.

Section 5 of this report outlines the next steps required for the subsequent phases of the local SWS.

2. Background Information Review

The intent of the Phase 1 Subwatershed Characterization and Integration report of the local SWS is to inventory, characterize, and assess natural hazards and natural heritage features and functions within the Study Area. In order to inform the detailed investigations required to further characterize and assess features and functions, all disciplines (natural heritage, stream morphology, hydraulics and hydrology, hydrogeology, geotechnical, surface water quality, and climate change) completed detailed desktop background reviews.

As part of the background review, several studies and guidelines were referenced to provide input and guidance to the preparation of the SWS. These include, but are not limited to, the following:

- Approved Assessment Report: Toronto and Region Source Protection Area (CTC Source Protection Committee, 2022);
- Approved CTC Source Protection Plan (CTC Source Protection Committee, 2022);
- Channel Modification Design and Submission Requirements (TRCA, 2007);
- Crossings Guideline for Valley and Stream Corridors (TRCA, 2015);
- Erosion and Sediment Control Guide for Urban Construction (TRCA, 2019);
- Evaluation, Classification, and Management of Headwater Drainage Features Guidelines (CVC & TRCA, 2014);
- Final Report Humber River Hydrology Update (TRCA, 2018);
- Geotechnical Engineering Design and Submission Requirements (TRCA 2007);
- Guidance for Development Activities in Redside Dace Protected Habitats (MNRF, 2016);
- Humber River Fisheries Management Plan (MNR and TRCA, 2005); Humber River State of the Watershed Reports (TRCA, 2008);
- Humber River Watershed Plan (TRCA, 2008);
- Humber River Watershed Plan Implementation Guide (TRCA, 2008);
- Humber River Watershed Characterization Report (TRCA, 2023);
- Hydrogeological Assessment Submissions- Conservation Authority Guidelines to Support Development Applications (Conservation Ontario 2013);
- Listen to Your River: A Report Card on the Health of the Humber River Watershed (TRCA, 2007);
- Ministry of the Environment Water Well Records;
- Ministry of Natural Resources: Natural Heritage Reference Manual: Second Edition (Ministry of Natural Resources; MNR 2010);
- Stormwater Management Planning and Design Manual (Ministry of Environment, Conservation and Park; MECP, 2023);

- Technical Guidelines for Flood Hazard Mapping (TRCA and other Conservation Authorities, 2017);
- Technical Guide for River & Stream Systems: Erosion Hazard Limit (MNRF, 2002);
- Thermal Mitigation Checklist for Stormwater Management Ponds Discharging into Redside Dace Habitat (MNRF, 2014);
- TRCA Master Environmental and Servicing Plan Guideline (TRCA, 2015);
- TRCA Stormwater Management Criteria Document (TRCA, 2012);
- TRCA/CVC Low Impact Development Stormwater Management Planning and Design Guide (2010);
- Wetland Water Balance Risk Evaluation (TRCA, 2017);
- Wetland Water Balance Monitoring Protocol (TRCA, 2016); and
- Wetland Water Balance Modelling Guidance Document (TRCA, 2020).

The SWS will support the overarching Secondary Plan for the Study Area. As such, it must conform with or be consistent with all applicable local and provincial land use planning policies including, but not limited to the following:

- Town of Caledon Official Plan (Caledon OP; 2024 Consolidation);
- Future Caledon Official Plan (Future Caledon Draft OP; 2024);
- Peel Region Official Plan (2022 Consolidation);
    - Settlement Area Boundary Expansion Study:
        - Environmental Screening Report (Wood, 2020); and
        - Scoped S (Part A, B, & C, Wood et al. 2022).
- TRCA Living City Policies (2014) and Ontario Regulation (O. Reg.) 41/24;
- Provincial Policy Statement (PPS; 2020) and Draft Provincial Policy Statement (Draft PPS; 2024);
- A Place to Grow – Growth Plan for the Greater Golden Horseshoe (Growth Plan; 2020 Consolidation);
- Greenbelt Plan (2017);
- *Provincial Endangered Species Act* (ESA; 2007, 2024 Consolidation);
- *Environmental Protection Act* (EPA; 1990, 2024 Consolidation);
- *Ontario Water Resources Act* (1990, 2021 Consolidation);
- *Clean Water Act* (2006, 2024 Consolidation);
- *Fish and Wildlife Conservation Act* (1997; 2024 Consolidation);
- *Federal Fisheries Act* (1985; Amended 2019);

- *Migratory Bird Convention Act* (1994; Amended 2024); and
- *Species at Risk Act* (2002; Amended 2017).

The local SWS will also consider climate change throughout its phases. The Region of Peel has been responding to climate change through a series of planning initiatives and actions aimed at reducing greenhouse gas (GHG) emissions, adaptation and resilience building. Numerous vulnerability assessments across multiple sectors were conducted to gain a baseline understanding of municipal risks related to climate change, including:

- Assessing Exposure, Sensitivity, and Adaptive Capacity in the Region of Peel (2012, and updated in 2023);
- Agricultural Systems Vulnerability Assessment in Peel Region (2016);
- Community Services and Assets in Peel Region: Port Credit Vulnerability Assessment Case Study (2016);
- Natural Systems Vulnerability Assessment in Peel Region (2017); and
- Water Infrastructure Systems Vulnerability to Climate Change in the Region of Peel (2017).

In 2019, the Region released a Climate Change Master Plan to help guide and achieve long-term organizational GHG emissions targets and build a more resilient community through the management of regional assets, infrastructure, and services. The Region has also committed to updating its OP to strengthen existing as well as include new policies to address climate change through regional planning and provide direction to support the implementation of relevant land use policies.

Where relevant, the aforementioned studies, guidelines, policies, and legislation were used to inform the scope of work undertaken for the Phase 1 local SWS.

2.1 Planning Considerations

A preliminary assessment of the extent of natural heritage features found on and adjacent to the Study Area was completed. Opportunities and constraints to development were evaluated in the context of the requirements of the previously noted relevant regulatory agencies, local and regional municipalities and/or legislation.

The relevant portions of each of these, as they apply to the Study Area are discussed in the following sections.

Town of Caledon Official Plan (2024 Consolidation)

Parts of the Study Area are designated as “Prime Agricultural Area” on Schedule A of the Caledon OP. Natural features associated with the watercourses on the Study Area are designated “Environmental Policy Area” on Schedule A (**Figure 1, Appendix B1**). Schedule A1 identifies portions of the Study Area as being occupied by “Greenbelt Plan Area” and “Greenbelt Plan Protected Countryside Designation”. Schedule S – The Greenbelt in Caledon identifies “Greenbelt Plan Natural Heritage System” at the northeastern, southeastern, central, and southwestern portions of the Study Area.

"Environmental Policy Area" encompasses "Natural Core Areas" and "Natural Corridors" within the Town of Caledon OP. Section 5.7.3.1.1 of the Caledon OP states that major development and site alteration is not permitted within lands designated "Environmental Policy Area". Minor refinements to the limits of an "Environmental Policy Area" may be made through environmental studies without the need for an OP Amendment. Major modifications to an "Environmental Policy Area" require an OP Amendment.

Natural Core Areas and Natural Corridors are defined within Table 3.1 of the OP as including the following features:

Natural Core Areas:

- All Woodland Core Areas;
- All Wetland Core Areas;
- All Niagara Escarpment Natural Areas;
- All Life Science ANSIs;
- All Environmentally Significant Areas;
- All Significant Habitat of Threatened and Endangered Species; and
- All Greenbelt and Oak Ridges Moranine KNHFs and KHFs.

Natural Corridors:

- All Core Fishery Resource Areas; and
- All Valley and Stream Corridors.

These components are subject to detailed land use policies for Environmental Protection Areas in Section 5.7.

Future Caledon Official Plan (Draft, 2024)

The Town of Caledon's Future Caledon Draft OP (2024) was adopted by Council on March 26th, 2024. This OP is not yet in force and effect as it must still be approved by the Ministry of Municipal Affairs and Housing.

Schedule B2 of the Future Caledon Draft OP, the Study Area is noted as part of the "New Urban Area 2051".

Schedule B4 denotes proposed Land Uses for the New Urban Area; the Study Area include "Natural Features and Areas" (**Figure 1, Appendix B1**). Additionally, land use designations include "Prime Agricultural Area" associated with the Greenbelt Plan limits (Schedule B3a), "New Employment Area" along Torbram Road, and "New Community Area" across the balance of the Study Area.

It is anticipated that through the Secondary Plan OPA process, with the support of a local SWS, that final detailed land uses designations will be determined and will facilitate future site-specific land development applications by individual landowners.

The Future Caledon Draft OP refers to the Region of Peel Scoped SWS(Wood et al., 2022) in Section 13.9 in reference to the delineation of a preliminary Natural Environment System for New Community Areas and New Employment Areas (Section 13.9). This Section outlines the requirements for a local SWS to be completed for each secondary plan area within these "New Urban Areas" in Section 13.9.1. The "Natural Features and Areas" outlined in Schedule B4 for the New Urban Areas have been preliminarily defined through the SABE (see below for more details on the SABE reports); however, it is assumed that these areas will be further refined and updated based on more targeted desktop and field investigations through the local SWS.

In general, the local SWS should provide recommendations for updated "Natural Environment System" that includes "Natural Features and Areas" including:

- Provincially Significant Wetlands (PSW);
- Woodlands meeting one or more of the criteria for Core Area woodland on Table 1 of the Region of Peel Official Plan;
- Significant Valleylands;
- Environmentally Sensitive or Significant Areas;
- Provincial Life Science Areas of Natural and Scientific Interest (ANSIs);
- Escarpment Natural Area designation of the Niagara Escarpment Plan; and
- Valley and stream corridors meeting one or more of the criteria for Core Area valley and stream corridors in Table 2 of the Region of Peel OP.

As well as "Supporting Features and Areas" inclusive of:

- Evaluated non-provincially significant wetlands;
- Unevaluated wetlands;
- Woodlands meeting one or more of the criteria for a natural areas and corridors woodland in Table 1 of the Region of Peel OP;
- Cultural woodlands and cultural savannahs within the urban system meeting one or more of the criteria for a potential natural area and corridor woodland in Table 1 of the Region of Peel OP;
- Any other woodland greater than 0.5 hectares that does not meet the criteria for a natural areas and corridors (NAC) woodland in Table 1 of the Region of Peel OP;
- SWH meeting one or more of the criteria in the Ministry of Natural Resources and Forestry significant wildlife habitat technical guide, but located outside of an applicable provincial plan area;
- Fish habitat;
- Habitat of aquatic SAR; and
- Habitat of endangered species and threatened species.

Appropriate buffers for natural heritage features are to be established based on the local SWS assessments.

The Future Caledon OP (2024) also brings in additional climate change considerations. In 2010, the Town of Caledon created its first Community Climate Change Action Plan (CCCAP), furthering their climate action efforts in 2017 by signing on to the Global Covenant of Mayors for Climate and Energy (GCOM). The Town created a Future Climate Projections Report (2018) to better understand anticipated trends and impacts of climate change on the community. The climate change objectives and policy directions outlined in Chapter 5 of the Future Caledon OP aim to support the corporate goals, actions, and strategies identified in the newest version of the Resilient Caledon CCCAP, released in 2021. The Resilient Caledon Plan combines adaptation and mitigation actions to reduce GHG emissions and help the community prepare for climate change. The Future Caledon – Our Official Plan (2024), highlights the need to address climate change through a series of objectives and policy decisions that support the corporate goals, actions, and strategies in the Resilient CCCAP.

Peel Region Official Plan (2022)

Portions of the Study Area are identified on Schedule C2 – Core Areas of the Greenlands System of the Peel OP as existing on and within 120 m of the "Greenlands System" (**Figure 1, Appendix B1**). The Study Area contain both Prime Agricultural Area and Rural Land according to Schedule D-1 – Rural System.

The branches of the West Humber River and associated tributaries are noted as part of the Greenlands System as per Schedule C-1 ("Greenlands System"). Further, the main branches (within the centre and south-west corner of the Study Area), are designated as Core Areas of the Greenlands System and NAC) while the other watercourses to the north of the western portion of these branches are identified as Potential Natural Areas and Corridors (PNAC) in Figure 7 "("Regional Greenlands System - Core Areas, Natural Areas and Corridors and Potential Natural Areas and Corridors"). The Greenlands System is based on natural heritage features and areas and the linkages among them.

Core Areas of the Greenlands Systems are defined within Section 2.14.12 of the OP as:

- Significant wetlands;
- Significant coastal wetlands;
- Woodlands meeting one or more Core Area woodland in Table 1 of the OP;
- Environmentally sensitive or significant areas;
- Provincial life science ANSIs;
- Escarpment natural areas of the Niagara Escarpment Plan; and
- Valley and stream corridors meeting one or more of the criteria for Core Area valley and stream corridors in Table 2 of the OP.

NAC of the Greenland Systems are defined within Section 2.14.18 of the OP as:

- Evaluated non-provincially significant wetlands and coastal wetlands;
- Woodlands meeting one or more of the criteria for NAC woodland in Table 1;
- SWH;
- Fish habitat;
- Habitat of aquatic SAR;
- Habitat of endangered and threatened species defined in accordance with the *Endangered Species Act*;
- Regionally significant life science ANSIs;
- Provincially significant earth science ANSIs;
- Escarpment Protection Areas of the Niagara Escarpment Plan;
- The Lake Ontario shoreline and littoral zone and other natural lakes and their shorelines;
- Any other valley and stream corridors that have not been defined as part of the Core Areas;
- Sensitive headwater areas and sensitive groundwater discharge areas; and
- Any other natural features and functional areas interpretated as part of the Greenlands System Natural Areas and Corridors by the local municipalities, in consultation with the conservation authorities and MNR, including as appropriate, elements of the Potential Natural Areas and Corridors.

Potential Natural Areas and Corridors of the Greenland System are defined within Section 2.14.19 of the OP as:

- Unevaluated wetlands and coastal wetlands;
- Cultural woodlands and cultural savannahs within the Urban Systems meeting one or more of the criteria for PNAC woodland in Table 1;
- Any other woodlands greater than 0.5 ha;
- Regionally significant earth science ANSIs;
- Sensitive groundwater recharge areas;
- Portions of historic shorelines;
- Open space portions of the Parkway Belt West Plan Area;
- Enhancement areas, buffers and linkages; and
- Any other natural features and functional areas interpreted as part of the Greenlands System Potential Natural Areas and Corridors, by the individual local municipalities in consultation with the conservation authorities.

The Official Plan review (Peel 2051) also identified the need for a Community Energy and Emissions Reduction Plan (CEERP) and Climate Adaptation Plan (CAP) to be completed for each new secondary plan area. The CEERP aims to address the feasibility, planning and implementation requirements around energy matters such as net zero annual energy usage, alternative and renewable energy systems, and electric vehicle charging infrastructure. A CAP should address risk and vulnerability related matters for the built and natural environment, public health and water resource systems and provide direction to implement recommendations to reduce community and environmental vulnerability to changing climate conditions and extreme weather events.

As part of the review of the Region of Peel's Official Plan review (Peel Official Plan review (Peel 2051+) the Region conducted a SABE Study Including a technical study on climate change entitle Opportunities for Climate Change Mitigation, Energy and Emissions Reductions, which establishes a vision for the SABE area to be a low carbon community with the ultimate goal of transitioning to net zero overtime. The Town of Caledon has incorporated this policy direction in its draft Official Plan, including policies that prioritize climate change at the forefront of land use planning decisions. Goal 2.4.1(a) in the Town's draft Official Plan update is to achieve a built form and system of infrastructure that mitigates the Town's contribution to climate change and enhances resiliency to its impacts.

The main purpose of the SABE was to summarize findings of technical studies for a broad area in southern part of the Town of Caledon and to assess the most appropriate location for new urban lands and appropriate settlement growth. As part of the Peel Region SABE Study, a SWS was conducted to inform recommendations for the natural environment and provide base level guidelines for future, detailed subwatershed studies completed as part of the OPA process. The details of the studies undertaken are described in the subsequent section.

Settlement Area Boundary Expansion (SABE) Environmental Screening Report & Scoped SWS

The SABE Environmental reports address the following disciplines, in relation to the SABE:

- Terrestrial & NHS;
- Stream Systems;
- Groundwater;
- Surface Water; and
- Geotechnical.

To better understand the environmental conditions, impacts, and management opportunities, an Environmental Screening Report (Wood, 2020) was prepared, and followed up by the Scoped SWS (Part A, B & C; Wood, 2022). The Study Area for this local SWS falls within this SABE boundary, and thus the desktop data presented in the preliminary natural environment constraint screening prepared by Wood Environment & Infrastructure Solutions (Wood et al., 2020) and the SABE Scoped SWS (Part A, B, & C; Wood et. al., 2022) were used to inform this local SWS.

The initial SABE Study Area included all lands in the Region of Peel, outside of existing settlement areas and the Greenbelt Plan Area. Desktop data was collected and reviewed to support the characterization of features into three preliminary constraint levels (Section 3.3):

- High Constraint: "*Includes mapped natural environment features and areas with existing designations or significance that afford them protection under current provincial or municipal plans / policies. High Constraint areas represent features and areas that prohibit development*."
- Medium Constraint: "*Includes mapped natural environment features and areas that may, through future assessment represent constraints to development or are indicators of potentially significant functions. This category also includes portions of non-provincial Natural Heritage Systems outside of features captured under 'High Constraint' – this generally includes corridors and linkages, which may pose a constraint to development, but their exact location, width, etc. requires refinement through further levels of study. Moderate constraint areas may become high constraint or be assessed as posing little or no constraint (e.g., not present) to development, as additional information becomes known and based on the feature type and associated policies.*"
- Low Constraint: *"Includes mapped natural environment areas that, based on current knowledge, do not represent constraints to development (i.e. do not preclude development), but may influence some aspects of land use planning decisions (e.g., densities, type of development) or may present additional study requirements, enhanced management requirements, etc. that could increase development complexity, management needs, or otherwise affect the planning and / or development processes*."

Through the review of these constraints, the high and medium constraint features and areas were used to help refine the focus Study Area (FSA) for the subsequent SWS; Phase 2 of the SABE Environmental Reporting.

The SWS (Wood, 2022) was completed in three parts:

- Part A: Characterization;
- Part B: Impact Assessment; and
- Part C: Implementation Plan.

These constraints are preliminary and are expected to be refined and updated based on further investigations through subsequent planning stages.

Features, functions, and areas along with their constraint ranking are provided below based on discipline:

Terrestrial & Natural Heritage Systems

Preliminary High Constraints:

- PSW;
- Provincial NHS – inclusive of the Greenbelt NHS within the Study Area;

- Significant Woodland (Table 1: Core Woodlands, Region of Peel OP, 2022);
- ANSIs;
- Environmentally Sensitive Areas (Section 2.14.12: Region of Peel OP, 2022);
- Significant Valleylands;
- Other Valleylands; and
- Permanent and intermittent watercourses.

Preliminary Medium Constraints:

- Other wetlands;
- Other woodlands;
- Other drainage features (headwater drainage features; HDFs);
- Seepage areas and springs; and
- Municipal Natural Heritage Systems.

The SABE SWS does not necessarily apply significance to natural heritage features due to the limitations of desktop data; the intent of a local SWS is to obtain site-specific field data to better inform the presence and function of the high and medium constrain natural heritage features.

In order to define the preliminary NHS for the SABE Scoped SWS (as shown on Figure DA2-11b within Appendix D of the Part C Report), the following feature classes were identified and integrated into the NHS:

Key Features: features and areas that are recommended to be protected as part of a connected NHS and include:

- Woodlands;
- Wetlands;
- Valleylands;
- Environmentally Sensitive/Significant Areas;
- SWH;
- Fish Habitat;
- Provincially significant Life Science and Earth Science ANSIs;
- Regionally significant Life Science ANSIs;
- Habitat for Endangered and Threatened Species;
- HDFs identified as Protection or Conservation;
- Key Natural Heritage Features as defined in the Greenbelt Plan and the Growth Plan;
- Key Hydrologic Features as defined in the Greenbelt Plan and the Growth Plan; and
- Sand Barrens, Savannahs, and Grasslands (as per Provincial Plans or ELC classifications).

Supporting Features: features and areas that are not identified as Key Features but meet criteria as Supporting Features and require further assessment as part of a local SWS to determine if they meet Key Feature criteria or to evaluate their functions, interactions and contributions to the NHS in order to determine how they are managed:

These include:

- Woodlands;
- Wetlands;
- Valleylands;
- Regionally significant Earth Science ANSIs;
- HDFs identified as Mitigation;
- Successional habitats; and
- Open aquatic habitats.

Other Features: those features and areas that are not Key or Supporting features but meet criteria as 'Other Features'. This category may include small and/or isolated features, features or areas requiring further assessment to determine their status as potential key or supporting features. These include:

- Woodlands;
- Wetlands;
- Successional habitats; and
- Open aquatic habitats.

The SABE SWS also outlines recommended targets for the NHS within the SABE area. These targets are recommendations that should be explored through the local SWS to support the identification and planning of the NHS. Targets for feature types are as follows:

- Natural cover: no net loss;
- Wetlands: no net loss of wetland cover; increase total wetland cover through NHS enhancements;
- Valley and Stream corridors: no net loss of ecological and hydrological functions; increase natural cover within these corridors through enhancements;
- Successional/Open Habitats: Maintain important existing successional / open habitats contiguous to other features and areas of the NHS; increase representation and quality of open country habitats across the landscape through NHS enhancement opportunities; strive to create at least one habitat area with a minimum size threshold of 5 ha;
- Aquatic: achieve 75% naturally vegetated watercourse length through protection, enhancement or restoration;

- Sand Barrens, Savannahs, Grasslands: protect these where they occur; and
- NHS Enhancements: identify and distribute enhancement opportunities across the NHS to support a robust and sustainable system; increase natural cover by 30%.

Stream Systems

In the SABE SWS, stream features were given a classification of high, medium, and low geomorphic constraint. High constraint features attract Conservation Authority regulation and must not be relocated or altered in a post development scenario. Medium constraint features have attributes in common with high constraint features, but are typically highly impacted or unstable, warranting potential realignment. Low constraint features are ephemeral in nature, and are typically poorly defined, yet must still be treated as watercourses prior to further analysis. As reaches had been previously delineated as part of the Scoped SWS, the same reach delineation shall be adopted in this study. Reaches included in this study, as well as their associated constraints limits, are shown in **Table 2-1** below.

Table 2-1: Reach Delineation and Constraints for Watercourses from Peel Region SABE

Reach	Constraints Method	Final Belt Width
CCC(2)	Toe Erosion	65 – 150 m
WHT4(3)6-1	Meander Belt	33.6 m
WHT4(3)	Toe Erosion	175 – 365 m
WHT4(3)4-2	Meander Belt	36 m
WHT4(3)3-1	Meander Belt	57.6 m
WHT4(3)2-1	Toe Erosion	100 – 170 m
WHT4(2)	Toe Erosion	130 – 275 m
WHT4(3)5-1	Toe Erosion	115 – 220 m
WHT4(3)5-2	Meander Belt	36 m
WHT4(1)6-1	Meander Belt	108 m
WHT4(3)4-1	Toe Erosion	95 – 180 m
WHT4(3)3-1a	Meander Belt	40.8 m
WHT4(3)1-1	Toe Erosion	N/A

Note: Toe erosion constraints method includes access allowance of 6 m.

Groundwater

Part A of the SABE Scoped SWS provides a desktop existing conditions hydrogeological characterization of the Study Area. The regional stratigraphic interpretation included a total of six overburden units, consisting from ground surface to bedrock of the following: Halton Till, Oak Ridges Moraine Deposits, Newmarket Till, Thorncliffe Formation, Sunnybrook Drift, and Scarborough Formation over bedrock. In this study, Halton Till, Oak Ridges Moraine Deposits and Newmarket Till are the most relevant.

The study identified four (4) distinct units within the Halton Till, including the Upper Fractured Till Unit at the top, which was described as massive and generally weathered with vertical fracturing that extended up to 5 m below ground surface (mbgs); Middle Till Complex that consisted of massive till layers with interbeds of stratified silt to sand and gravel with components exhibiting varying degrees of weathering; underlain by Glaciolacustrine Deposits of layers of fine-grained glaciolacustrine clayey silts and silty clays of varying thicknesses; over Lower Till Complex with similar characteristics to the Middle Till Complex, but not as variable.

Of particular importance in the Study Area is the Upper Fractured Till Unit, which can be a relatively active groundwater flow zone as it can exhibit a significantly higher conductivity, approximately 2-3 orders of magnitude higher than the underlying till materials. The flow in this unit is considered to be primarily lateral towards surrounding depressional features (wetlands, streams, etc.). Dominant water movement can be laterally through this unit or overland, depending on the groundwater level and the relative locations of depressional features. Additionally, where stream reaches have incised far enough into or through the till, ephemeral discharge locations (seeps) may be observed. If the stream reaches have incised entirely through the till into the underlying Oak Ridges Moraine Deposits, more permanent groundwater discharge may be observed. Groundwater recharge is reported to vary between 20 and 125 mm/year due to the proportion of finer-grained soil deposits related to the till units. Higher recharge could occur in parts of the study area tend to correlate with areas of more permeable deposits at surface, where present. Significant Groundwater Recharge Areas (SGRAs) tended to be mapped in smaller localized areas that coincide with pockets of coarser sands and gravels mapped at surface. Additionally, Ecologically Significant Groundwater Recharge Areas (ESGRAs) mapping highlight some additional areas, but it should be noted that the mapping represents modelling that identifies a groundwater link between a recharge and discharge area but does not provide a volume (so areas may be mapped in areas with low permeability till soils at surface). It was also noted that ecological and stream features that may have been identified as potential groundwater discharge features may not have been fully field verified as of the production of the ESGRA mapping by TRCA (TRCA, 2019). For local groundwater users (i.e. private or municipal well owners), higher capacity wells tend to draw from the deeper Thorncliffe and Scarborough Aquifers. While some dug or bored wells near surface may draw from the Halton Till, these wells tend to produce small quantities of water (less than 1 gallon per minute or 6.5 m^3/day). Due to the relatively low permeability nature of the till soils at or near ground surface and the thickness of these units, Highly Vulnerable Aquifers were mapped in only a few isolated locations, typically close to stream features and likely correspond to the presence of coarse sands and gravels mapped at ground surface.

Part B of the SABE Scoped SWS did not provide additional information. The hydrogeological portion of the report summarized the findings presented in Part A with the addition of general statements of potential impacts to the groundwater system related to various activities, such as temporary or permanent dewatering (potential impacts from disruption of groundwater reaching local depression features), removal of agricultural drainage tiles (higher groundwater levels), impacts from installation of utility trenches for servicing (preferential flow that can be reduced by using anti-seepage collars or clay plugs), and groundwater quality impacts (while low given the till soils, can be impacted by creation of preferential pathways (monitoring wells, domestic wells, utility trenches) or potential spills or contaminant use, especially in HVA areas).

Surface Water

Part A of the SABE Scoped SWS included a baseline characterization of the hydrologic features and systems based on a desktop study. This included a review of available mapping as well as using multiple data stations setup and operated by the government as well as TRCA for monitoring surface water levels, flows and chemistry. Monitoring data that has been included in this dataset includes spotflow measurements, continuous flow monitoring, and targeted monitoring programs for flows and chemistry. The findings from this review indicated routine Provincial Water Quality Objectives (PWQO) exceedances across all the subwatersheds for certain metals including cadmium, cobalt, copper and iron. Additionally all the subwatersheds were found to exceed PWQO for E.coli. It was noted that for the Humber River watershed, flow monitoring locations tended to be located downstream and therefore misses the upstream characterization. There has however been a number of spotflow measurements made within these smaller reaches to provide some characterization of their relative contributions within the West Humber River. The Part B investigation combined the surface water and groundwater systems, but primarily focused on the surface water system. It also identified separate studies that included the Humber River for predictive flooding hydraulic modelling exercises (Wood, 2017 for the Humber River). The conclusions on the flood modelling were that stormwater management requirements would need to be established as part of future studies in the area.

Hydrology and Hydraulics

The summary and recommendations of the hydrology and hydraulic model review completed as part of the SABE SWS (2022) have been summarized in **Section 2.3**. The SABE SWS (2022) concluded that hydrologic and hydraulic modeling completed to date for the Humber River can be utilized and built upon as part of subsequent studies. On this basis, and in accordance with the approved MTLOG Terms of Reference (TOR; **Appendix A**), the latest TRCA hydrology (VO), and hydraulics (HEC-RAS) models will be utilized to establish the existing conditions of the Secondary Plan.

Geotechnical

In the Part A SABE Scoped SWS report, Wood et. al. completed a desktop level assessment to estimate the potential for instability for slopes identified in the SABE boundary. The ranking system followed the MNR Slope Rating Chart methodology to estimate if the slopes have a low, slight, or moderate risk for instability. The report summarized the risk as follows:

- *Low* risk for slope instability means the slopes are likely stable and would only require a site inspection and letter report to confirm the slope is stable;
- *Slight* risk for slope instability means the slopes are typically stable but require a site inspection and conservative slopes stability analysis to verify if the existing slope is stable; and
- *Moderate* risk for slope instability means the slopes may or may not be stable in their current form, and a geotechnical subsurface investigation is required. The stable top of slope may not coincide with the current top of slope.

On-site visual slope inspections were not completed, so some assumptions were required in the assessment, along with using a digital elevation model, surficial geology mapping, and aerial imagery. Wood et. al. notes that future studies are required to confirm the rating and investigation requirements. Figures G-D2-H and G-D3 within the SABE show mapping with the risk evaluation for West Humber River watershed, and it includes the Local SWS Study Area. The main tributaries flowing through the Study Area (within Properties 2, 7, 8, 9, 10, and 11) were identified as having low to slight risk for slope instability. The other Humber River tributary in the southwest corner of Property 3 was noted to have a slight potential for instability. The smaller watercourses on Properties 1 and 4 were not investigated by Wood as part of their slope stability desktop assessment.

The Part A report also provides commentary on the policy requirements related to slope and erosion hazards, along with high-level discussion on the toe erosion allowance, stable slope allowance, and erosion access allowance.

Part B of the Scoped SWS contains similar geotechnical information and the assessment for slope risk in the Study Area remains the same. Figure D-2 in the Part B SABE Scoped Subwatershed report shows low to slight risk for instability along the main West Humber River tributaries within the Study Area.

TRCA and Ontario Regulation 41/24

Effective January 1, 2023, following the implementation of Bill 23, the role of Conservation Authorities in reviewing development applications has changed. Previously, the TRCA reviewed planning application submissions associated with future development of properties within its jurisdictional boundaries. In addition, the TRCA provided planning and technical advice to planning authorities to assist them in fulfilling their responsibilities regarding natural hazards, natural heritage, and other relevant policy areas pursuant to the *Planning Act*, as both a watershed-based resource management agency and through planning advisory services, in addition to their regulatory responsibilities. With the changes associated with Bill 23, the commenting role Conservation Authorities will play in *Planning Act* applications may vary from municipality to municipality.

Effective April 1, 2024, O. Reg. 41/24: Prohibited Activities, Exemptions and Permits has come into force, replacing the former O. Reg. 166/06: Toronto and Region Conservation Authority: Development, Interference with Wetlands, Alterations to Shorelines and Watercourses Regulation. O. Reg. 41/24 allows Conservation Authorities to implement Section 28 *Conservation Authorities Act, 1990* (amended 2024), which states under Section 28(1) that:

> 28 (1) *No person shall carry on the following activities, or permit another person to carry on the following activities, in the area of jurisdiction of an authority:*
>
> *1. Activities to straighten, change, divert or interfere in any way with the existing channel of a river, creek, stream or watercourse or to change or interfere in any way with a wetland.*
>
> *2. Development activities in areas that are within the authority's area of jurisdiction and are,*
>
> *i. hazardous lands,*

ii. wetlands,
iii. river or stream valleys the limits of which shall be determined in accordance with the regulations,
iv. areas that are adjacent or close to the shoreline of the Great Lakes-St. Lawrence River System or to an inland lake and that may be affected by flooding, erosion or dynamic beach hazards, such areas to be further determined or specified in accordance with the regulations, or
v. other areas in which development should be prohibited or regulated, as may be determined by the regulations. 2017, c. 23, Sched. 4, s. 25.

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.

A review of the TRCA's Regulation Mapping (2023) was completed to understand what approximate natural hazards may be present within the Study Area. As shown on **Figure 1** (**Appendix B1**) several natural hazards were identified including erosion, flooding and slope hazards are identified. These hazards are associated with drainage features, valleylands and wetlands.

The Living City Policies (TRCA, 2014)

The Living City Policies for Planning and Development in the Watersheds of the Toronto and Region Conservation Authority (Living City; November 2014) "is the new policy document of the TRCA approved by the TRCA's Board on November 28, 2014. It is a conservation authority policy document to guide the implementation of the TRCA's legislated and delegated roles and responsibilities in the planning and development approvals process for the next ten years" (Page 1 Summary). The Living City establishes the TRCA's Vision, Mission, Strategic Objectives and Principles, as well as policies for advocacy for sustainable communities (e.g., climate change, energy, transportation); environmental planning including environmental protection and environmental management; and for the administration of TRCA's development interference with wetlands and alterations to shorelines and watercourses regulation.

Provincial Policy Statement (2020)

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

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

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

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

Development and site alteration shall not be permitted in significant wetlands or in significant coastal wetlands. Development and site alteration may be permitted on adjacent lands to these natural heritage features provided it has been 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 significant woodlands, significant valleylands, SWH or significant ANSIs or on adjacent lands to these natural heritage features and areas, unless it is demonstrated that there will be no negative impacts on the natural features or their ecological functions.

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

Development and site alteration may be permitted on lands adjacent to fish habitat provided it has been demonstrated that there will be no negative impacts on the natural features or their ecological functions.

The Province released a draft Provincial Planning Statement (draft PPS) on April 10, 2024; which will come into effect on October 20, 2024. The intention for this document is to replace both the current PPS (2020) and *A Place to Grow: Growth Plan for the Greater Golden Horseshoe (*2020*).* The draft does not propose any changes to natural heritage policies in the PPS (2020) identified above. There are some minor definition changes proposed in the draft PPS including the following:

- “Habitat of Endangered Species and Threatened Species”” definition was added to describe “habitat within the meaning of Section 2 of the ESA, 2007”;
- “Negative Impacts” are defined in the context of specific ecological or natural heritage provisions as follows:
    - For municipal sewage and water Services: Potential risks to human health and safety and degradation to the quality and quantity of water, sensitive surface water features and sensitive ground water features, and their related hydrologic functions, due to single, multiple or successive development. Negative impacts

should be assessed through environmental studies including hydrogeological or water quality impact assessments, in accordance with provincial standard;

- For fish habitat: “any harmful alteration, disruption or destruction of fish habitat, except where an exemption to the prohibition has been authorized under the *Fisheries Act*”;
- For other natural heritage features and areas: “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;” and
- For water resources: “degradation to the quality and quantity of water, sensitive surface water features and sensitive ground water features, and their related hydrologic functions, due to single, multiple or successive development or site alteration activities”.

- “Significant” has be redefined to remove references to the MNR, and instead refers to “evaluation criteria and procedures established by the Province, as amended from time to time”; and
- Wetlands are redefined to exclude “periodically soaked or wetlands being used for agricultural purposes which no longer exhibit wetland characteristics are not considered to be wetlands for the purposes of this definition”.

These above changes are not in force and effect as of the date of this Phase 1 local SWS report submission; however, consideration of these changes will be considered throughout the SWS to ensure the SWS addresses all relevant PPS provisions should it be approved during the Secondary Plan application process.

The Greenbelt Plan (2017)

The Greenbelt Plan (approved under the *Greenbelt Act* (2005)) works to permanently protect environmentally sensitive areas due to their ecological value within the Golden Horseshoe. It is intended to enhance the natural landscapes by working to facilitate the connection of environmentally significant areas and reduce fragmentation of the landscape. Protection is offered also to permanent agricultural areas ensuring the permanency and sustainability of natural resources.

The northeastern, southeastern, central, and southwestern portions of the Study Area are identified within the Greenbelt Plan Area and are included in both the “Natural Heritage System” and “Protected Countryside” designations (**Figure 1, Appendix B1**). The “Natural Heritage System” protects natural heritage, hydrologic and/or landform features (key hydrologic areas (KHAs), key hydrologic features (KHFs) and key natural heritage features (KNHFs) that contribute to conserving Ontario’s biodiversity and the ecological integrity of the Greenbelt itself. As described within Section 3.2 of the Greenbelt Plan (2017), the Protected Countryside contains a Natural System composed of a Natural Heritage System and a Water Resource System. As described within Section 3.2.2 of the Greenbelt Plan (2017), new developments and/or site alterations must show that there are no negative impacts on the key natural heritage features or key hydrologic features or their functions.

KHAs include the following:

- Significant groundwater recharge areas (SGRAs);
- HVAs; and
- Significant surface water contribution areas.

KHFs include the following:

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

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.

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

A Place to Grow (2020) provides guidelines for sustainable growth and development for the geographic Greater Golden Horseshoe (GGH) area in southern Ontario into 2051. This area of Ontario has diverse ecological and hydrological environments as well as fertile farmland. A Place To Grow provides a framework guiding where and how communities will grow in the GGH with the goal of doing so while encouraging economic prosperity and environmental protection. This Plan builds on the policies within the PPS with an emphasis on more specific policies for the GGH.

A Place To Grow identifies a “Natural Heritage System for the Growth Plan” which is based on extending the NHS within the *Greenbelt Act* to include natural heritage features (core areas) and natural corridors (linkages) for the entire GGH area; this is required to be included in all Official Plans and has been integrated into the existing and future Town of Caledon’s OP (2024 Consolidation; Draft Future Caledon 2024). In general, development/site alteration is not permitted in key natural heritage or key hydrologic features (Section 4.2.3.1). A Vegetation Protection Zone (VPZ) of 30 m is also required for KHFs, fish habitat, and significant woodlands (Section 4.2.4.1). There is no Natural Heritage System for the Growth Plan or VPZ that overlaps with the Study Area.

In addition to the “Natural Heritage System for the Growth Plan”, municipalities are expected to protect other natural heritage features and areas in a manner that is consistent with the PPS. Of note, the Draft PPS (2024, discussed previously) will replace the existing PPS and A Place to Grow effective October 20, 2024.

Ontario Endangered Species Act (2007)

The provincial ESA (2007) was developed to:

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

The ESA (2007) protects all threatened, endangered and extirpated species listed on the Species at Risk in Ontario (SARO) list (O. Reg. 230/08). These species are legally protected from harm or harassment and their associated habitats are legally protected from damage or destruction, as defined under the ESA (2007).

Fish and Wildlife Conservation Act (1997)

The provincial *Fish and Wildlife Conservation Act (1997)* was developed to set out regulations for hunting, trapping, fishing, and other activities related to the intentional capture or harm of wildlife in Ontario. Where this Act conflict with the *ESA,* the Act that provides provisions offering the most protection prevail.

Clean Water Act (2006)

The *Clean Water Act* (2006) protects municipal drinking water sources. For the Study Area, TRCA is legislated under this act to oversee risk management of drinking water sources as it relates to site alteration, construction, and other activities that could impact drinking water quality through the ‘CTC Source Protection Plan’. This document provides guidelines on preventing drinking water quality threats that may also be associated with development processes; where activities pose a potential risk to drinking water sources, consultation with the TRCA is required to ensure a risk management plan is in place.

Ontario Water Resources Act (1990)

The *Ontario Water Resources Act* helps protect surface and groundwater water in Ontario by protecting water quality by regulating and/or prohibiting wastewater discharge and water pollution and managing the quantity of water being used (O. Reg 387/04). In Ontario, anyone seeking to take more than 50,000 litres of water per day must apply for a permit and demonstrate no negative impacts on the environment, local water users, or the watershed as whole. Development and construction must adhere to this legislation.

Environmental Protection Act (1990)

The *Environmental Protection Act* outlines prohibitions related to environmental contaminants and enforcement measures to ensure contamination concerns are properly managed in Ontario. Within this Act are various regulations that speak to managing potential contaminants and

pollutants that have known adverse impacts on the environment. These regulations range from managing emissions (O. Reg 1/17), to spill management (O. Reg 224/07), and to controlling excess soils (O. Reg 406/19). These regulations must be followed throughout the development process.

Federal Fisheries Act (2019)

The Department of Fisheries and Oceans Canada (DFO) administers the federal *Fisheries Act*, 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" (subsection (2)1). The *Fisheries Act* prohibits the death of fish by means other than fishing (subsection 34.4 (1)) and the harmful alteration, disruption or destruction of fish habitat (HADD; subsection 35. (1)). A HADD is defined as "any temporary or permanent change to fish habitat that directly or indirectly impairs the habitat's capacity to support one or more life processes".

Migratory Birds 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. 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.

Species at Risk Act (2002)

The *Species at Risk Act* (SARA, amended 2024) applies principally on federally owned lands, however there are general prohibitions in the SARA against killing an individual of a protected aquatic or migratory bird species, or destroying their residence, which apply to all lands, and with respect to critical habitat for aquatic SAR identified in Schedule 1 of SARA. SARA is administered by DFO for aquatic species. Where SAR are listed on Schedule 1 of the Federal SARA and are also listed on the SARO List as Threatened or Endangered, they are offered provincial protection under the Ontario ESA.

2.2 Natural Heritage and Stream Morphology

2.2.1 Natural Heritage Background Review

Natural Heritage Databases

GEI reviewed existing background information to gather data on the Study Area's existing natural heritage features and reported SAR and species of conservation concern in the area. Information sources reviewed include the following:

- Ministry of Natural Resources (MNR) Land Information Ontario (LIO) Natural Heritage Areas mapping;

- Natural Heritage Information Centre (NHIC) database;
- DFO's Aquatic SAR Map;
- Provincial wildlife atlases; and
- Online citizen science databases.

Figure 1 (**Appendix B1**) illustrates the existing natural heritage feature designations for the Study Area as described in the following subsections.

Land Information Ontario Natural Heritage Areas

Based on the MNR LIO (2024) Natural Heritage Areas geographic database, the primary natural heritage features of interest within the Study Area include woodlands located throughout the southeast, central, and northeastern area and two small unevaluated wetland units in the central and southwestern portions of the Study Area. These unevaluated wetlands are associated with the Tributaries of the West Humber River that run in various directions across the Study Area, including Campbells Cross Creek to the southwest.

No PSWs were identified within or immediately adjacent (120 m) to the Study Area.

Natural Heritage Information Centre

GEI searched the NHIC (MNR 2024) database for records of SAR, provincially rare species (S1 to S3) and rare vegetation communities within the Study Area. The database provides occurrence data by 1 km x 1 km squares, which include areas outside of the Study Area. The following NHIC squares overlap the Study Area: 17NJ9549, 17NJ9649, 17NJ9650, 17NJ9750, 17NJ9850, 17NH9950, 17NJ9648, 17NJ9749, 17NJ9748, 17NJ9849, 17N9547, 17NJ9747, 17NJ9847, 17NJ9848, 17NJ9647, and 17NJ9548.

The following species of interest were noted:

Species listed as Threatened or Endangered on the SARO List:

- Redside Dace (*Clinostomus elongatus*) - Endangered;
- Bobolink (*Dolichonyx oryzivorus*) - Threatened; and
- Eastern Meadowlark (*Sturnella magna*) – Threatened.

Species of conservation concern (i.e., listed as Special Concern on the SARO List or identified as an S1–S3 species):

- Barn Swallow (*Hirundo rustica)* - Special Concern;
- Eastern Wood-Pewee (*Contopus virens*)- Special Concern; and
- Wood Thrush (*Hylocichla mustelina*) - Special Concern.

One wildlife concentration area was also identified: Mixed Wader Nesting Colony. This is a SWH type associated with colonially nesting birds within trees and shrub habitats.

Ontario Breeding Bird Atlas

The Ontario Breeding Bird Atlas Data Summary: 2001–2005 (Bird Studies Canada 2006) contains detailed information on the population and distribution status of birds in Ontario. The database provides occurrence data by 10 km x 10 km squares. The Study Area is located within atlas squares 17TNJ94 and 17TNJ95, which were used to determine a potential bird species list for the area. The Study Area is a small component of the overall atlas squares, and therefore all bird species listed for these atlas squares may not be found within the Study Area. Habitat type, availability and size are all contributing factors to bird species presence and use.

A total of 166 bird species were recorded in atlas squares 17TNJ94 and 17TNJ95, with the following species of interest noted:

- Species listed as Threatened or Endangered on the SARO List:
    - Bank Swallow (*Riparia riparia*) - Threatened;
    - Bobolink - Threatened;
    - Red-headed Woodpecker (*Melanerpes erythrocephalus*) - Endangered;
    - Chimney Swift (*Chaetura pelagica*) - Threatened; and
    - Eastern Meadowlark - Threatened.
- Species of conservation concern (i.e., listed as Special Concern on the SARO List or identified as an S1–S3 species):
    - Barn Swallow - Special Concern;
    - Common Nighthawk (*Chordeiles minor*) - Special Concern;
    - Eastern Wood-Pewee - Special Concern*;*
    - Golden-winged Warbler (*Vermivora chrysoptera*) - Special Concern;
    - Grasshopper Sparrow (*Ammodramus savannarum*) - Special Concern;
    - Ruddy Duck (*Oxyura jamaicensis)* - S3B (vulnerable/rare to uncommon); and
    - Wood Thrush - Special Concern.

Ontario Reptile and Amphibian Atlas

The Ontario Reptile and Amphibian Atlas (Ontario Nature 2020) contains detailed information on the population and distribution status of reptiles and amphibians in Ontario. The database provides occurrence data by 10 km x 10 km squares. The Study Area is located within atlas squares 17NJ94 and 17NJ95, which were used to determine a potential reptile and amphibian species list for the area. The Study Area is a component of the overall atlas squares, and therefore all reptile and amphibian species listed for these atlas squares may not be found within the Study Area. Habitat type, availability and size are all contributing factors to reptile and amphibian species presence and use.

A total of 22 reptile and amphibian species were recorded in atlas squares 17NJ94 and 17NJ95, including four turtle species, four snake species, four salamander species and ten frog and toad species. The following species of interest were noted:

- Species listed as Threatened or Endangered on the SARO List:
    - Jefferson Salamander (*Ambystoma jeffersonianum*) – Endangered.
- Species of conservation concern (i.e., listed as Special Concern on the SARO List or identified as an S1–S3 species):
    - Eastern Musk Turtle (*Sternotherus odoratus*) - Special Concern;
    - Northern Map Turtle (G*raptemys geographica*) - Special Concern; and
    - Snapping Turtle (*Chelydra serpentina*) - Special Concern.

Ontario Butterfly and Moth Atlases

The Ontario Butterfly and Moth Atlases (Toronto Entomologists' Association 2023, 2020) contain detailed information on the population and distribution status of butterflies and moths in Ontario. The database provides occurrence data by 10 km x 10 km squares. The Study Area is located within the atlas squares 17NJ94 and 17NJ95, which were used to determine a potential butterfly and moth species list for the area. The Study Area is a component of the overall atlas squares, and therefore all butterfly and moth species listed for these atlas squares may not be found within the Study Area. Habitat type, availability and size are all contributing factors to reptile and amphibian species presence and use.

A total of 61 butterfly species and 24 moth species were recorded in atlas squares 17NJ94 and 17NJ95. The following species of interest were identified within the Study Area or the adjacent 120 m.

- Species of conservation concern (i.e., listed as Special Concern on the SARO List or identified as an S1–S3 species):
    - Black Dash (*Euphyes conspicua*) - S3; and
    - Monarch (*Danaus plexippus*) - Special Concern.

Aquatic Species at Risk Distribution Mapping

The DFO Aquatic Species at Risk Map (2024) was reviewed to identify any known occurrences of aquatic SAR, including fish and mussels, in the headwater tributaries of the Humber River that flow through the Study Area. Occupied Redside Dace habitat was identified within the main Humber River along the southern portion of the Study Area up to the midpoint between Bramalea and Torbram Roads. Occupied habitat is identified upstream in the tributary of the West Humber along Torbram Road and along Campbell's Cross Creek.

Specifically, occupied Redside Dace habitat was identified within Properties 3, 7, 8, 9, 10 and 11.

Citizen Science Database: eBird

The eBird (2024) database is a large citizen science-based project that aims to collect, archive and share bird diversity information in the form of checklists in order to inform new data-driven approaches to science, conservation and education. As the observations can be submitted by anyone, and the records are not officially vetted, the data obtained from this tool should not be used as a clear indicator of species presence. Species may be filtered out based on habitat and target survey efforts.

No species of interest were identified within the Study Area or the adjacent 120 m.

Citizen Science Database: iNaturalist

The iNaturalist (2024) database is a large citizen science-based project that aims to collect, archive and share sightings of flora and fauna species. Users can submit observations to be reviewed and identified by naturalists and scientists to help provide accurate species observations. As the observations can be submitted by anyone, and the records are not officially vetted, the data obtained from this tool should not be used as a clear indicator of species presence. Species may be filtered out based on habitat and target survey efforts.

One species of interest (i.e., listed as Special Concern on the SARO List or identified as an S1 - S3 species): Snapping Turtle was identified within the Study Area or the adjacent 120 m.

Natural Heritage Background Reports

Humber River Watershed Characterization Report (2023)

The TRCA completed a characterization report for the Humber River Watershed (2023) that considers available monitoring data and analyses to review watershed trends and support the TRCA's overarching watershed planning process. This is part two of a four-stage process that includes Community Engagement (Stage 1 - complete), characterization (Stage 2 - complete), future management scenario analysis (Stage 3 - in progress), and the final watershed plan (Stage 4 - to be completed). This report identifies key stressors on the Humber River watershed associated with land use changes, urban growth pressure and climate change. Some of these concerns are related to in-stream barriers to fish movement, fish community health, quality and quantity of natural cover, forest cover, surface water quality, and stormwater runoff, flooding and erosion issues. Key findings of this report are separated into four categories: water resource system (WRS), NHS and urban forest, surface water quality, and natural hazards. Relevant surface water and groundwater findings are deferred to **Section 2.2**, **Section 2.3** and **Section 2.4**.

Some of the key findings from this report as it related to natural heritage in the West Humber subwatershed are as follows:

- Average health rating for fish community for this subwatershed is 'fair';
- There is both occupied and contributing habitat for Redside Dace;
- Potential habitat for Rapids Clubtail (Phanogomphus quadricolor) was identified;

- There has been a shift in fish communities within the subwatershed towards pollution tolerant species – with fewer sensitive individuals being observed;
- Aquatic habitat quality – which is comprised of channel stability, water quality, and stream biodiversity - was classified as “impacted” largely to the high impervious cover (22.6%);
- Terrestrial habitat quality is generally poor due to the lower natural cover within this subwatershed (it received a score of 8.21 based on the Landscape Analysis Model (LAM), where a score of 6-8 is considered poor);
- There has been a minor increase in forest canopy cover for this Subwatershed; however, it is still below the average watershed canopy cover; and
- There are many opportunities for wildlife movement within the ravine systems and valleylands. Priority connectivity areas were identified for linkages between wetland patches and forest patched associated with the Greenland NHS within the Mayfield Tullamore SWS (May 20 & Map 21).

Overall, this local SWS will seek to further characterize the Study Area to better understand ecological stressors and provide appropriate protection, restoration and mitigation to the natural features with the local SWS area.

It is anticipated that this report, and subsequent reports that arise as part of the TRCA’s Humber River Watershed planning process, will further support the impact assessment, mitigation, and restoration considerations for the subsequent local SWS reports for the Study Area.

Humber River Fisheries Management Plan (TRCA 2005)

A Humber River Fisheries Management Plan (FMP) was developed by the Ontario Ministry of Natural Resources and TRCA (2005) and was intended to characterize the existing conditions of seven aquatic habitat types found in the watershed and assess their habitat potential. Specific management directions and rehabilitation priorities are provided for the five subwatersheds. The Humber River FMP identifies target fish species for management: Brook Trout *(Salvelinus fontinalis*), Redside Dace, Rainbow Trout *(Oncorhynchus mykiss)*, Brown Trout (*Salmo trutta*) Atlantic Salmon *(Salmo salar)*, and Darters. Management in support of these species will provide conditions that are suitable for other species that require stable, cold, or cool water habitats.

The TRCA delineated twelve Fish Management Zones (FMZs) within the Humber River watershed, evaluating fish communities in the context of a river continuum, where similar physiographic and hydrologic conditions give rise to habitats that support similar fish communities in a specific zone. The Study Area reaches mainly fall within Fish Management Zone 7, where target species are Redside Dace, Rainbow Darter (*Etheostoma caeruleum)*, and Smallmouth Bass *(Micropterus dolomieu)*.

No in-stream barriers were identified within the immediate vicinity of the Study Area (as shown in Figure 10 of the FMP). No aquatic sampling stations were identified within the Study Area; however, two sampling stations are located downstream of the Study Area within the same branches of the West Humber River. The first sampling station coincides with reach located in the south-west corner of the Study Area (within Parcel 3) and is identified as station HUO16WM. This sampling station is located north of Castlemore Road along Airport Road. The second sampling

station is associated with the main branch of the West Humber that flows off the Study Area at Torbram Road. This sampling station is identified as HUO15WM and is located north of Castlemore Road and west of Goreway Drive.

As recorded within Appendix V of the FMP, Golden Shiner *(Ntemigonus crysoleucas*), Common Shiner *(Luxilus cornutus)*, Spottail Shiner *(Notropis hudsonius*), Bluntnose Minnow (*Pimephales notatus)*, Fantail Darter (*Etheostoma flabellare*) and Johnny Darter (*Etheostoma nigrum*) were recorded at HUO15 WM. Golden Shiner and Rainbow Darter were recorded at HUO16WM.

Finally, as shown within Figure 22 of the FMP, the Study Area has both small and intermediate riverine warmwater habitat types.

Humber River State of the Watershed Report (2008)

The TRCA prepared a State of the Watershed Report (TRCA 2008) for the Humber River to provide a summary of available information on current conditions within the watershed. The State of the Watershed Report provides information on emerging trends and identifies key watershed management issues and opportunities in the Humber Watershed pertaining to aquatic and terrestrial systems. The key findings regarding aquatic and terrestrial systems within the report are as follows:

Aquatic Systems

The Humber River State of the Watershed Report (2008) reveals contrasting aquatic ecosystem health along its length. The Study Area is located within the West Humber Watershed. While the headwaters and middle reaches (including the West Humber) maintain robust habitats, the lower, urbanized sections exhibit degradation. The fish community within the watershed is diverse, encompassing species from cold to warm water, including the endangered Redside Dace are sensitive to flow and turbidity changes. It should be noted that the West Humber currently only supports a small, confined population of Redside Dace, which could be partially attributed to the fine-textured nature of the Soils within the West Humber naturally causing turbid in-stream conditions. The West Humber may be undergoing a shift from specialist fish to more tolerant generalists. According to the report, habitat assessments indicate declining suitable habitats and potential impairment in benthic invertebrate communities across the entirety of the watershed.

The presence of diverse freshwater mussels suggests relatively healthy aquatic conditions, despite challenges such as the invasive rusty crayfish threatening native species within the West Humber. Stream temperatures are stable in some areas but fluctuate unnaturally in highly urbanized sections. It should be noted that the clay soils within the West Humber absorb less water and thus have higher runoff characteristics resulting in larger fluctuations in stream temperature. Riparian natural cover falls short of targets at 61%, while riparian wetlands cover 6%, closer to the goal compared to other urban watersheds. It should be noted that the West Humber has the greatest portion of riparian areas that lack natural cover at 59%.

Identified barriers totaling 1,201 potentially restrict fish movement, highlighting further challenges in maintaining ecosystem connectivity and health within the Humber River watershed. The West Humber was given a fish index of biotic integrity score of C, while the overall watershed rating was a D. The findings of this report emphasize the importance of ensuring development practices are consistent with the need to maintain the ecological function of local and downstream catchment areas managing stormwater to maintain predevelopment water balance.

Terrestrial Systems

The Humber River watershed, historically 90% forested with interspersed wetlands and meadows, now faces challenges in maintaining its terrestrial NHS amid urbanization. Assessments using remote sensing and field inventories inform biodiversity targets, revealing most habitat patches are of fair quality due to urban influences, particularly in southern areas lacking tableland forest. Connectivity is predominantly north-south via riparian corridors, with limited east-west connections. Currently, the watershed holds 32% natural cover, including 18% forest, below the 39% target set by TRCA's strategy. Wetlands cover just 1.6%, far less than historical levels. The ongoing loss of natural land cover and increasing land use intensity within the watershed has led to a decline in the quality, distribution, and quantity of its terrestrial system. The connections between high-quality core habitat patches in the watershed are currently inadequate to support viable populations of species and communities.

Prioritizing the TRCA Terrestrial NHS Strategy is crucial to expanding natural cover, enhancing patch quality, and improving connectivity against anticipated urban growth impacts.

Fluvial Geomorphology

This report provides a baseline condition evaluation for several reaches within the watershed. The report also described emerging trends and identified potential watershed management issues and opportunities in the Humber River relating to fluvial geomorphology. This study divided the Humber River watershed into five subwatersheds: Main Humber, East Humber, West Humber, Lower Humber, and Black Creek. The Study Area lies within the West Humber subwatershed (TRCA, 2008).

Most of the tributaries flowing within the Study Area were first-, second-, and third-order streams, while the West Humber River in the Study Area was characterized as a fourth-order stream. The TRCA established two monitoring stations near the Study Area: GHU-19, immediately west of Bramalea Road, and GHU-18, downstream of the Study Area, near Countryside Drive. GHU-19 had a contributing drainage area of 8.9 km^2, and average dimensions were noted to be 6.05 m in width and 0.29 m in depth. GHU-18 had a contributing drainage area of 27.9 km^2, and average dimensions of 7.38 m in width and 0.42 m in depth (TRCA 2008).

2.2.2 Gap Analysis

Relevant background reports, the SABE Scoped SWS, and existing policy frameworks have been used to inform baseline monitoring and ecological field investigations for the local SWS to support the definition of natural heritage features and functions. Site specific investigations were not previously completed within the Study Area to date, instead, high-level information has been used to characterize the area based on desktop analyses through various watershed reports by TRCA and the SABE Scoped SWS.

Therefore, a comprehensive multi-disciplinary investigation has been prescribed by the SWS team to characterize existing constraints. In order to refine the preliminary NHS proposed in the SABE Scoped SWS Study (Wood, 2022), a comprehensive ecological field investigation program has been developed with the goal of further identifying and defining features to understand their form and function within the Study Area. It is anticipated that this will then inform the Phase 2 requirements.

2.3 Hydrology and Hydraulics

The Secondary Plan Area is located within the West Humber River subwatershed which has been extensively studied by the TRCA from a hydraulics and hydrology perspective. The Secondary Plan Area is approximately 596 ha in size which is 11% of the West Humber River subwatershed within the SABE (approximately 5,339 ha). It should be noted that the hydrology and hydraulics Study Area excludes the Greenbelt Plan Area valleys southwest of Campbell's Cross Creek.

The hydrology and hydraulics Study Area extends beyond the limits of the Secondary Plan and includes the tributary areas of watercourses and drainage features that flow through it (approximately 3940 ha). The Study Area as outlined in the Terms of Reference has been provided in **Appendix D4**.

In support of establishing the stormwater management, hydraulics, and hydrology criteria, several reports, design guidelines, and standards were reviewed – these are all included in the review described in **Section 2.0** of this report.

The TRCA currently uses a hydrologic model of the Humber River Watershed that has been calibrated and validated based on observed rainfall-runoff responses measured at various flow gauges throughout the watershed. The existing conditions hydrologic model was prepared using Visual OTTHYMO (VO) software in 2015 and was run using the 6, 12, and 24-hour AES synthetic design storms in order to evaluate the requirements for quantity control in the Humber River. The results concluded that the 6 and 12-hour AES storms were the critical durations in terms of flooding throughout the watershed. Additional storms such as the 350 year and 500 year events were also simulated, although not recognized as regulatory events. For the simulation of the Regional Storm event, the saturated antecedent moisture condition (AMC III) was applied to account for the increase in soil moisture caused by the first 36 hours of the storm. In accordance with the MNR Technical Guide, 2002, all SWM facilities were removed for the Regional Storm simulation and areal adjustment factors were applied based on the equivalent circular area method.

The model was updated in 2018 to better reflect the future conditions land use plans for various Local and Regional municipalities (Humber River Hydrology Update, Civica on behalf of TRCA, April 2018). The Secondary Plan Area was not included as future development (i.e. urbanized) as part of the Humber River Hydrology Update future conditions, relevant excerpts are provided in **Appendix D4**. The latest version of the Humber River Watershed hydrologic model was obtained from the TRCA in February 2024.

A thorough desktop review of previously completed hydrologic models for the Humber River Watershed was completed as part of the SABE SWS (2022), relevant excerpts are provided in **Appendix D4**. Part A of the SABE SWS (2022) noted that the Humber River Hydrology Update (2015) did not include a continuous simulation assessment and; therefore, did not characterize existing conditions land use or assess the impact of future land development on the basis of regional water balance or erosion of downstream receivers. It was recommended that future studies should apply continuous simulation for the hydrologic analyses, to allow for assessment of flood risk (i.e. frequency analysis), erosion assessment (i.e. duration analysis) and water budget assessment using long-term continuous meteorological datasets, and thereby allow

for a fulsome impact assessment and evaluation of the recommended stormwater management plan including application of low impact development best management practices (LID BMPs). Per the MTLOG TOR (**Appendix A**), the TRCA VO model will be utilized for establishing existing floodplain constraints throughout the Secondary Plan area, refer to **Figure 9C** (**Appendix B1**.)

Hydraulic analyses of open watercourses are predominantly completed using the HEC-RAS hydraulic model. Previously completed hydraulic analyses and approved floodlines have been provided for the Secondary Plan and surrounding areas, as approved by the TRCA. The regulated floodlines have been generated based upon the results from the approved HEC-RAS models simulating the Regulatory event (greater of Regional Storm or 100 year event). The latest existing Regulatory floodplain mapping is provided in **Appendix D4**. The latest hydraulic models for the Study Area (Final West Humber and West Humber Zone 1) were obtained from the TRCA in February 2024.

A thorough desktop review of hydraulic models for the Humber River Watershed was completed in Part A of the SABE SWS (2022), relevant excerpts are provided in **Appendix D4**. It was noted that floodplain mapping throughout the SABE was comprised of engineered and “estimated” floodlines. Engineered floodlines are understood to have been developed from engineered hydraulic models, which were built using detailed data collection for channel/floodplain geometry and includes hydraulic structures (i.e. culverts, bridges, weirs, etc.), based upon best available sources (field survey, as-built drawings, etc.). Estimated floodlines are understood to have been developed from simplified hydraulic models, generally based upon basic channel topography (i.e., from an available DEM source only) and do not always include hydraulic structures. Where estimated, the floodplain mapping will need to be confirmed based on detailed topographic survey and hydrologic/fluvial assessments to confirm that it meets minimum drainage area requirements (50 ha) and meets the latest definition of a “watercourse” as described in O. Reg. 41/24 (a defined channel, having a bed and banks or sides, in which a flow of water regularly or continuously occurs).

Flood Vulnerable Areas (FVAs) as identified by the TRCA were categorized in Part A of the SABE SWS (2022). One FVA applies to the downstream of the Study Area, the Main Humber River FVA at the confluence with the West Humber River, located in the City of Toronto. It was noted that based on a review of the time to peak results from the Humber River Hydrologic Model, the timing influences may be unfavorable for traditional stormwater management (SWM) in the headwaters, which may lead to increases in peak flows further downstream, due to lagged release of outflows. Part B of the SABE SWS (2022) reviews the potential impacts of development of the SABE on FVAs, this will be discussed further in Phase 2 of the Local SWS.

A review of existing undersized crossings was also undertaken in Part A of the SABE SWS (2022). Undersized structures within the Secondary Plan or immediately downstream have been identified in **Table D1-1** (**Appendix D1)** and are illustrated on Figure WR6 of Part A of the SABE SWS (2022; **Appendix D1**).

Per the Town of Caledon DC Background Study (February 29, 2024), Bramalea Road, Torbram Road, and Old School Road will all be widened from two lanes to four lanes. Through coordination with Town of Caledon staff, it is understood that the design process of the Torbram Road widening is ongoing with Old School Road and Bramalea Road widening design to be initiated in 2041 and 2051 respectively.

Culvert inspection reports were obtained from the Region of Peel and Town of Caledon for the existing culverts crossing Mayfield Road, Bramalea Road, Torbram Road, and Old School Road along the frontage of the Secondary Plan. The culvert inspections reports are provided in **Appendix D4**. In general, all culverts were noted as being in fair or good condition with minor repairs required (e.g. minor ditching, patch repairs to concrete, minor restoration, etc.).

2.4 Hydrogeology and Geotechnical

2.4.1 Background Review

An overview of the subsurface conditions expected to be encountered was established using a range of publicly available information and previous subsurface investigations by other consultants nearby to or within the Study Area and are summarized below.

Physiography and Geology

The site is within the physiographic region known as the South Slope (Chapman and Putnam, 1984) which is dominated by drumlinized glacial till plain landforms. The South Slope is noted to be present at the southernmost flank of the Oak Ridges Moraine, and glacial till is typically encountered (soil types are mostly clay to loam). Runoff tends to be higher and infiltration tends to be lower in the South Slope as the terrain is not hummocky like the Oak Ridges Moraine (TRCA, 2008) and the finer-grained soils restrict infiltration. A map of the physiographic regions and landforms is provided as **Figure 1 and 2** in **Appendix E1** (Ontario Ministry of Mines, 2024).

At depth, OGS mapping on **Figure 3** in **Appendix E1** (Ontario Ministry of Mines, 2024) shows the Study Area is mostly underlain by bedrock of the Queenston Formation, which consists of shale with siltstone, minor limestone and sandstone. The southeastern corner is shown to be underlain by bedrock of the Georgian Bay Formation, which consists primarily of shale with limestone interbeds. Bedrock topography mapping (Ontario Department of Mines, 1968) shows that the bedrock surface is estimated to range from Elev. 233 to 207 m across the Study Area.

Surficial geology mapping from the Ontario Geological Survey (OGS) was reviewed and is provided as **Figure 4** in **Appendix E1** (Ontario Ministry of Mines, 2024). The OGS mapping indicates that the surficial geology expected below most of the Study Area consists of clay to silt textured till. Along the valley lands within the Study Area, modern alluvial deposits of clay, silt, sand or gravel, and potential organic zones, are expected. Near the middle of the Study Area, at Bramalea Road and north of the branch of the Humber River, ice-contact stratified deposits are expected including sand and gravel, with minor silt, clay, and glacial till.

Geotechnical boreholes available on a database from the Ministry of Energy, Northern Development and Mines (MNDM) were reviewed. Six (6) boreholes were found within 500 m of the Study Area. Based on the records the boreholes ranged from Elev. 241.9 to 274.9 metres above sea level (masl). The total depth of boreholes ranged from 0.9 to 7.6 metres below ground surface (mbgs) and generally encountered silt and sand till, or silt till (Ontario Ministry of Mines, 2024).

Regional Cross-Sections and Stratigraphic Units

TRCA (2008) and Oak Ridges Moraine Groundwater Program (ORMGP, 2020) provide regional cross-sections and summaries of the main stratigraphic units below the Region of Peel and Humber River Watershed.

ORMGP (2020) contains a north-south cross section along Airport Road, one major street east of the Study Area, which shows subsurface stratigraphy primarily consisting of Halton Till. Closer to Mayfield Road, the Halton Till may be underlain by a thinner deposit of Lower Newmarket Till above the bedrock surface. Near Old School Road, the Oak Ridges Aquifer Complex (ORAC) is shown below the Halton Till and above the bedrock surface.

TRCA (2008) shows a generalized cross-section through West Humber River, alignment unknown. The section shows Mayfield Road being underlain by recent sediments at grade, then a thick deposit of Halton Till, then ORAC above the bedrock surface.

Halton Till, Oak Ridges Deposits and Newmarket Till are part of the Late Wisconsin Glacial Complex, deposited approximately 13,000 to 20,000 years ago.

Halton Till varies in composition but is known to generally consist of sandy silt to clayey silt till interbedded with silt, clay, sand and gravel (Kassenaar and Wexler, 2006). Figure B126 from Kassenaar and Wexler (2006) estimates the thickness of Halton Till could be on the order of 10 to 20 m thick in the Study Area. This forms the Halton Aquitard hydrostratigraphic unit.

The Oak Ridges Moraine (ORM) sediments consist of interbedded fine sands and silts, locally with coarse, diffusely-bedded sands, heterogenous gravels, and clay laminae (Kassenaar and Wexler, 2006). Kassenaar and Wexler (2006) state the following:

> *There remains considerable uncertainty about the origin and nature of sand and gravel deposits identified on the flanks of the moraine. The borehole and water well record database show the presence of significant sand bodies lying either within a single till unit or sandwiched between two different till units, particularly in the low-lying areas south of the moraine. These deposits may be associated with the sedimentological processes that created the moraine and therefore lie on top of the Newmarket Till or, alternatively, they may be isolated sand bodies within the Newmarket Till. If they do correspond to Oak Ridges deposition, then there is a greater probability that they are hydraulically connected to the ORM. Alternatively, if they are an element of the Newmarket Till, they would more likely be hydraulically isolated from the ORM.*

Figure B125 from Kassenaar and Wexler (2006) indicates there could be local zones of ORM sediments below parts of the Study Area, on the order of approximately 1 to 5 m thick. The ORM sediments form the ORAC hydrostratigraphic unit. Sand deposits located below surficial glacial tills along the flanks of the ORM deposits are included in the ORAC, but in areas remote from the ORM, the sands are locally discontinuous and typically less than 10 m thick (TRCA, 2008). The Study Area is south of the ORM in the South Slope physiographic region, and there could be locally discontinuous areas of the ORAC (where encountered). Information from the ORMGP (2020) indicates that the northernmost extent of the Study Area (including the northern parts of Properties 1 and 4) and a local area at the east side of Property 9, could contain the ORAC with a thickness of about 5 to 10 m.

Figure B124 from Kassenaar and Wexler (2006) indicates there could be some zones of Newmarket Till below the Halton Till or ORM sediments, on the order of about 5 m thick. Newmarket Till is generally a massive and over consolidated deposit with a matrix consisting primarily of silty sand to sandy silt with gravel. It can contain thin interbeds of sand and silt, rarely contain clay laminae, and can contain discontinuous sand interbeds about 1 to 2 m thick (Kassenaar and Wexler, 2006). This forms the Newmarket Aquitard hydrostratigraphic unit.

Source Water Protection

The site is within the jurisdiction of the Toronto Source Protection Area (SPA) within the larger CTC Source Protection Region (SPR). The following documents should be used in determination of the regulatory requirements when it comes to maintaining hydrogeological function at this site:

- "Approved Source Protection Plan: CTC Source Protection Region", dated February 2022, by CTC Source Protection Committee.

Based on Source Water Protection online mapping (LIO, 2024; and TRCA, 2022), the following is noted:

- Wellhead Protection Area (WHPA): The Study Area is not located within a WHPA (**Figure 5**, **Appendix E1**);
- Intake Protection Zone (IPZ): The Study Area is not located within an Intake Protection Zone (**Figure 6, Appendix E1**);
- Highly Vulnerable Aquifer (HVA): Local parts of the Study Area are underlain by an HVA (**Figure 7, Appendix E1**);
- Significant Groundwater Recharge Area (SGRA): The site is located within an SGRA with a score of 0-2 (**Figure 8, Appendix E1**);
- Ecologically Significant Groundwater Recharge Area (ESGRA): The site is partially located within an ESGRA; and
- The site is not located within the Oak Ridges Moraine or Niagara Escarpment, but is partially located within the Greenbelt Plan Area.

Hydrostratigraphy

The regional hydrostratigraphic units are summarized above. **Table 2-1** (below) summarizes the units expected to be encountered on site (Wood, 2022).

Table 2-1: Regional Hydrostratigraphy

Geological Unit	Lithology	Aquifer or Aquitard
Halton Till	Sandy silt to clayey silt till	Aquitard

Geological Unit	Lithology	Aquifer or Aquitard
Newmarket Till	Massive and frequently over-consolidated stony and dense silty sand till	Aquitard
Oak Ridges Moraine Deposits	Fine sands and silts, with coarser sands and gravels that can dominate local areas	Aquifer
Georgian Bay Formation Bedrock	Thin beds of grey-green and grey-blue shales, calcareous siltstones, and silty to argillaceous limestones	Poor aquifers, except where sufficiently weathered or fractured
Queenston Formation Bedrock	Red, silty calcareous shales and clay shale with thin interbeds of grey to green silty limestones and calcareous siltstones	

MECP Water Well Records and PTTW Mapping

MECP water well records were obtained within 500 m of the Study Area to assess the general nature of the groundwater resource in near vicinity of the Study Area, and historical/current uses of wells in the area. One hundred and twenty-six (126) well records were found, the approximate MECP well locations are shown on **Figure 9 (Appendix E1**; LIO, 2024). A summary of the MECP well records are included in **Appendix E8**.

The wells were installed for the following uses:

- Twenty-four (24) of the records indicate monitoring, test hole use;
- Fifty-three (53) of the records indicate the wells as not used or other use;
- Forty-seven (47) of the records indicate that the wells were used for domestic and irrigation use; and
- Two (2) of the records indicate that the well was used for public or municipal use.

The stratigraphic descriptions within the MECP well records are typically inaccurate due to the methodology in which they are determined (observations of cuttings and no consistency between descriptions of soil between different well drillers). Though this is the case, an overall sense of the stratigraphy can still be determined.

The well records generally encountered “clays” at grade (which may also represent glacial till deposits), underlain by silt tills, underlain by sand and gravels. Un-stabilized water levels were noted to be about 1.2 to 44.5 m below grade or deeper on the well records. The wells were typically screened at depths of 6.1 to 49.3 m. The water levels in the well records may not fully represent groundwater levels near the ground surface. Bedrock was noted at depths of 10.7 to 52.4 m below ground surface.

The online MECP Permit to Take Water (PTTW) database (MECP, 2024) shows there are four (4) active PTTWs within 1 km of the Study Area. All four of the permits are located at golf courses for surface water takings. Three (3) of the PTTWs are located at Property 9 for golf course irrigation

with a maximum water taking of 250,000 to 1,673,280 L/day. One (1) of the PTTWs is located at Property 1 for golf course irrigation with a maximum surface water taking of 1,402,200 L/day.

Aerial Images

Various aerial images from 2002 to 2022 were reviewed in First Base Solutions (LIO, 2024) and are provided as **Figures 10A to 10E (Appendix E1)**. The Study Area has been used as farmland, except for the northwestern corner where Property 1 is and in the eastern central portion of the Study Area at Property 9. From 2002 to 2022, no apparent signs of land use change, erosion, or other changes were observed.

MTO Boreholes

The MTO Foundation Library online database (2024) was searched for any MTO geotechnical reports and boreholes near the Study Area. The nearest geotechnical reports were located over 1.5 km south from the Study Area and are not included in this assessment.

Previous Investigations

The MTLOG provided previous geotechnical, hydrogeological, and environmental reports available in the Study Area. Three (3) reports referenced and summarized below contain relevant borehole information and aid in providing background information to the Study Area.

- "Preliminary Geotechnical Investigation 12282 Bramalea Road, Caledon, Ontario," Proj. No. BRM-21004350-B0, April 2021, by EXP;
- "Preliminary Geotechnical Investigation 12442 Bramalea Road, Caledon, Ontario," Proj. No. BRM-22002697-B0, February 2022, by EXP; and
- "Detailed Factual Geotechnical and Hydrogeological Subsurface Investigation Report – Mayfield Golf Course Redevelopment Golf Course Lands and South Lands, Caledon, Ontario," Proj. No. 101987.001, July 2023, by GEMTEC.

Based on the findings of the subsurface investigation reports within the Study Area, the majority of the overburden soils consist of surficial topsoil and fill materials overlying various deposits of glacial till (cohesive and cohesionless) and silty clay to clayey silt, as well as silt, sand and gravel. The overburden is underlain by bedrock consisting of interbedded limestone and shale. Bedrock was found on Property 9 from 7.3 to 18.3 m bgs. Based on the reports the general area typically sees a groundwater table that follows the topography of the land ranging from Elev. 241.8 to 259.9 masl. Artesian conditions were encountered locally on Property 9. The existing borehole locations are shown on the other consultant borehole plans in **Appendix E4** and also on **Figures 2C to 2E (Appendix E2)**.

Based on the existing reports by others, the hydraulic conductivities for the glacial till ranged from 1.0×10^{-7} to 4.0×10^{-8} m/s. The hydraulic conductivities for the silt and/or sand and silt ranged from 3.0×10^{-6} to 9.0×10^{-8} m/s. The hydraulic conductivities for the bedrock was found to be approximately 2.0×10^{-8} m/s.

2.4.2 Gap Analysis and Borehole Recommendations

Based on the background review, particularly the expected regional glacial till deposits and existing borehole information available for the Study Area, a gap analysis was completed to determine the scope of work required in support of the Local SWS geotechnical and hydrogeological reporting components.

At a high level, the purpose of the hydrogeological assessment is to review the regional hydrogeological setting of the Study Area, and characterize the local soil, groundwater and surface water flow conditions. The focus of the work is to understand the key hydrogeological functions and groundwater interactions with natural features to provide input to the design and engineering of proposed development areas such that important aquifers and natural features will be supported, as well as identify potential areas that warrant more detailed consideration in future site-level investigations. The purpose of the geotechnical assessment is to complete a subsurface investigation to determine the underlying soil and groundwater conditions, characterize the site geology, conduct a slope stability assessment, and to support the hydrogeological study.

The borehole and monitoring well layout to support the Local SWS was developed accordingly, summarized below. The borehole and monitoring well location plans are provided as **Figures 2A to 2E (Appendix E2)**.

- In general, a targeted borehole spacing of approximately 300 m was selected across the Study Area for the participating properties;
- Detailed existing borehole information is available for Properties 2, 3, and 9. New boreholes and monitoring wells were added on these properties to supplement the existing data. No other participating properties had borehole information available;
- SCS provided high-level markups showing potential stormwater management facility (SWMF) locations for the Study Area. Borehole coverage was adjusted accordingly to gather information in or near the potential SWMF locations;
- SCS also provided approximate ground surface elevations and bottom of SWMF elevations to GEI. To accommodate the potential SWMF depths, several of the boreholes and monitoring wells in or near the SWMFs were extended to depths of 8 to 15 m (about 2 to 3 m deeper than the potential bottom elevations);
- Selected boreholes across the Study Area were instrumented with monitoring wells to characterize groundwater levels and to facilitate groundwater sampling and in-situ testing. Some additional monitoring wells were installed in strategic locations, such as near surface water features, in or near the SWMFs, or near the slopes associated with the confined valley systems;
- Nested monitoring wells (deep and shallow well screens) were also installed in strategic locations near or adjacent to the various surface water features, to assist with assessing groundwater gradients and potential baseflow into water features or groundwater-surface water interactions;
- In general, the borehole and monitoring well depths were 6 m below grade which is sufficient for typical land development and for SWS reporting;

- Seven of the boreholes and monitoring wells along the main confined valley corridor of the West Humber River tributary were extended to depths of 10 m below grade to support a slope stability assessment; and
- SCS also provided preliminary alignments and obvert elevations for a potential deep sanitary sewer that will service the Study Area. Two of the original 6 m boreholes were shifted toward the potential alignment, extended to depths of 15 m, and were instrumented with monitoring wells. Two additional 20 m boreholes with monitoring wells were added on the east and west sides of the watercourse on the Property 4 , where directional drilling may be required beneath the watercourse to install the sewer.

In summary, 20 boreholes, 29 boreholes with monitoring wells, and 9 nested deep / shallow monitoring wells were recommended to supplement the existing borehole information, and to support the geotechnical and hydrogeological reporting requirements as part of the Local SWS. **Figures 2A to 2E (Appendix E2)** show the locations and depths of the proposed boreholes and monitoring wells.

Additionally, Section 2.3.1.3 of Peel Region's Part A SABE Scoped SWS (Wood, 2022), included a hydrostratigraphic interpretation of the Halton Till, further breaking it down into four (4) distinct units, including the Upper Fractured Till Unit at the top, which was described as massive and generally weathered with vertical fracturing that extended up to 5 mbgs; Middle Till Complex that consisted of massive till layers with interbeds of staggered silt to sand and gravel with components exhibiting varying degrees of weathering; underlain by Glaciolacustrine Deposits of layers of fine-grained glaciolacustrine clayey silts and silty clays of varying thicknesses; over Lower Till Complex with similar characteristics to the Middle Till Complex, but not as variable.

Of particular importance in the Study Area is the Upper Fractured Till Unit which can be a relatively active groundwater flow zone as it can exhibit a significantly higher conductivity, approximately 2 - 3 orders of magnitude higher than the underlying till materials. The flow in this unit is considered to be primarily lateral towards surrounding depressional features (wetlands, streams, etc.). Dominant water movement can be laterally through this unit or overland, depending on the groundwater level and the relative locations of depressional features.

Additionally, where stream reaches have incised far enough into or through the till, ephemeral discharge locations (seeps) may be observed. If the stream reaches have incised entirely through the till into the underlying Oak Ridges Moraine Deposits, more permanent groundwater discharge may be observed.

2.5 Surface Water

2.5.1 Drainage

The Study Area is located within the Humber River watershed. The Humber River watershed measures 90,258 ha in size and is the largest watershed within TRCA jurisdiction. Drainage in the Humber River watershed originates in the Niagara Escarpment and Oak Ridges Moraine, and flows towards Lake Ontario. As of 2020, urban land uses represent 26.7% of the watershed, and approximately 32.7% of the watershed is natural cover. Terrestrial natural cover in the watershed decreased by 4.4% between 2002 and 2020 (TRCA, 2023).

The average annual streamflow in the watershed is 280.4 mm/year, which represents 33% of the average annual precipitation. Streamflow in the watershed from 1991-2021 has increased by 20.3% from the streamflow reported for 1961-1990 due to a combination of an increase in pervious cover as well as an increase in average annual precipitation of 5% across the same time periods (TRCA, 2023).

Baseflow Index (BFI) was reported within the Humber River Watershed Characterization Report for a number of reaches within the watershed, and represents the ratio of long-term baseflow to total stream flow. BFI within the Main Humber subwatershed was reported to range from 0.34 to 0.73; BFI within the East Humber was reported to range from 0.56 to 0.58; BFI within the West Humber subwatershed was reported as 0.36, and BFI within the Lower Humber and Black Creek subwatersheds was reported as 0.53 and 0.36, respectively. In general, BFI has been found to increase from 2002 to 2021.

The average groundwater recharge for the entire Humber River watershed is reported as 235 mm/year within the Humber River Watershed Characterization Report (TRCA, 2023), and is greatest within the hummocky terrain and surficial permeable deposits of sand and gravel in the Oak Ridges Moraine.

2.5.2 Surface Water Quality

Based on investigations completed by TRCA as part of the Humber River Watershed Characterization Report (2023), surface water quality within the Humber River Watershed is variable as a whole. Specifically, surface water quality becomes poorer moving downstream, likely due to anthropogenic influences and urbanization. Contaminants of concern identified within the watershed include chlorides (from road salts), phosphorus (from fertilizers and sewage cross-connections), metals such as iron, cadmium, copper and zinc (from natural and industrial sources and/or roadways) and E.Coli (from sewage/animal wastes). According to the TRCA Humber River Watershed Characterization Report (2023), the Main Humber and East Humber subwatersheds have generally higher quality habitat due to larger amounts of natural cover and reduced negative urban influences. The West Humber, Lower Humber, and Black Creek subwatersheds have generally poorer quality habitat due to smaller amounts of natural cover and negative urban influences.

Trends reported by TRCA (2023), based on an assessment of results from 11 stations between 2012 and 2021, included the following for the West Humber River:

- Total Suspended Solids – 1% decrease;
- Chloride – 15% increase;
- Total Phosphorus – 1% decrease;
- Nitrates – 2% increase;
- Un-ionized Ammonia – unchanged;
- Copper – 8% decrease;
- Iron – 4% decrease;
- Zinc – 9% decrease;

- Lead – 26% decrease;
- Chromium – 3% decrease;
- Cadmium – 6% decrease;
- Nickel – no change; and
- E.coli - 13% decrease.

Surface water chemistry data that is typically presented under the context of the watershed (Humber River) or subwatershed (West Humber River) as a whole and do not provide characterization of select channels of these rivers, of which there are many. The collection of surface water chemistry data was indicated as a need to provide a characterization of the Study Area as well as to compare to the groundwater chemistry results to evaluate similarities, if any, which can be clues to connectivity between the systems. A selection of surface water sampling locations were identified to provide coverage across the Study Area and provide a preliminary characterization. The surface water monitoring locations are shown on **Figures 11A to 11E (Appendix E1)**.

2.6 Climate Change

A technical climate change study, titled Opportunities for Climate Change Mitigation, Energy and Emissions Reductions (2020), was completed as part of the SABE to support planning for the expansion of Caledon's existing urban boundary. The study developed a planning policy framework to support energy planning to minimize new GHG emissions, mitigate climate change in the long term, and to enable the SABE to be a net-zero emissions community.

The Region has identified two GHG emissions targets to assist in mitigation efforts. The first target is community-based and applies to all GHG sectors within the Region. The target for reducing GHG emissions 80% below 1990 levels by 2050 was selected. The second GHG target relates to corporate GHG emissions for municipally owned and operated buildings and infrastructure and sets a reduction target of 45% below 2010 levels by 2030.

The ROP provides a land use planning framework to shape the built and natural environment in the Region through development and conservation and includes existing objectives and policies that encourage and promote more sustainable energy and emissions reduction strategies. The technical climate report reviews challenges and opportunities to translate emissions reduction strategies into regional municipal land use planning to enable longer-term energy system transformation.

The technical climate change study (2020) provides recommendations for the SABE based on best practices and lessons learned about planning for the transition from fossil fuel dependent energy sources towards net-zero communities based on energy conservation and efficiency in planning, reliance on renewable energy sources, community district energy and distributed energy networks. The recommendations outlined in the report are intended to support the long-term development of the SABE as the ROP and the Town of Caledon continue to transition to low-carbon and net-zero communities.

With the focus of the technical climate change study being on mitigation and energy, this report further explores climate change trends, potential impacts and opportunities for bolstering resilience and adaptation efforts. Creating climate ready and resilient communities requires both mitigation and adaptation planning, policies and considerations, which was not previously reviewed as part of the SABE.

3. Baseline Inventory

The following section provides a description of the general characteristics of the Study Area and will include discussions on climate, landform, geology, and soils; hydrogeology/groundwater quantity and quality; surface water quantity and quality; stream geomorphology and aquatic and terrestrial ecosystems

3.1 Natural Environment Existing Conditions

This section will inventory, characterize and assess natural heritage features and functions within the Study Area in accordance with municipal and provincial guidance documents. Where access is permitted, field investigations were completed to confirm the presence and extent of natural heritage features. Where access was not permitted, reviews from roadsides and/or adjacent sites were collected. Background information was reviewed through aerial interpretation to determine what natural heritage features may be present within these properties. If non-participating properties become participating in future development applications, additional field investigations will be required to confirm whether these candidate features may be present. This is further discussed within **Section 5** of this report.

3.1.1 Scope Overview

The following ecological field investigations have been undertaken by GEI during the 2024 field season (winter, spring, summer, fall):

- Anthropogenic Structure screening for wildlife habitat (one survey);
- Ecological Land Classification (ELC) and three-season botanical inventories (spring, summer and fall);
- Breeding bird surveys (two rounds) and winter raptor survey (one survey);
- Turtle basking surveys (three rounds) and turtle nesting suitability survey (one survey);
- Snake surveys (four rounds);
- Amphibian call count surveys (three rounds);
- Bat habitat survey (one survey) and acoustic survey (one survey);
- Monarch survey (three rounds);
- Headwater Drainage Feature Assessments (HDFA; three rounds);
- Aquatic habitat assessment (one survey); and
- Fish community sampling within all drainage features and ponds.

In addition to the above noted investigations, feature staking (top of bank, tree limit and wetland limit) have been completed. All of the above noted surveys were included within the TOR (**Appendix A**), except for Monarch surveys. These have been added based on site specific surveys that were completed, which identified candidate habitat for the species.

A list of the survey types and dates has been provided in **Table 1** (**Appendix B2**). The 2024 fieldwork season is currently ongoing and several surveys have not been completed at the time of writing this report. Additional survey details will be provided in subsequent reports following the completion of the 2024 field season in the Fall.

The exception to this is within Properties 9 and 10 , where Beacon Environmental was retained to complete the majority of site-specific investigations for the properties in 2022 and 2023, with the exception of structure screening and bat acoustic surveys (which were completed by GEI in 2024). This information has been incorporated into the report for these properties. A copy of their methodologies and results are found within Sections 3 and 4 of their Natural Heritage Evaluation (**Appendix B3**).

All field investigations were targeted within properties that were participating within the SWS; however, representative coverage of features throughout the Study Area were targeted in an effort to characterize the presence and extent of natural features within non-participating and participating properties. Additional studies will be required within non-participating properties.

3.1.2 Survey Methodology

3.1.2.1 Terrestrial Field Survey Methods

Anthropogenic Structure Screening

There are several SAR and Species of Conservation Concern (SOCC) that may utilize anthropogenic structures to support various life stages. For example, these structures can provide maternity roosting habitat for Little Brown Myotis, Northern Myotis, Eastern Small-footed Myotis and Tri-colored bats or provide nesting habitat for Barn Swallows and Chimney Swifts. Structures with access below the frostline can also provide snake hibernacula. The anthropogenic structures within participating parcels were assessed for their potential to provide wildlife habitat. Each structure was specifically reviewed to determine whether it had the potential to provide habitat in support of the below SAR or SWH types.

- SAR Bat Roosting Habitat: Anthropogenic structures surveyed for potential entry and exit points that may be used by SAR Bat species (e.g., peak of the roofline, vents near the roofline, under soffit or where fascia meets roofline). Structures identified to have potentially suitable habitat may require additional surveys, referred to as Bat Exit Surveys, to confirm whether SAR bats are using the structures for roosting.
- Chimney Swift Habitat: Anthropogenic structures were also surveyed for chimneys that are suitable to support Chimney Swift, as this bird species is Threatened in Ontario. The species use open uncapped chimneys without any modifications like ventilation or exhausts. These species are screened though two methods; visual inspection of possibly suitable chimneys and the completion of breeding bird surveys to determine if Chimney Swifts are breeding in the area.

- Snake Hibernacula SWH: Anthropogenic structures, rock piles or other features that may provide access below ground were assessed for their potential to provide access below the frostline (i.e., cracks in the foundation, other entry and exit points below ground with the potential to support snakes overwintering). Structures identified to have potentially suitable habitat may require additional surveys, referred to as Snake Visual Encounter Surveys, to confirm whether snakes are using these potential habitats. These survey methods are discussed further below within this Section.
- Habitat of Species of Special Concern (Barn Swallow) SWH: Anthropogenic structures were surveyed for historic evidence of Barn Swallow nesting. If historic evidence was recorded, these structures will need to be reviewed within the active bird breeding window.

Features with the potential to provide habitat for SAR or SWH indicator species were recorded for future studies during appropriate seasonal conditions.

Vegetation Surveys

Vegetation communities were first identified on aerial imagery and then verified in the field, where access was provided. 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 were also mapped. Where a suitable ELC classification code was not available in the 1998 manual, codes from the unpublished 2008 ELC 2nd Approximation (Lee, H. T. 2008) were used. Scientific names primarily follow nomenclature from the Database of Vascular Plants of Canada (Brouillet et al. 2010+). The provincial status of all plant taxa and vegetation communities is based on NHIC (2024; 2021).

The limits of these vegetative communities have been refined through ground-truthed feature staking with the Town of Caledon and TRCA. Specifically, the treed limit was delineated on May 30, May 31 and June 3, 2024 while the wetland limit was staked on July 4, 5 and 8, 2024. Dripline was staked by Beacon Environmental on October 18, 2022 within Properties 9 and 10, except for the southern Dry-Fresh Deciduous Forest (FOD3) community. The limit of this feature should be delineated as part of site-specific applications.

For the purposes of this preliminary report, botanical surveys and Ecological Land Classification data reflect results captured during the spring botanical inventory and feature staking exercises. A summer and fall inventory will be completed in the future and their results will be summarized in subsequent reports.

Bird Surveys

<u>Winter Raptor Surveys</u>

A review was completed to determine presence of potentially suitable habitat as per the ‘Raptor Wintering Area’ SWH category defined in the Significant Wildlife Habitat Criteria Schedules for Ecoregion 6E (MNRF 2015).

Potential Raptor Wintering Area habitat is defined in the SWH Criteria Schedules for Ecoregion 6E (MNRF 2015), as cultural upland habitats (ELC communities Cultural Meadow (CUM), Cultural Thicket (CUT), Cultural Savannah (CUS), Cultural Woodland (CUW), lightly grazed or idle / fallow fields) that are greater than 20 ha in size and adjacent to forest communities (ELC communities Deciduous Forest (FOD), Coniferous Swamp (SWC), SWM, Deciduous Swamp (SWD) or Cultural Plantation (CUP3).

No upland habitat communities greater than 20 ha in size were identified within tablelands of the participating properties, and therefore, a fulsome Winter Raptor Survey fieldwork program was not required. Under suitable habitat conditions, this fieldwork program would include multiple visits to determine whether raptor wintering habitat is being used and to confirm species of raptors present. It is assumed that suitable habitat may be present within the Greenbelt Plan Area.

Although the size criteria were not met for this SWH type within the tablelands of the participating parcels, the fieldwork was undertaken during one visit to the Study Area, as this level of effort has been requested by the Town of Caledon in neighboring areas for completeness. Suitable ecosites below the 20 ha threshold were monitored for any raptor activity during the winter field visit. Each suitable ecosite was surveyed for a minimum 15-minute period to observe whether there was raptor activity within the unit.

The winter raptor surveys were conducted on days of no rain or heavy snow, with a Beaufort wind speed of 3 or less (<20 km/h).

Breeding Bird Survey

Breeding bird surveys were conducted following protocols set forth by the Ontario Breeding Bird Atlas (Cadman et al., 1998; Cadman et al., 2007). Surveys were conducted between dawn and five hours after dawn with suitable wind conditions, no thick fog or precipitation (Cadman et al., 2007). Point count stations were located in various habitat types within the Study Area (except Properties 9 and 10) and combined with area searches to help determine the presence, variety and abundance of bird species. Some point counts were also placed within participating properties to listen into non-participating parcels. Some of these locations occur within actively managed agricultural fields.

Within Properties 9 and 10, Beacon Environmental completed breeding bird surveys using a roving technique instead of point-count stations. Though Beacon's method differs than methods used by GEI, this modified survey technique collects sufficient bird species presence and breeding evidence data to support the subwatershed study.

Point count stations were 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 at least 10 days apart. No third survey was required if grassland breeding bird use could be confirmed in rounds 1 and 2, or where there was no habitat suitable for grassland breeding birds at the time.

A third-round breeding bird survey is typically required to confirm whether grassland bird habitat may be present (including Bobolink and Eastern Meadowlark) unless the first and second round result in sufficient evidence to confirm breeding. Observations of Bobolink and Eastern Meadowlark were recorded during round 1 and 2 visits. The only property that contained candidate grassland breeding bird habitat was on Property 1 where Eastern Meadowlark was observed carrying food within the small meadow patches within property. As such, a third visit was not warranted for this Study Area given the small size of the community. No other grassland bird habitat was identified during round 1 and 2 surveys within the remaining tablelands of the Study Area with a sufficient thatched layer to support grassland bird breeding; thus, a third visit is not warranted.

Structures that appeared suitable for Barn Swallow nesting locations were examined during both rounds of the breeding bird surveys. These inspections were conducted to confirm breeding locations in the Study Area, particularly when individuals were noted in flight near potential nesting structures and no other evidence was observed.

Both the Natural Heritage Information Centre (NHIC 2024) database and the SARO list (O. Reg. 230/08) were reviewed to determine the current provincial status for each bird species.

Reptile Surveys

Snake

Four snake surveys were conducted during the spring emergence period (April to June), given that the probability of encountering elusive snake species is generally higher during this window. Visual Encounter Survey timing windows and survey conditions were based on protocols set forth by the Ministry of Natural Resources and Forestry (MNRF 2016).

Surveys were conducted between 9:00 and 17:00 under sunny conditions with air temperatures between 10°C and 25°C, or alternatively under overcast conditions where air temperatures are between 15°C and 30°C. On days when afternoon air temperature exceeds 25°C surveys were conducted between 8:00 and 12:00 or 17:00 and 20:00.

The location of these area search nodes was determined based on the results of the structure screening (methods discussed above). These areas searches were located near older barn structures were older foundations were present that could potentially be used for overwintering/hibernacula. During the area searches, cover objects such as logs, rock and man-made debris were searched as well as open-canopy habitats for basking individuals.

Turtles

Turtle basking and nesting surveys were completed throughout the Study Area to determine (1) whether turtle overwintering was occurring; and (2) if there were any viable nesting areas where successful breeding may occur.

Three turtle basking and one turtle nesting suitability survey were completed within the Study Area. Turtle survey timing windows and temperature thresholds were based on protocols set forth by the Ministry of Natural Resources and Forestry (MNRF 2015).

Turtle Basking

Potentially suitable aquatic habitat for turtles (e.g., ponds, open wetlands, and riparian/lacustrine areas) was first identified using aerial photography and were determined to potentially support overwintering habitat. Surveys were conducted between 8:00 and 17:00 under sunny conditions with air temperatures between 6°C and 25°C, or alternatively under overcast conditions where air temperatures are between 15°C and 30°C. On days when afternoon air temperature exceeds 25°C surveys were conducted between 8:00 and 10:00

Binoculars were used to scan, from a distance, for thirty minutes, the edges and surface of each water body for basking turtles. If possible, the perimeter of the feature was walked and surveyed, using polarized sunglasses, after scanning with binoculars.

Turtle Nesting Suitability

One turtle nesting suitability survey was conducted throughout the Study Area to assess the potentially suitability across the different properties and habitat types. This included the basking survey results to determine where the highest numbers of turtles are present, the estimated ages of the observed turtles and noting all potential movement corridors to provide an informed characterization of the areas within and immediately adjacent to the Study Area.

Beacon Environmental confirmed that they followed a similar survey during their ecological investigations under appropriate timing windows. GEI agrees that targeted surveys are not required to determine whether suitable habitat may be present; therefore, additional effort was not warranted on Properties 9 and 10.

Anuran Call Surveys

These surveys followed standard protocols outlined in the Great Lakes Marsh Monitoring Program (BSC 2003).

Survey station locations were determined through an assessment of orthophotography, existing vegetation communities and ground observations.

Surveys were conducted on warm nights with little wind. Surveys commenced one half hour after sunset and were completed before midnight. Each station was surveyed three times (once in April, once in May and once in June) during optimal weather conditions (low wind levels, no heavy rain). Minimum night air temperatures at time of survey of 5°C, 10°C and 17°C were applied to each of the respective survey periods. Visits were at least 15 days apart as per protocols. If noise from plane, road traffic and/or trains was present, monitoring was delayed and began during a quiet period.

The stations were surveyed for three minutes and a three-level call category system was used to identify the level and type of frog activity.

The standard call levels are:

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

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

The provincial and global statuses of species identified on the Study Area were obtained from the Natural Heritage Information Centre (NHIC 2024) and the SARO list.

Bat Surveys

Two types of bat surveys were completed within the Study Area to determine (1) whether candidate habitat may be present to support SAR and SWH bat species and (2) what bat species are using these candidate habitats. Bat acoustic surveys were targeted within areas where high densities of candidate bat habitat (snags) were recorded and/or in wooded habitats.

Detailed assessments were targeted within the tablelands within the participating properties of the Study Area. Targeted effort was not completed within the confined valleyland systems of the West Humber River and its associated tributary as these communities are expected to be retained and protected within the Study Area.

Bat Habitat Assessment

Four bat species are listed on the SARO list as Endangered: Eastern Small-footed Myotis (*Myotis leibii*), Little Brown Myotis (*Myotis lucifugus*), Tri-coloured Bat (*Perimyotis subflavus*) and Northern Myotis (*Myotis septentrionalis*). The habitat for these species is protected under the *Endangered Species Act, 2007* (ESA). Additionally, three other bat species (Eastern Red Bat *(Lasiurus borealis*), Hoary Bat *(Lasiurus cinereus*) and Silver-haired Bat *(Lasionycteris noctivagans))* are expected to be added to the SARO list in January 2025. These species have been included within the analysis.

Bat Maternity Colonies for Big Brown Bat (*Eptesicus fuscus*) and Silver-haired Bat are an indicator of SWH to be considered under the PPS (MMAH 2014).

The SWH Criteria Schedules for Ecoregion 6E (MNRF 2015) and the Significant Wildlife Habitat Technical Guide (MNR 2000) consider deciduous and mixed forests and swamps (i.e., ELC communities FOD and SWD) that include trees at least 25 cm diameter-at-breast-height (DBH) potentially suitable bat maternity colony habitat. With respect to SAR bats, coniferous, deciduous or mixed wooded ecosites, including treed swamps and cultural woodlands, that includes trees at least 10 cm DBH should be considered suitable maternity roost habitat. Habitat assessments were also completed along hedgerows as recent correspondence with MECP suggests that they consider any treed areas potentially suitable for SAR bats.

One bat habitat assessment survey was completed during leaf-off season using a transect approach. 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, height class, and snag attributes (i.e., peeling bark, decay class, presence of cavities, etc.).

No survey effort was completed within the West Humber River and its associated tributary valleylands; rather, these habitats are assumed to support SAR and SWH bats as a result of their size and connectivity to a mosaic of habitat types.

Bat Acoustic Monitoring

Survey methods were developed based on professional experience and using a combination of MNR survey guidelines as outlined in “Bats and Bat Habitats: Guidelines for Wind Power Projects (MNR 2011)”,“MNRF Survey Protocols for Species at Risks Bats within Treed Habitats: Little Brown Myotis, Northern Myotis, and Tri-Coloured Bat (20)” and MECP’s Maternity Roost Surveys (Forest/Woodlands) briefing note (2022). Surveys to detect bat species were carried out in June 2024 and were completed using Wildlife Acoustics Song Meter SM4BAT recording devices over a duration of ten consecutive evenings.

The locations of acoustic detectors were positioned in areas where high density of candidate bat habitat (snags) was identified and/or within candidate habitat (e.g., within the valleylands or densely wooded areas) to representatively cover the Study Area.

Passive acoustic recorders were programmed to begin recording at sunset and to end recording at sunrise. In addition, the SM4BAT passive recorder microphones were elevated approximately 2 m above the ground to reduce background noise and echo. 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.

All species of bats can make calls that range in frequencies and sonogram characteristics, depending on the behaviour at the time of call recording (i.e., social calls, foraging calls, feeding buzzes). Calls recorded during a bat’s search phase are the most reliable for an accurate species identification, and these calls were used preferentially to identify recorded species from the Study Area.

Calls can be classified as not identifiable by the program due to the high level of confidence needed when classifying recordings, quality of the calls, overlap of multiple bat calls and/or too much environmental background noise. High frequency calls that were not identifiable to species were manually reviewed by a wildlife ecologist with training in bat species identification by sonogram to identify those calls with characteristics of SAR bats (i.e., calls with frequencies greater than 40kHz).

Monarch Surveys

Insect surveys, including Monarchs, do not currently have an industry standard survey protocol in Ontario. Species detection is dependent on repeated visits during the appropriate flight times for a given species in suitable habitat. The protocol outlined below was drafted through discussions with the Guelph District MNRF along with the Monarch Recovery Strategy (Environment Canada, 2014) and other relevant literature.

Suitable ELC communities were used to determine where breeding habitat for Monarch may exist. Surveys will be completed in Summer 2024 and will be focused in areas where high densities of Milkweed plant (*Asclepias spp.*) is present within the suitable vegetation communities. All candidate ELC communities (CUM, DIST) will be reviewed for large abundances of Milkweed. Large abundances will be mapped and will be targeted for visual surveys.

Visual surveys for determining breeding evidence will be conducted in the summer months when Monarch are present and breeding in southern Ontario. Surveys will be conducted from morning to sunset with sunny/partially sunny skies, suitable low wind conditions, no thick fog or precipitation. Temperatures will be 15°C or higher to ensure Monarch activity is optimal for detection. For adequate coverage of the breeding window, three rounds will be completed. There is no specific amount of time to lapse between survey visits; however, it is recommended one survey occur per month (July, August, September).

During each survey, Milkweed will be searched for the presence of either Monarch eggs or caterpillars, or evidence thereof (such as arc-shaped eating patterns in the leaf, or a leaf that has a notch chewed into the centre vein of the leaf); though this does not confirm breeding habitat.

3.1.2.2 Aquatic Field Survey Methods

The SABE completed a preliminary assessment of drainage features in the Study Area to determine potential constraint rankings for watercourses. No HDFA was completed for the SABE, but the study noted that some drainage features that were assessed as Low Constraint watercourses for the SABE could potentially be considered HDFs.

For this SWS, all drainage features within the Study Area were reviewed to determine whether they should be classified as watercourses or headwater drainage features (HDFs). The assessment was primarily based on the definition of "watercourse" from O. Reg. 41/24 (Prohibited Activities, Exemptions and Permits) under the *Conservation Authorities Act*, which defines a watercourse as "*a defined channel, having a bed and banks or sides, in which a flow of water regularly or continuously occurs*".

Where drainage features were identified as HDFs(i.e., features without a defined channel with bed and banks or sides) they were evaluated using the CVC and TRCA's 2014 "Evaluation, Classification and Management of Headwater Drainage Features Guidelines" (herein referred to as the HDFA Guidelines). Where drainage features were identified as watercourses, the constraint level was determined based on the assessment methodology outlined in the SABE.

Drainage features characterized as HDFs are evaluated within this Section, while watercourses are evaluated within **Section 3.2**.

Headwater Drainage Feature Assessments

Potential HDFs on the Study Area were assessed using the CVC/TRCA's 2014 HDFA Guidelines. These guidelines provide a standardized means of identifying and assessing the value of HDFs and identifying the 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 will complete three site visits to assess HDFs on the Study Area within early spring, late spring and summer. At the time of writing this report, both spring assessments have been completed (Round 1 and 2); however, the summer assessment (Round 3) has not been completed. The results from the summer assessment will be summarized in subsequent reports.

During the first round (early spring assessment), which occurred following a precipitation event, all areas of the participating Study Area were walked to identify potential HDFs. This year did not have a significant snowpack, which could have impacted the characterization of drainage features during early spring assessments; therefore, it was determined that the best characterization of freshet flowing features would be to characterize them following a rain event. Each HDF observed was separated into specific reaches, per the guidance on reach delineation in the HDFA Guidelines. Data collection was completed for each reach based on OSAP protocols (Gorenz and Stanfield 2017), Section 4: Module 11 (Unconstrained Headwater Sampling).

The second-round (late spring) assessment occurred at least 48 hours after precipitation events so that drainage features would be at baseflow condition, per the requirements of Gorenz and Stanfield (2017). This assessment was completed later in the window as early to mid-May there were several significant rain events, which could have incorrectly skewed the flow conditions of drainage features.

A third (summer) assessment will be completed after several days of no precipitation to best characterize whether any baseflow contributions are occurring.

Following completion of all survey rounds, the drainage features will be assigned a management recommendation based on the HDFA Guidelines hierarchy. While the third (summer) assessment is outstanding at the time of writing this report, a conservative approach to the management recommendations has been assumed based on our professional experience of HDFs within these types of environments. These management recommendations will be revised following the completion of the third (summer) assessment.

Aquatic Habitat Assessment

One Aquatic Habitat Assessment (AHA) will be completed within the summer for the watercourses located within the Study Area. The AHA will consist of a visual survey of existing in-stream and riparian habitat conditions along and adjacent to the watercourses.

The assessment will record the following information:

- Hydrology (e.g., flowing or standing water);
- General watercourse morphology;

- Wetted width;
- Water temperature;
- Bed 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); and
- Riparian habitat.

The purpose of completing an AHA is to understand whether fish habitat may be present, and if so, understand the availability of spawning, rearing, feeding, resting and overwintering area would be present.

Results from this survey will be included within subsequent reports.

Fish Community Sampling

Two fish community sampling events will be completed to confirm the distribution and extent of direct fish habitat in the features on the Study Area (including Properties 9 and 10), identify species diversity and relative abundance. These surveys have been/will be completed in the spring and summer to understand whether drainage features provide seasonal or permanent fish habitat for various fish species. During the spring sampling, seasonal drainage features (HDFs) were targeted to determine whether seasonal fish habitat was present, while the summer sampling will be focused within permanent drainage features (watercourses).

Fish community sampling will not occur within occupied Redside Dace habitat as these watercourses are more sensitive and can be assumed to support permanent fish communities.

At the time of preparing this report, spring sampling has been completed however the summer sampling event is still outstanding. The results from the summer sampling event will be provided within subsequent reports.

Prior to commencing the survey, GEI obtained a License to Collect Fish for Scientific Purposes from the MNR. During these sampling events, a Halltech HT-2000 Battery Backpack Electrofisher and two D-frame dip nets with a 500-micron mesh size were/will be used to retrieve fish and semi-aquatic organisms (e.g. frogs). Sampling was/will be conducted using the Ontario Stream Assessment Protocol standard single pass survey method (Stanfield 2017). All data recorded will be reported to the MNR in accordance with the License requirements.

3.1.3 Characterization and Analysis

The results from the completed ecological investigations are presented below.

Properties 9 and 10 were surveyed by Beacon Environmental in 2022 and 2023; their survey results have been summarized within the below Sections however full details of their survey results are provided within Section 4 of their NHE (**Appendix B3**).

As previously noted, some surveys are outstanding at the time of preparing this report. Results from the summer and fall surveys will be included within subsequent reports.

3.1.3.1 Terrestrial Habitats

Anthropogenic Structure Screening

Based on preliminary field observations and aerial imagery, all structures present within the Study Area were assessed for their potential suitability for SAR bat roosting habitat, snake hibernacula SWH and Barn Swallow nesting habitat (Habitat of Species of Special Concern SWH). Based on this assessment several structures have been identified for further investigation:

- A total of five anthropogenic areas were identified with the potential to support SAR bat roosting habitat. Additional survey efforts are required as part of the site-specific development applications prior to their removal. The locations are shown as structures identified for further study on **Figure 2**, **Appendix B1** within Properties 1 and 4.
- No structures were identified as having potentially suitable Chimney Swift habitat; however, this will be confirmed through the results of identified bird species that may be breeding within the boundary of the Study Area. Breeding bird survey results are summarized further below within this Section.
- A total of two structures were identified with the potential to support snake hibernacula habitat and require additional surveys to determine if these structures support overwintering individuals. These structures were surveyed during targeted snake surveys. The results of these surveys are presented below within this Section. The location of these structures is shown on **Figure 2**, **Appendix B1** within Properties 4 and 11.
- Three barns were identified as suitable for Barn Swallows (i.e., observations of intact or remnant Barn Swallow nests). The locations of these barns include Properties 3 and 4 and are included within the structures identified for further study, as shown on **Figure 2**, **Appendix B1**. Since the completion of these surveys, one barn has been removed from the landscape outside of the active bird window (within Property 3).

Barn Swallow structure surveys were performed within the active breeding bird window by GEI for the Study Area (not including Properties 9 and 10), and by Beacon Environmental for Properties 9 and 10. The results of these are discussed in the Breeding Bird Survey results section below.

Ecological Land Classification

The Study Area includes riverine, bottomland, valleyslope, and tableland topographic features. **Table 3-1** summarizes the ELC communities present within the Study Area based on a spring assessment of participating lands.

Table 3-1: ELC Community Types within the Study Area

	Hectares	Percentage of Study Area (%)
Agriculture (AG)	320.4	52.40%
Cultural Meadow (CUM, CUM1-1)	40.2	6.58%
Cultural Thicket (CUT1, CUT1-1, CUT1-5, THDM2-6, THDM2-6/2-11))	26.1	4.27%
Cultural Woodland (CUW1)	4.0	0.65%
Cultural Plantation (CUP3, CUP3-12, CUP3-13, CUP3-14, CUP3-2)	9.3	1.52%
Forest, Deciduous (FOD, FOD3, FOD4, FOD5-4, FOD5-5, FOD7, FOD7-3, FOD7-3/7-7, FODM7-7)	21.1	3.45%
Marsh, Meadow (MAM, MAM2, MAM2-10, MAM2-2, MAMM1-12, MAMM1-2)	9.4	1.54%
Marsh, Shallow (MAS, MAS2-1)	0.6	0.10%
Shallow Aquatic, Floating-leaved (SAF_1-4, SAF1-3)	0.7	0.11%
Mixed Shallow Aquatic (SAM1-4)	0.1	0.02%
Shallow Aquatic (SA)	0.2	0.03%
Swamp, Deciduous (SWD, SWD4, SWD4-1)	5.0	0.82%
Swamp, Thicket (SWT, SWT2-2, SWT2-5, SWT2-5/DIST)	1.2	0.20%
Open Aquatic (OAO)	6.0	0.98%
Other (ANTH, DIST, Drain, Golf, HR, Orchard, RES, COM, Unclassified)	167.1	27.33%
Pond (POND)	0.1	0.02%

ELC mapping of the Study Area is shown on **Figure 3 (Appendix B1)**. The limits of the treed areas are defined by the feature staking that was completed on May 30, 31 and June 3, 2024 with the Town of Caledon by GEI and dripline was staked within Properties 9 and 10 by Beacon Environmental on October 18, 2022 with the TRCA. As previously discussed, one portion of the FOD3 community within Property 10 was not staked. This woodland limit should be delineated during the site-specific application.

The wetland limits within the Study Area were staked by GEI with the TRCA on July 4, 5 and 8, 2024. No wetland staking was completed within Properties 9 and 10 by Beacon Environmental given that the majority of these features are located well within the Tributary of the West Humber River corridor. This ELC mapping also incorporates the linework provided by Beacon Environmental for Properties 9 and 10 (as shown within Figure 3 of the NHE; **Appendix B3**).

A general description of each ELC type (excluding Properties 9 and 10) is provided in **Table 2 (Appendix B2)**. ELC communities found within Properties 9 and 10 are described within Section 4.2.1 of Beacon Environmental's NHE (**Appendix B3**). No provincially rare vegetation communities have been observed on the Study Area (NHIC 2021).

Minor refinements to internal ELC boundaries and ELC community types may occur following summer and fall botanical investigations. Any refinements will be included within subsequent reporting.

Vascular Flora

Results of the spring botanical inventory completed within the Study Area show a total of 125 species (i.e., taxa, inclusive of subspecies, varieties, and hybrids), except from Properties 9 and 10 which are summarized further below. Of these, 54% are native to Ontario and 46% are exotic. Most of the native plants (90%) are ranked S5 (secure in Ontario), five species (7%) are ranked S4 (apparently secure in Ontario), and two species are considered provincially rare (i.e., tracked by the NHIC). A preliminary list of species documented from the Study Area is provided in **Table 3 (Appendix B2)**. This list will be updated following the summer and fall botanical inventories.

Species at Risk Plants

SAR have an assigned designation (e.g., endangered) based on assessments by the Committee on the Status of Species at Risk in Ontario (COSSARO) and the Committee on the Status of Endangered Wildlife in Canada (COSEWIC). Species designated as extirpated, endangered or threatened are protected under section 9(1)(a) of the ESA (2007).

GEI field surveys confirmed the presence of one SAR plant on the Study Area:

- Butternut (*Juglans cinerea*; S2?; Endangered). Seventeen Butternut trees have been observed to-date within Properties 1 and 2. The majority of these Butternuts are located within the Greenbelt Plan Area. Based on the distributions and maturities observed, additional Butternut may be encountered during subsequent surveys. It is possible some of these Butternut are hybrid, in which case they would not be protected under the ESA (2007). Additional surveys will be required to confirm genetic purity, and (if pure), assess the health of the trees. This should be completed at the site-specific development stage.

An NHIC search was completed for the Study Area using the MNR Make a Map: Natural Heritage Areas mapping application. Based on MNR data, the following rare plants have been historically documented on or in the vicinity of the Study Area:

- Black Ash (*Fraxinus nigra*; S4, Endangered). This species grows in wetlands or wetland/upland transitional areas, often found in swamps and floodplains. Although the species was not observed during surveys, suitable habitat is present on the Study Area within deciduous swamps and lowland forests.

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).

GEI field surveys confirmed the presence of one provincially rare species on the Study Area (Property 1):

- Large Toothwort (*Cardamine maxima*; S3) – Approximately 30 specimens were observed as a single population, present within the FODM7-7 adjacent to the watercourse. Some taxonomists treat this species as a hybrid between Cut-Leaved Toothwort (*Cardamine concatenata*) and Two-Leaved Toothwort (*Cardamine diphylla*) – both of which were also observed in the vicinity of the Large Toothwort (*Cardamine maxima*; S3). However, the NHIC treats this as a distinct species and considers it provincially rare.

Locally Rare Plants

Local plant rarity is based on the number of population occurrences for a given area. For Peel Region, a plant is considered rare if it has 10 or fewer known occurrences, the data of which is derived primarily from historical checklists, MNR reports, site records, and herbaria records (Varga et al. 2005).

GEI field surveys confirmed the presence of four locally rare plants on the Study Area:

- Silky Dogwood (*Cornus obliqua*; R5) – Infrequent within a CUT1 on Property 1, bordering an open aquatic feature;
- Sandbar Willow (*Salix interior*; R5) – Infrequent within a MAM2 on Property 2;
- White Spruce (*Picea glauca*; R3) – Present on properties 1, 7, and 8. Typically a planted species within the Study Area; and
- Start Duckweed (*Lemna trisulca*; R4) – Infrequent within a MAM2-2 on Property 8.

Potentially Sensitive Plants

Potential sensitivity of native plants is determined based on coefficient of conservatism (CC) values, as assigned by Oldham et al. (1995). This CC value, ranging from 0 (low) to 10 (high), is based on a species tolerance of disturbance and/or 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.

GEI field surveys confirmed the presence of one potentially sensitive plant on the Study Area :

- Large Toothwort – Infrequent within the FODM7-7 on Property 1, adjacent to the watercourse.

Invasive Plants

Invasive plants are those that can become (or presently are) a serious problem within a defined location. These plants reproduce and spread aggressively, reducing the local biodiversity and threatening ecological function. Depending on existing conditions, some invasive species can outcompete all other species.

Urban Forest Associates (2002) provides a categorical ranking system for plants known to be invasive in southern Ontario. Of the 57 exotic species observed on the Study Area, 11 are ranked as Category 1 by Urban Forest Associates.

Category 1 plants are deemed to be the most invasive and can dominate a site indefinitely. These are a threat to natural areas wherever they occur because they have very effective reproduction and dispersal mechanisms. The 11 Category 1 plants observed on the Study Area are:

- Goutweed (*Aegopodium podagraria*) – present on Property 11;
- European Swallowwort (*Vincetoxicum rossicum;* also commonly referred to as Dog-strangling Vine) - present on Property 5;
- Canada Thistle (*Cirsium arvense*) – present on Properties 1, 2, and 11;
- European Black Alder (*Alnus glutinosa*) - present on Property 1;
- Showy Fly Honeysuckle (*Lonicera* x *bella*) – present on Properties 1, 2, 3, 4, 5, 7, 8, and 11;
- Garlic Mustard (*Alliaria petiolata*) – present on Properties 1, 2, 4, 6, 8, and 11;
- Dame's Rocket (*Hesperis matronalis*) – present on Properties 2, 8, and 11;
- Purple Loosestrife (*Lythrum salicaria*) – present on Properties 5, 8, and 11;
- European Buckthorn (*Rhamnus cathartica*) – present on Properties 1, 2, 4, 5, 6, 7, 8, and 11;
- Manitoba Maple (*Acer negundo*) – present on Properties 1, 2, 3, 4, 8, and 11; and
- European Reed (*Phragmites australis* ssp. *australis*) – present on Properties 1, 2, 5, and 11.

Properties 9 and 10 Results (Beacon Natural Heritage Evaluation 2024)

A brief summary of Section 4.2.3 of Beacon Environmental's NHE is provided below. The full NHE is provided within **Appendix B3**.

A total of 161 plants were recorded within Properties 9 and 10, of which 42% were non-native. No floral SAR or S1-S3 species were recorded. Seven locally rare species (L1 and L3 by the TRCA) were recorded within the FOD3, SWD3, CUW1 and SAM1-4 communities and ten locally rare species (Peel Region; Varga 2005) were recorded within the Pondweed Mixed Shallow Aquatic (SAM1-4), SWD3, CUW1, Anthropogenic (ANT) and CUM1-1 communities.

Birds

Winter Raptor Surveys

Potentially suitable ecosites were identified within the Study Area, with the majority of the potentially suitable ecosites being located within the Greenbelt Plan Area. No targeted winter raptor surveys were completed by Beacon Environmental; therefore, Properties 9 and 10 were also reviewed for the suitability of winter raptor habitat.

As previously discussed, no communities greater than 20 ha in size were identified within the tablelands of the participating properties, so it is GEI's opinion that no Raptor Wintering Area SWH is present within tablelands of the participating properties within the Study Area. Suitable habitat may be present within the Greenbelt Plan Area; therefore, it is assumed that the Greenbelt Plan Area may support winter raptors.

Although the size criteria were not met for this SWH type within the tablelands of the participating properties, the fieldwork was undertaken during one visit to the Study Area, as this level of effort has been requested by the Town of Caledon in neighboring areas for completeness.

A raptor survey was conducted on February 8, 2024, within the golf courses (Properties 1 and 9), cultural meadows, hayfields, and fallow lands within the participating boundaries of the Study Area. Row crop fields on agricultural lands outside the Study Area were surveyed from the roadsides of Bramalea and Torbram Roads by stopping at each land parcel and scanning in all directions for perched and flying raptors.

One area was identified as marginally suitable winter raptor habitat; however, it did not meet the minimum size criteria (<20 ha). The fallow agricultural field adjoining a farmstead on Property 2 and 3 along Bramalea Road was observed for at least 15 minutes and did not yield any observations of use by raptors.

Breeding Bird

A total of nineteen point count stations were completed by GEI within the Study Area. Within Properties 9 and 10, Beacon Environmental used area searches rather than point count stations to survey birds (see results below). Point count station locations are shown on **Figure 4** (**Appendix B1**). As previously discussed, no suitable grassland bird habitat was recorded during the first two breeding bird surveys; thus a third round was not warranted. All point count stations located within actively managed agricultural fields were used to listen into adjacent natural heritage features (which may occur within adjacent non-participating lands). Specifically, point count stations 14 and 15 are listening into the adjacent non-participating lands, point count station 19 was stationed to listen into the adjacent FOD5-4 community and point count station 18 was stationed at the edge of the valleyland to listen into the Greenbelt Plan Area.

GEI observed 63 bird species within the Study Area with breeding evidence. A list of bird species found by GEI in the Study Area vicinity (including areas within 120 m) is provided in **Table 4**, **Appendix B2**. Of this total, 14 species are confirmed, 35 are probable, and 12 are possible breeders on the Study Area. The remaining two bird species are considered non-breeders, flyovers, or migrants. No additional species were observed on surrounding lands within 120 m. The observed breeding bird species are discussed in the sections below.

A total of 61 (100%) of the confirmed, probable, or possible breeders are provincially ranked S5 (common and secure), S4 (apparently common and secure) or SNA (species not native to Ontario). No bird species are considered provincially rare (S1-S3; NHIC 2024). The following species are found in the SARO List:

- Bobolink - Threatened in Ontario: This species was recorded at PC1 (Property 3) and at PCs 14 and 15 (Property 4) during the first round. These species were not recorded again during second round. No suitable breeding habitat was identified within either property as both properties are actively managed agricultural fields;

- Eastern Meadowlark - Threatened in Ontario: This species was recorded at PC6 (Property 1) during both rounds of surveys, and at PCs 14 and 15 (Property 4) during round 1 survey. Property 1 is an actively managed golf course with a smaller cultural meadow that is not considered large enough to support breeding habitat. Property 4 is an actively managed agricultural field that does not provide suitable breeding habitat;
- Wood Thrush - Special Concern in Ontario: This species was recorded during first round at PC 4 (Property 1). Possible breeding habitat was noted within the West Humber River valleyland; although this species was not recorded again during second round surveys;
- Eastern Wood Pewee - Special Concern in Ontario: This species was recorded at once at PC 2 (Property 2) and PC 4 (Property 1) during the first round surveys, and was recorded at PC 5 (Property 1) and PC 19 (Property 6) during both rounds. It is assumed that the West Humber River valleyland and the isolated woodland within Property 6 provide suitable breeding habitat; and
- Barn Swallow -Special Concern in Ontario: This species was documented nesting within two shipping containers within Property 1. No other evidence of breeding was recorded within any other structures during the breeding bird surveys.

The following locally rare species (L1-L3) were documented within the Study Area:

- Horned Lark (*Eremophila alpestris)*(L3) - located at PCs 13 and 14 (Property 4), PC 16 (Property 7), PC 18 (Property 11) and PC 19 (Property 6);
- Brown Thrasher (*Toxostoma rufum)* (L3) - located at PC 19 (Property 6).Vesper Sparrow (*Pooecetes gramineus*) (L3) - located at PC 9 (Property 1) and PC 19 (Property 6);
- Eastern Towhee (*Pipilo erythrophthalmus*) (L3) - located at PC5 (Property 1); and
- American Redstart (*Setophaga ruticilla*) (L3) - located at PC 3 (Property 2), PCs 5 and 11 (Property 1) and PC 18 (Property 11).

Northern Harrier (L2) was also incidentally recorded outside of the Study Area.

Properties 9 and 10 Results (Beacon Natural Heritage Evaluation 2024)

A summary of Section 4.2.4 of Beacon Environmental's NHE is provided below. The full NHE is provided within **Appendix B3**.

Most birds recorded were either L4 or L5. However, there were some L3 species (species of conservation concern) documented within the properties including American Redstart, Brown Thrasher, Bobolink, Eastern Meadowlark, Eastern Towhee, Least Flycatcher (*Empidonax minimus*), Vesper Sparrow and Wild Turkey (*Meleagris gallopavo*).

Four SAR were identified within the properties: two Threatened, Eastern Meadowlark andBobolink, and two Special Concern, Eastern Wood-Pewee and Barn Swallow.

Herpetofauna

According to the Ontario Reptile and Amphibian Atlas (Ontario Nature 2020), 22 species of herpetofauna are reported within the 10 km square overlapping with the Study Area. During field surveys, the presence of six species were confirmed within the Study Area including: Midland Painted Turtle (*Chrysemys picta marginata*), Snapping Turtle, American Toad (*Anaxyrus americanus*), Gray Treefrog (*Hyla versicolor*), Northern Green Frog (*Lithobates clamitans melanota*), and Wood Frog (*Lithobates sylvaticus*). The results of species-specific surveys are detailed below.

Snakes

Two visual encounter survey locations were identified during the structure screening near barns with older foundations. These locations are shown on **Figure 5** (**Appendix B1**). However, more generally, this survey type was completed for the entire Study Area incidentally during other survey efforts, including Properties 9 and 10.

No snakes were observed during any of the targeted field visits. One incidental Eastern Garternsnake (*Thamnophis sirtalis sirtalis*) was recorded along the southern woodland limit on Property 10 within an actively managed agricultural field. Given the timing of the observation (end of May and outside of the ideal emergence window) it is likely that it was foraging at the time of observation. This species observation was also not located near any structures or areas where access below the frost line had been noted.

Within Section 4.2.7 of Beacon Environmental's NHE (2024) it is noted that two snake species were incidentally observed: Eastern Gartersnake and Dekay's Brownsnake (*Storeria dekayi)*.

Turtles

Twelve turtle basking stations were surveyed within the Study Area, of which seven stations were completed by GEI and five stations were completed by Beacon Environmental on Properties 9 and 10. Turtle basking stations are shown on **Figure 5** (**Appendix B1).**

Two turtle species were observed during targeted basking surveys, Midland Painted Turtle and Snapping Turtle and all turtle observations were made within Property 1. Like many Golf Courses, Property 1 is assumed to support the life cycles of both Midland Painted and Snapping Turtles based on the high numbers of turtles observed basking. Additionally, as BS3 through to BS7 are located within the active golf course, suitable nesting habitat is assumed to be present (e.g., sand traps, mowed lawn etc.). Both species were incidentally recorded nesting within sand traps. One Snapping turtle was also incidentally found near BS1 during the wetland pre-staking exercises. The Snapping Turtle was buried into the mud within the watercourse. One Snapping turtle was also incidentally found near BS1 during the wetland pre-staking exercises. The Snapping Turtle was buried into the mud within the watercourse. No other turtle observations were noted within the Study Area.

Survey results are summarized within **Table 5** (**Appendix B2**). The features identified with the most suitable turtle habitat are summarized below:

- BS4: The highest number of observations within this feature was 14 individuals (13 Midland Painted Turtles and 1 Snapping Turtle). In a natural pond, this would meet the threshold of significance, however, as this feature is a created golf course pond, it is not considered significant;
- BS5: The highest number of observations within this feature was 16 individuals (15 Midland Painted Turtles and 1 Snapping Turtle). In a natural pond, this would meet the threshold of significance, however, as this feature is a created golf course pond, it is not considered significant; and
- BS7: The highest number of observations within this feature was 69 individuals (65 Midland Painted Turtles and 4 Snapping Turtle). In a natural pond, this would meet the threshold of significance, however, as this feature is a created golf course pond, it is not considered significant.

One Snapping Turtle was also incidentally found near BS1 during the wetland pre-staking exercises. The Snapping Turtle was buried into the mud within the watercourse.

A review of turtle nesting suitability was also completed. As previously noted, the best nesting habitat was located within the golf courses (Properties 1 and 9) within man-made sand traps. Other areas within the Study Area did not appear to provide high quality nesting habitat that would result in successful nesting activities (e.g., actively managed agricultural fields). Road shoulders would not be considered significant nesting habitat.

Properties 9 and 10 Results (Beacon Natural Heritage Evaluation 2024)

A brief summary of Section 4.2.6 of Beacon Environmental's NHE is provided below. The full NHE is provided within **Appendix B3**.

Basking surveys took place throughout wetland and pond features on the Study Area, totaling five basking stations between Properties 9 and 10. Two species were recorded: Midland Painted Turtle and Snapping Turtle (see Table 4 within the NHE). Adults and younger individuals of both species were observed.

Beacon identified potential suitability for turtle nesting within the NHE.

Anurans (Frogs and Toads)

A total of forty amphibian call count stations were completed within the Study Area, of which thirty-three stations were completed by GEI and seven stations were completed by Beacon Environmental within Properties 9 and 10. Call count station locations are shown on **Figure 6**, **Appendix B1**.

Similar to the breeding bird surveys, some stations were positioned within actively managed agricultural fields to listen into adjacent features, some of which are located on non-participating properties (e.g., amphibian call count stations 1, 2, 4 and 9).

During breeding amphibian call count surveys, four species were recorded: American Toad, Gray Treefrog, Green Frog, and Wood Frog. The results of the monitoring are shown in **Table 6**, **Appendix B2**. The features identified with the most suitable turtle habitat are summarized below:

- AMC11: This station had moderate amphibian breeding habitat. Three species were recorded, with the number falling below the threshold of 20 individuals;
- AMC16: This station had moderate to high amphibian breeding habitat. Three species were recorded, with the highest number being twelve Green Frog, however, the number of individuals falls below the threshold of 20 individuals. This station was located within the tributary to the West Humber River;
- AMC28: This station had moderate to high amphibian breeding habitat. Two species were recorded, with the highest number being a full chorus of Green Frog. As shown in **Table 6** (**Appendix B2**), three Wood Frog were observed during the third-round surveys, these were recently metamorphosized juveniles that appeared to have just started to move to their summer upland habitat. It should be noted that Wood Frog were not recorded calling during round one, and therefore, the adults observed were recorded during the third round. In a natural pond, this would meet the threshold of significance, however, as this feature is supported on an active golf course, it is not considered significant; and
- AMC30: This station had moderate to high amphibian breeding habitat. Three species were recorded, with the highest number being seven Green Frog, however, the number of individuals falls below the threshold of 20 individuals.

American Toad toadlets were also incidentally recorded during the wetland staking at Property 6.

Properties 9 and 10 Results (Beacon Natural Heritage Evaluation 2024)

A brief summary of Section 4.2.5 of Beacon Environmental's NHE is provided below. The full NHE is provided within **Appendix B3**.

Vocalizations of four species were recorded within the Study Area: Wood Frog, Green Frog, Gray Treefrog and American Toad. Low call abundances were recorded at each station. Additionally, Northern Leopard Frogs (*Lithobates pipiens*) were observed visually within the property. None of the frog species observed were of provincial or global concern (S5 & G5).

Bats

Bat Habitat Assessments

Bat habitat assessments are used to determine whether identified features are to be considered candidate SWH, or if the habitat provides conditions favourable for SAR bats. The presence of snags is considered an indicator of high-quality bat maternity roost habitat, and these surveys are required as the first step in confirming presence of bat maternity colony SWH (as per the PPS). Snags may also indicate the presence of high-quality SAR bat habitat.

As discussed in **Section 3.1.2**, the majority of treed features within the Study Area are contained within the Greenbelt Plan Area. The forested ecosites within the Greenbelt Plan Area are assumed to provide suitable habitat for both bat maternity SWH and SAR bat habitat due to their classification as forest ELC communities (e.g., CUW, FOD, SWD) and their connectivity within the landscape.

All treed vegetation communities outside of the Greenbelt Plan Area were assessed in the field for the presence of bat habitat, including all hedgerows. One forest community straddles two properties (Properties 6 and 11), one of which the centre property between the two is non-participating; therefore, only the portion accessible from the participating landowner's site was assessed.

The location of candidate snags are identified within **Figure 7** (**Appendix B1**).

The results of the qualitative assessment are presented in **Table 7** (**Appendix B2**).

With respect to bat maternity colony SWH, only Polygon N (associated with the FODM7-7 vegetation community on Property 1) meets the density to be considered candidate SWH minimum density criteria for significance (>10 suitable roosting trees/ha). Both Polygon B and O (associated with HR vegetation communities within Property 1) meet the density to be considered candidate SWH, however, these vegetation communities are not considered habitat under SWH guidelines based on their ELC ecosite code (MNRF 2015). All other surveyed areas did not meet the requirements to support bat SWH.

The presence of suitable snags within the surveyed vegetation communities suggests that there is candidate habitat for SAR bat habitat within the Study Area. Acoustic monitoring was recommended to confirm presence/absence of these species to inform requirements under the Endangered Species Act. These acoustic results are summarized further below.

Properties 9 and 10 Results (Beacon Environmental Natural Heritage Evaluation 2024)

A brief summary of Sections 4.3-4.4 of Beacon Environmental NHE is provided below. The full NHE is provided within **Appendix B3**.

A desktop assessment of potential bat habitat was performed for the Study Area and concluded that there was the potential for suitable SAR bat roosting habitat and bat maternity colony SWH in woodland communities. However, no studies or surveys were performed to inventory treed features for snags.

As such, the bat habitat assessment conducted by GEI was used to inform the bat acoustic monitoring survey stations for the entire Study Area, including properties 9 and 10.

Bat Acoustic Monitoring

A total of 15 bat acoustic recorders were deployed throughout the Study Area (as shown on **Figure 7**, **Appendix B1**).

Six bat species were confirmed to be present within the woodlands: Big Brown Bat , Silver-haired Bat , Hoary Bat , Eastern Red Bat , Eastern Small-footed Myotis , and Little Brown Myotis . During 150 detector evenings of acoustic surveys, a total of 4,999 calls were recorded.

Of the 3,464 calls that were identifiable to species, 1,021 were Big Brown Bat, 908 were Silver-haired Bat, 1,408 were Hoary Bat, 49 were Eastern Red Bat, 65 were Eastern Small-footed Myotis, and 13 were Little Brown Myotis (**Table 8**, **Appendix B2**). An additional 897 calls with Myotis characteristics (i.e., calls with frequencies greater than 40 kHz) were recorded on the Study Area.

The Little Brown Myotis, and Eastern Small-footed Myotis are listed as Endangered on the SARO List. A total of two recordings of Eastern Small-footed Myotis were detected at station MTLOG-A (found on Property 1), 22 recordings at station MTLOG-D (found on Property 4), 2 recordings at station MTLOG-E (found on Property 1), 23 recordings at station MTLOG-F (found on Property 1), and 16 recordings at station MTLOG-J (found on Property 7). A total of 7 recordings of Little Brown bat were detected at station MTLOG-D (found on Property 4), two recordings at station MTLOG-F (found on Property 1), and four recordings at station MTLOG-J (found on Property 7). These are relatively low call abundances and while numbers of calls recorded do not necessarily correspond to numbers of individuals, it can be assumed the overall abundance of each species is low given that these calls were recorded over ten consecutive evenings.

This survey was completed for the entire Study Area, including Properties 9 and 10.

Monarch

This survey has not been completed at the time of preparing this report. Results from this survey will be included within subsequent reports.

Incidental Wildlife Observations

All incidental wildlife observations are included within the Master Wildlife Table (**Table 9**, **Appendix B2**). All incidental wildlife observations are common and secure or apparently common and secure species (S5 or S4).

One terrestrial crayfish was documented within an actively managed agricultural field on Property 5. No evidence of wetland habitat was found within the immediate vicinity of the chimney.

American Mink (*Neovison vison*) wasrecorded within the Greenbelt Plan Area during ecological inventories.

Finally, incidental observations of Snapping Turtle, Bobolink, Eastern Meadowlark, Eastern Wood-Pewee, Eastern Gartersnake, and Beaver *(Castor canadensis)* were recorded during feature staking activities within the Study Area.

3.1.3.2 Aquatic Habitats

Headwater Drainage Feature Assessment

HDFs are ill-defined, non-permanently flowing drainage features that may not have defined beds and banks. 26 features (totaling 65 total reaches, of which 50 were identified by GEI and 15 were identified by Beacon Environmental) of the West Humber River were identified within the Study Area (**Figure 8, Appendix B1**).

All features are discussed in the following sections. The resulting HDFA management recommendations are discussed below based on the preliminary field results. These management recommendations will be updated following the completion of the summer assessment (third round). A summary of the HDFA classifications and management recommendations for each reach is provided in **Table 10** (**Appendix B2**).

Management recommendations for all HDFs were decided upon utilizing Part Three of the HDFA Guidelines (CVC and TRCA 2014) and based on GEI's technical experience with similar features (e.g., agriculturally influenced drainage features). Given that the third round HDFA had not been completed at the time of completing the initial assessment of management recommendations, some assumptions have been made. All management recommendations will be reviewed and revised, as necessary, following the completion of the third (summer) visit. Updates to the management recommendations will be provided within subsequent submissions.

This section of the HDFA Guidelines provides guidance in linking the habitat classification information with the proposed management approach for each HDF. The HDFA Guidelines and information collected from the surveys were utilized to determine management recommendations. All HDF reaches are depicted in **Figure 8** (**Appendix B1**).

It is important to acknowledge that as with any guidelines, the HDFA Guidelines are intended to have flexibility to best reflect additional considerations regarding the site-specific nature of features, such as historical straightening for agricultural purposes, impairment related to surrounding agriculture, the replication of Redside Dace contributing habitat functions and compatibility with land uses. As such, there are situations where recommendations are made for an alternative management recommendation based on site specific understanding of these additional factors. Where recommendations vary from the HDFA Guideline, additional rationale is provided. All management recommendations are based off of GEI's technical experience.

The application of the HDFA Guidelines to existing site conditions results in recommendation for protection, conservation, mitigation, or no management. Strict application of the HDFA Guidelines to certain HDFs that have upstream wetlands would result in management recommendations of protection. HDFs that are contributing habitat for Redside Dace would have a management recommendation of Conservation or Protection. Recognizing the agricultural impacts on some of the HDFs, including straightening and impairment (i.e., siltation due to the ploughing up to the edge of the feature and pollution due to fertilizers), as well as lack of riparian habitat, these features may be proposed for realignment and/or compensation with replication of their functions expected to be achieved through natural channel design. Additional discussions with MECP will be required to alter any contributing Redside Dace habitat. This should occur at the site-specific stage.

Feature Analysis

All HDFs identified within the Study Area are associated with the West Humber River and its tributaries. No HDFs were identified connecting into Campbell's Cross Creek (located in the southeast corner of the Study Area).

HDFs H1 – H6 were flowing at the time of the Round 1 assessment but were completely dry by the time of the second survey. These ephemeral features were generally characterized as erosional swales across an active agricultural landscape. HDFS H1-H5 appear to have been agriculturally influenced and could be classified as furrows; however, since they are not located along the edge of agricultural fields and appear to generally follow historical flow paths they have been identified as HDFs. Agricultural furrows are typically not classified under the HDFA Guidelines. These features demonstrated a complete lack of riparian or terrestrial vegetation. The seasonal flow conveyed by these features represents contributing fish habitat to occupied reaches downstream, but at no time during the year provides direct habitat to any fish species. This is further discussed below within the fish community sampling section.

HDF H7-S1 was characterized as a poorly defined drainage swale, which contained within a narrow band of CUM1-1 community. H7-S1 receives ephemeral flow from erosional swales within the adjacent agricultural field. The feature flows onto the non-participating property to the south, before entering the roadside ditch and being piped beneath Bramalea Road. HDF H7-S1 was flowing during Round 1 but was completely dry during the Round 2 assessment.

HDF H8 conveys flow across the southern half of the overall Study Area. The feature is comprised primarily of erosional swales across active agricultural fields, connecting narrow bands of isolated wetlands and one forest community. HDF H8 is largely ephemeral. All channel reaches along H8 were flowing at the time of the Round 1 assessment. During Round 2, standing water was noted at the culvert beneath Bramalea Road, while all channel reaches upstream of that location were dry. Downstream of Bramalea Road, H8 held stagnant water, isolated between areas of total dryness along the channel. H8 represents contributing fish habitat to occupied reaches downstream. The wetlands along the channel corridor provide limited function, existing as narrow and isolated bands across a heavily farmed landscape. No calling amphibians were present within the wetland features. Channel definition is very poor along most reaches, characterized by an overall absence of vegetation and lack of sinuosity across the Study Area. It is acknowledged that a small portion near the forested community is slightly more defined; but then becomes undefined downstream of the woodlot. This is likely as a result of ongoing agricultural management and a convergence of tile-drain outlets. This is further discussed within the stream morphology section (**Section 3.2.2**).

HDF H8A connects to H8-S1 towards the southern limit of the Study Area. This feature provides ephemeral flow through erosional swales across an actively farmed agricultural field. At its northernmost limit, H8A receives seasonal flow from Property 10, which is summarized as part of Beacon Environmental's analysis below.

HDFs H9 and H10 were flowing during the first-round assessment but were completely dry by the time of the second survey. These ephemeral features were generally characterized as erosional swales across an active agricultural landscape. These features demonstrate a complete lack of riparian or terrestrial vegetation, elevated on tablelands well above the West Himber River corridor. The features contribute ephemeral flow to the occupied reaches of the main tributary but do not represent direct habitat.

A total of fifteen reaches were identified on Properties 9 and 10. These features were evaluated by Beacon Environmental under a separate scope of work and are further described in the next section of the SWS. HDFs H18 to H20 were identified as contributing flow to the features on Properties 9 and 10. The portions of these features which fell outside of the boundary of Properties 9 and 10 were evaluated by GEI staff. All identified features were characterized as erosional swales across active agricultural fields. These features displayed a complete lack of riparian or terrestrial vegetation and were dry or holding standing water at the time of the Round 2 assessment. H19-S1 was characterized by the same ephemeral flow regime but exists within a narrow wetland corridor. H19-S1 was flowing during both initial rounds of assessment. No calling amphibians were present within H19-S1. HDFs H18 to H20 were all non-navigable by fish and identified as contributing habitat.

HDFs H21 and H22 flowed into the valley, as opposed to connecting with the golf course (Property 9), but displayed the same general characteristics as HDFs H18 and H20.

HDF H23-S1 is an artificially created golf course hazard. The feature is characterized as a channelized pool, hardened along all sides with armor stone. Stacked armor stones block the connection to the adjacent golf course pond, however, gaps in the stone allow for the transfer of water across the barrier. The feature is highly manipulated as part of the golf course landscaping, lined with an artificial barrier designed to hold water. Calling amphibians were identified at this feature during AMC3 (**Table 6**, **Appendix B2)**.

HDF H24-S1 is characterized as a poorly defined drainage swale along the edge of a European Reed community. This European Stand was not identified as a wetland by the TRCA during the feature staking event given the absence of hydric soils. The drainage feature connects overland to the adjacent golf course pond across a golf cart path. H24 was flowing at the time of the Round 1 assessment and held stagnant water at the time of Round 2. This feature is not navigable by fish and represents contributing fish habitat.

H25-S1 is characterized as a highly channelized, dug swale along the western boundary of the golf course. In an agricultural setting this would be identified as a furrow as the primary function appears to convey drainage off the landscape quickly. As per the HDFA Guidelines, furrows are not typically included as features; however, this was mapped since it was noted by the Town during feature staking. This artificially created linear feature appears designed to convey overland flow away from the operable areas of the golf course and into the valley. H25 is bordered along its western bank by mature forest communities, and its eastern bank by a combination of fairways and cart paths. H25 was flowing at the time of the Round 1 assessment and held stagnant water at the time of Round 2. This feature is not navigable by fish and represents contributing fish habitat.

H26-S1 is a buried drainage pipe which conveys seasonal flow into the valley. The corrugated plastic pipe is buried along a narrow band of CUM1-1 along the active golf course. H26 was flowing at the time of the Round 1 assessment and held stagnant water at the time of Round 2. This feature is not navigable by fish and represents contributing fish habitat.

Preliminary Management Recommendations

Part 2 of the HDFA Guidelines provides an approach to classify HDFs 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 10** (**Appendix B2**) highlights the key components of this analysis based on the two rounds of HDFA completed and will be updated following the third (summer) assessment.

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 HDF 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 the Study Area (as identified in the final column of **Table 10, Appendix B2**).

The resulting management recommendations for each reach, along with the recommended management approaches for each management classification (from the HDFA Guidelines), is as follows:

- Protection (No Reaches within the Study Area)
    - Protect and/or enhance the existing feature and its riparian zone corridor, and groundwater discharge or wetland in-situ;
    - Maintain hydroperiod;
    - Incorporate shallow groundwater and base flow protection techniques such as infiltration treatment;
    - Use natural channel design techniques or wetland design to restore and enhance existing habitat features, if necessary; realignment generally not permitted; and
    - Design and locate the stormwater management system (e.g. extended detention outfalls) to avoid impacts (i.e. sediment, temperature) to the feature.
- Conservation (No Reaches within the Study Area)
    - Maintain, relocate and/or enhance drainage feature and its riparian corridor zone;
    - If catchment drainage had been previously removed or will be removed due to diversion of stormwater flows, restore lost functions through enhanced lot level controls (i.e. restore original catchment using clean roof drainage), as feasible;
    - Maintain or replace on-site flows using mitigation measures and/or wetland creation, if necessary;
    - Maintain or replace external flows;
    - Use natural channel design techniques to maintain or enhance overall productivity of the reach; and/or
    - Drainage feature must connect to downstream.
- Mitigation (H1-S1, H2-S1, H3-S1, H4-S1, H5-S1, H6-S1, H7-S1, H7A-S1, H7B-S1, H7-S2, H7-S3, H8-S1, H8A-S1, H8A1-S1, H8B-S1, H8C-S1, H8-S2, H8A-S2, H8-S3, H8-S4, H8-S5, H8-S6, H8-S7, H8-S8, H8-S9, H8-S10, H8-S11, H9-S1, H9A-S1, H9B-S1, H10-S1, H11-S1, H18-S1, H18A-S1, H18A1-S1, H19-S1, H19A-S1, H19B-S1, H19C-S1, H19D-S1, H19-S2, H19A-S2, H20-S1, H21-S1, H22-S1, H22A-S1, H23-S1, H24-S1, H25-S1, and H26-S1)

- Replicate or enhance functions through enhanced lot level conveyance measures, such as well-vegetated swales (herbaceous, shrub and tree material) to mimic online wet vegetation pockets or replicate through constructed wetland features connected to downstream;
- Replicate on-site flow and outlet flows at the top end of system to maintain feature functions with vegetated swales, bioswales etc. If catchment drainage has been previously removed due to diversion of stormwater flows, restore lost functions through enhanced lot level controls (i.e., restore original catchment using clean roof drainage); and
- Replication functions by lot level conveyance measures (e.g. vegetated swales) connected to the NHS, as feasible and/or Low Impact Development (LID) stormwater options.

- Recharge Protection (No Reaches within the Study Area)
  - Maintain overall water balance by providing mitigation measures to infiltrate clean stormwater, unless the area qualifies as an Area of High Aquifer Vulnerability under the Oak Ridges Moraine Conservation Plan or Significant Recharge Areas under the Source Water Protection Act. These areas will be subject to specific policies under their respective legislation; and
  - Terrestrial features may need to be assessed separately through an Environmental Impact Study to determine whether there are other terrestrial functions associated with them.
- Maintain or Replicate Terrestrial Linkage (No Reaches within the Study Area)
  - Maintain the corridor between the other features through in-situ protection or if the other features require protection, replicate and enhance the corridor elsewhere; and
  - If the feature is wider than 20 m, it may need to be assessed separately through an Environmental Impact Study to determine whether there are other terrestrial functions associated with it.
- No Management Required (No Reaches within the Study Area)
  - Confirmed that there is no feature and/or functions associated with HDFs and/or there is no connection downstream. These features are generally characterized by lack of flow, evidence of cultivation, furrowing, presence of a seasonal crop and lack of natural vegetation. No management recommendations required. Specific implementation techniques to replicate functions should be determined at the site specific stage and may include traditional storm sewers and/or LID measures.

<u>Properties 9 and 10 Results (Beacon Environmental Natural Heritage Evaluation 2024)</u>

A brief summary of Section 4.1.3.1 of Beacon Environmental's NHE is provided below. The full NHE is provided within **Appendix B3**.

Twelve features were identified within the property. Table 2 (Beacon Environmental NHE, 2024) provides full descriptions and further discussion of the recommended management strategies. A brief summary of Beacon's management recommendations is provided below:

- HDFs 1, 2, 4A, 4B,5, 6, 7, 11 and 12 were assigned a management recommendations of No Management;
- HDFs 3B, 8 and 10 were assigned a management recommendation of Mitigation;
- HDFs 3A and 4C were assigned a management recommendation of Conservation; and
- HDF 3C was assigned a management recommendation of Protection.

Based on GEI's interpretation of upstream reaches, the management recommendations for HDFs 1, 4A and 4B should be updated from No Management to Mitigation. At the time of Beacon's assessment, HDFs 1, 4A and 4B did not have any flowing water during early spring assessments, which aligns with the No Management Required management recommendation. However, since GEI has evaluated upstream reaches (HDFs H18 and 20) as flowing during early spring assessments, this will adjust the management recommendations of the downstream reaches. The change in hydrology associated with the same feature is representative of the seasonal changes in freshet conditions in ephemeral features.

Aquatic Habitat Assessment

This survey has not been completed at the time of preparing this report. Results from this survey will be included within subsequent reports.

Fish Community Sampling

Two fish community sampling visits have been/will be completed: once within the spring and once within the summer. At the time of preparing this report, only spring sampling has been completed. Results from the summer sampling will be included within subsequent reports.

Fish community sampling was completed within all HDFs (HDFs shown on **Figure 8**, **Appendix B1**) to determine if any of these features were providing seasonal fish habitat to the local fish community. No fish were collected within these drainage features.

Properties 9 and 10 Results (Beacon Environmental Natural Heritage Evaluation 2024)

A brief summary of Section 4.1.4 of Beacon Environmental's NHE is provided below. The full NHE is provided within **Appendix B3**.

No fish community sampling was completed within Properties 9 and 10; rather, a review of the FMP was completed. Beacon suggests that the three ponds (identified as Ponds A, B and C within their report) may support fish populations; however, protection prohibitions of the Fisheries Act does not apply to certain "prescribed waterbodies", including artificial waterbodies that are not connected to a waterbody that contains fish at any time of year. Beacon notes that these ponds have been anthropogenically altered to support golf course management.

Ponds A and C are likely to contain fish as they are either partially or fully within the floodplain of the Tributary of the West Humber; whereas, Pond B would not be connected to a waterbody with fish. As a result, Ponds A and C are identified as fish habitat; whereas, Pond B is not.

3.1.4 Significance and Sensitivity

This section provides an overview of the important natural heritage features in the Study Area and an analysis of policies related to these features. This information, informed through a review of available background information, as well as results of field surveys of aquatic and terrestrial habitats, has been used to identify the boundaries of natural environment resources in the Study Area. The preliminary NHS is defined further within Section 4 of the SWS. Within Section 4, setbacks/buffers/VPZs are recommended in accordance with local and provincial policies.

Analysis of the significance and sensitivity of existing natural features has been used to identify those features and habitats that are sensitive to disturbance and those that have been previously disturbed, impacted, or contain no natural features. Results of this analysis are intended to protect or manage the form and function of the natural heritage features in a NHS as appropriate, in order to protect or manage these from future development impacts.

Eight types of natural features are identified in the PPS (MMAH 2020):

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

The presence/absence of these natural features within the Study Area are discussed in the subsequent sections below. The NHRM (MNR 2010), the Greenbelt Plan (2017), Town of Caledon's OP (2024 Consolidation), Future Caledon OP (Draft, 2024), Peel Region's OP (2022) and TRCA O. Reg. 41/24 were referenced to assess the potential significance of other natural features, and their associated forms and functions on the landscape.

Based on a desktop review of background information as well as municipal, regional and provincial policy documents, the following environmental constraints have been identified, and have informed the proposed NHS for the Study Area. These features and their associated buffers are identified on **Figures 9A – D (Appendix B1**).

3.1.4.1 Significant Wetlands

As shown within Figure DA2-8B (Wetlands Components of the Preliminary Natural Heritage System) of the SABE Phase 2 Report (Appendix E), Key and Supporting Wetland Features are identified within the Study Area. Key Wetland Features are located within the Greenbelt Plan Areas, while the Supporting Wetland Features are located on the tablelands of Property 1 and associated with a golf course pond on Property 9. This information presented within the SABE was based on desktop information, and through detailed field studies completed as part of this SWS, these areas have been confirmed as present or absent and their limits have been identified based on site specific information, where access was permitted.

Within Ontario, significant wetlands are identified by the MNR or by their designates. Other evaluated or unevaluated wetlands may be identified for conservation by the municipality or the conservation authority. Two unevaluated wetlands identified in the LIO Natural Heritage Areas map overlap with the Study Area; these are located within the Greenbelt Plan Area.

An evaluation was completed by GEI's Ontario Wetland Evaluator following the Ontario Wetland Evaluation System (2022) to determine whether any PSWs may be present within the Study Area. All wetlands located within the Greenbelt Plan Area are considered candidate PSWs and were not evaluated. All wetlands located outside of the Greenbelt Plan Area and within the tablelands of the Study Area are evaluated below.

Candidate PSW wetlands (which are located within the Greenbelt Plan Area include:

- Meadow Marsh (MAM);
- Mineral Meadow Marsh (MAM2);
- Reed-canary Mineral Meadow Marsh (MAM2-2);
- Forb Mineral Meadow Marsh (MAM2-10);
- Cattail Mineral Shallow Marsh (MAS2-1);
- Duckweed Floating-leaved Shallow Aquatic (SAF1-3);
- Pondweed Floating-leaved Shallow Aquatic (SAF_1-4);
- Pondweed Mixed Shallow Aquatic (SAM1-4);
- Deciduous Swamp (SWD);
- Mineral Deciduous Swamp (SWD4);
- Willow Mineral Deciduous Swamp (SWD4-1);
- Thicket Swamp (SWT);
- Willow Mineral Thicket Swamp (SWT2-2); and
- Red-osier Dogwood Mineral Thicket Swamp (SWT2-5).

Candidate PSWs are illustrated on **Figure 9A** (**Appendix B1**).

OWES Evaluation

Wetland size must be considered when determining if a full OWES is appropriate. As per the OWES (2022), wetlands smaller than 2 ha are generally not evaluated. However, very small wetlands can provide habitat for wildlife or serve other ecological, hydrological, hydrogeological or social functions and; therefore, a wetland smaller than 2 ha can undergo a full wetland evaluation provided that the rationale for doing so is provided.

All the unevaluated, individual wetlands within the Study Area (and located outside of the Greenbelt Plan Area) are less than 2 ha. Since the OWES does not provide a defined set of criteria for rationalizing a full evaluation of a wetland smaller than 2 ha, GEI has developed a standardized approach that is consistent and gives consideration to each of the four main components of OWES: Biological, Social, Hydrological, and Special Features. This approach is based on the logic that high scoring OWES attributes within each of the four main components represent features/functions that are of greatest importance. Wetlands having such features are therefore deemed to have greater value relative to other wetlands, thereby warranting a full evaluation. Presence of these attributes does not necessarily mean the wetland will be provincially significant, but rather that rationale exists for a full evaluation. Therefore, for unevaluated wetland units smaller than 2 ha, GEI first determined if rationale existed to warrant a full evaluation.

GEI used flora and fauna field data collected during the spring of 2024 to inform this screening exercise for all properties other than Properties 9 and 10; evaluation of wetland communities on these properties is deferred to the results from the NHE prepared by Beacon Environmental (**Appendix B3**). As additional field information becomes available, these wetlands will be re-evaluated within the subsequent report. Nine wetlands were screened for evaluation rationale; these wetlands were all located within the tablelands of the Study Area. As previously discussed, wetlands occurring within the Greenbelt Plan Area or on non-participating properties were not reviewed. Based on current data, none of the nine wetlands had rationale for doing a full evaluation. Although these wetlands would then be considered non-significant (based on these preliminary findings), they would technically retain the title of “unevaluated” under MNR’s naming convention. These screening tables will be updated as new field data becomes available.

Non-Significant (“Unevaluated”) Wetlands

The following non-significant wetlands were identified within the Study Area:

- Reed-canary Mineral Meadow Marsh (MAM2-2);
- Forb Mineral Meadow Marsh (MAM2-10);
- Common Reed Graminoid Mineral Meadow Marsh (MAMM1-12’);
- Cattail Graminoid Mineral Meadow Marsh (MAMM1-2);
- Cattail Mineral Shallow Marsh (MAS2-1);
- Red-osier Dogwood Mineral Thicket Swamp (SWT2-5); and
- Duckweed Floating-leaved Shallow Aquatic (SAF1-3).

Non-significant wetlands are illustrated on **Figure 9A** (**Appendix B1**).

3.1.4.2 Significant Coastal Wetlands

Similar to significant wetlands, the MNR or their designates identify significant coastal wetlands present on the landscape. 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 or adjacent to the Study Area and would not be expected given the distance of the Study Area from the waterbodies noted above.

3.1.4.3 Significant Woodlands

As shown within Figure DA2-8A (Woodlands Components of the Preliminary Natural Heritage System) of the SABE Phase 2 Report (Appendix E), Key, Supporting and Other Woodland Features are identified within the Study Area. Key Woodland Features are associated with the Greenbelt Plan Area. Supporting Woodland Features are associated with the FOD5-4 that borders Properties 6 and 11, as well as the CUP3-14 communities on Property 4. One other Supporting Woodland Feature was identified on Property 1; however, this appears to be associated with a CUM and Orchard community. Finally, three Other Woodland Features were identified within Properties 1, 9 and 11. The Other Woodland Features within Properties 9 and 11 are located within the Greenbelt Plan Area and appear to be associated with thicket/hedgerow communities. The Other Woodland Feature within Property 1 is located within the tableland and appears to be associated with a hedgerow. This information presented within the SABE has been further studied and identified based on site specific information.

Significant woodlands are identified by the planning authority in consideration of criteria established by the MNR. Under the Natural Heritage Reference Manual (MNR; 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."*

Woodlands, as defined by the RPOP, include woodlots, cultural woodlands, cultural savannahs, plantations and forested areas and may also contain remnant of old growth forests. They further define woodlands as any area greater than 0.5 ha that has:

a) *A tree crown cover of over 60% of ground, determinable from aerial photography, or;*

b) *A tree crown cover of over 25% of the ground, determinable from aerial photography, together with on-ground stem estimates of at least:*
    i. *1,000 trees of any size per hectare;*
    ii. *750 trees measuring over five centimeters in diameter at breast height (1.37m), per hectare;*
    iii. *500 trees measuring over 12 centimeters in diameter at breast height (1.37m), per hectare; or*
    iv. *250 trees measuring over 20 centimeters in diameter at breast height (1.37m), per hectare (densities based on the Forestry Act of Ontario 1998); and, which have a minimum average width of 40 meters or more measured to crown edges.*

In accordance with the above noted PPS definition, natural treed communities (Coniferous Forest, FOC; Mixed Forest, FOM; FOD, Deciduous Forests are considered woodlands. Cultural communities (CUW and CUP) may be considered woodlands if they meet the density requirements in accordance with the Forestry Act. Woodland patches are considered part of the same continuous woodland if they are within 20 m of each other.

Generally, treed areas that may warrant evaluation under woodland criteria with boundaries that overlapped with or occurred within 30 m of potentially developable land were identified through dripline surveys in association with the Town of Caledon (2024 with GEI) or with the TRCA (2022 with Beacon on Properties 9 and 10). These boundaries are shown on **Figure 9B (Appendix B1)** and have been incorporated into ELC mapping (**Figure 3 (Appendix B1**). Beacon Environmental and the TRCA also included dripline limits for CUT communities within properties 9 and 10; these communities are not considered woodlands based on the MNR definition. In addition, based on language within the Greenbelt Technical Paper 1 (OMNR 2012), narrow linear treed areas that have an average width of less than 20 m and are more than 3 times longer than its average width can be excluded from woodland mapping.

For such linear treed features that connected to larger, wider woodlands, the Town's preference was to stake the entire contiguous features regardless of potential exclusions with the understanding that such linear treed areas could be reviewed post-staking to confirm length and width measurements and exclude such features where appropriate. This is shown on **Figure 9B** (**Appendix B1**), where some of the staked treed limit extended beyond woodland communities.

GEI completed a review of linear treed features connected to wider woodlands and observed three instances where these linear features could be excluded from woodland mapping. In those instances, such features were classified as hedgerow (HR) in ELC mapping. These three instances were observed on:

- Property 4 – A linear coniferous treed feature connected to a Norway Spruce Coniferous Plantation (CUP3-14*) has a length of 49m and an average width of 14m. The length of the feature is longer than 3 times its average width; therefore, the feature was classified as a hedgerow; and
- Property 1 – two linear treed features were observed extending along either edge of an Open Aquatic (OAO) feature and connecting to a wider Fresh - Moist Manitoba Maple Lowland Deciduous Forest (FODM7-7). The linear feature along the north edge of the OAO has a length of 148.6 m and an average width of 13 m, while the feature along the south edge has a length of 123.8 m and an average width of 11.5 m. The length of each feature is longer than 3 times its average width; therefore, each feature was classified as a hedgerow.

Within Properties 9 and 10, it appears that a similar approach was taken by the TRCA with Beacon Environmental, where two CUT communities were staked as dripline.

Two old apple orchards were identified within Property 1. Both of these orchards are below the 0.5 ha threshold (measuring 0.169 ha and 0.184 ha); thus, are not considered woodlands. This rationale was presented to the Town of Caledon during the feature staking and as a result the treed limit of the orchards were not staked.

The RPOP further considers woodlands as being part of the Core Area, NAC, or PNAC. The requirements for this classification are derived from Table 1 “Criteria and Thresholds for the Identification of Core Areas, Natural Areas and Corridors (NAC) and Potential Areas and Corridors (PNAC) Woodlands” of the Peel OP. The Region of Peel considers NAC and Core woodlands to be significant. The woodlands within the Study Area were assessed using these criteria, and is discussed further below, however, generally the features identified as significant were within the designated Greenbelt Plan Area (**Figure 9B, Appendix B1**).

Woodland communities located within the Greenbelt Plan Area are:

- Coniferous Plantation (CUP3);
- White Pine – White Spruce Coniferous Plantation (CUP3-12);
- White Cedar Coniferous Plantation (CUP3-13);
- Norway Spruce Coniferous Plantation (CUP3-14);
- White Pine Coniferous Plantation (CUP3-2);
- Mineral Cultural Woodland (CUW1);
- Deciduous Forest (FOD);
- Dry-Fresh Sugar Maple – Ironwood Deciduous Forest (FOD5-4);
- Dry-Fresh Sugar Maple – Hickory Deciduous Forest (FOD5-5);
- Lowland Deciduous Forest (FOD7);
- Fresh-Moist Willow Lowland Deciduous Forest (FOD7-3);
- Fresh-Moist Manitoba Maple Lowland Deciduous Forest (FODM7-7);
- Coniferous Swamp (SWC);
- Deciduous Swamp (SWD); and
- Willow Mineral Swamp (SWD4-1).

The majority of woodland communities are present within the Greenbelt Plan Area, with the following woodland communities outside of the Greenbelt Plan Area:

- CUW1: Three small features are present within the Study Area, one within participating properties and two woodlands identified on non-participating properties. The first is a small cultural woodland (0.315 ha) associated with a tributary of the West Humber River and associated riparian habitats to the north of the Study Area (Property 9). Regarding the

other two communities located on non-participating properties, the first (0.136 ha) is associated with the northwestern tributary of the West Humber River while the last community is a small (0.045 ha) isolated woodland identified on within the southwestern portion of the Study Area.

- CUP3: One coniferous plantation (0.194 ha) was associated with a tributary of the West Humber River and associated riparian habitats to the north of the Study Area, there is some overlap between both participating and non-participating properties (Property 4);
- CUP3-2: One White Pine plantation (0.227 ha) was identified on the non-participating property associated with the northwestern tributary of the West Humber River;
- CUP3-14: Four Norway Spruce communities (0.46 ha, 0.479 ha, 0.408 ha, and 0.249 ha) are associated with a tributary of the West Humber River and associated riparian habitats to the north of the Study Area (Property 4);
- FOD5-4: One Sugar Maple/Ironwood community (1.61 ha) is present in the southern portion of the Study Area, and it overlaps with both participating and non-participating properties (Properties 6 and 11); and
- FODM7-7: One Manitoba Maple lowland community (0.447 ha) was identified along the northwestern tributary of the West Humber River, in between two of the golf course ponds (Property 1).

As shown within Table 1 of the Peel Region OP, Core Areas are any woodlands within an Urban System that are equal to or greater than 4 ha in size, and NACs are any woodland within an Urban System that is equal to or greater than 2 ha. None of the woodlands outside of the Greenbelt Plan Area meet this minimum size criteria. As such, all woodlands located within the tablelands of the Study Area have been identified as non-significant woodlands that do not meet the criteria as Core Areas or NACs. Only one woodland (FOD5-4) would be considered an PNAC; all other woodlands are less than 0.5 ha in size.

Significant and non-significant woodlands are shown on **Figure 9B** (**Appendix B1**).

3.1.4.4 Significant Valleylands

As shown within Figure DA2-8d (Valleylands Components of the Preliminary Natural Heritage System) of the SABE Phase 2 Report (Appendix F), both Key Valleylands Features and Supporting Valleylands Features were identified within the Study Area. The main branches of the West Humber River (within the centre and south-west corner of the Study Area) were identified as Key Valleylands Features, as well as the tributary of the West Humber River that flows west of Torbram Road. The two valleylands on Properties 1 and 2 were identified as Supporting Valleylands Features. This information presented within the SABE has been further refined based on site specific information.

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

functions, restoration potential, and historical and cultural values. It is recognized that the NHRM does not specify the number of criteria that are required to be met for a valleyland to be considered significant and recommends that the local planning authorities undertake a study that would determine which criteria should be applied for a valleyland to be considered significant.

Section 8.5 of the Living City Policies (TRCA 2014) recognizes that all valleylands are regulated and are therefore afforded some level of protection from development and site alteration. TRCA's policies further defer to the NHRM to identify significant valleylands.

Table 2 of the Region of Peel OP identifies criteria and thresholds for the identification of Core Area Valley and Stream Corridors. Based on the criteria identified within this table, all medium and high constraint watercourses (as further discussed within Section 3.2.5, below) are considered Core Area Valley and Stream Corridors. The identification of these features as Core Area Valley and Stream Corridors does not necessarily mean that they meet the criteria for Significant Valleyland under the PPS as the criteria to meet the Region's threshold is relatively low (i.e., any regulated watercourse would meet this threshold). As such, additional analysis using further criteria and standards has been completed following the guidance provided within Table 8.1 of the NHRM (2010).

Table 8-1 of the NHRM provides ten recommended evaluation criteria for determining significant valleylands, with each criteria containing a number of standards to be used in assessing those criteria. An evaluation was undertaken for medium and high constraint watercourses within the Study Area. **Tables 12A-F** (**Appendix B2**) have been prepared, using Table 8-1 as the framework, to undertake the assessment of valleyland significance.

As shown within Tables **12A-F** (**Appendix B2**), only the valleylands located within the Greenbelt Plan Area met many of the criteria of significance. The valleylands located outside of the Greenbelt Plan Area (**Tables 12D** and **12E**, **Appendix B2**) did not meet most of the criteria so they were assessed as non-significantory. As a result, the main West Humber River valleyland, the tributary along Torbram Road and Campbell's Cross Creek valleyland are considered significant valleylands. This coincides with the Greenbelt Plan Area and the delineation of the Key Valleylands Features within the SABE Report.

Significant and non-significant valleylands are shown on **Figure 9C** (**Appendix B1**). Discussion on how the limits of the valleylands were determined is provided within **Section 6** of this report.

3.1.4.5 Significant Wildlife Habitat

Candidate SWH Occurrences were identified within Figure DA2-5E (Candidate SWH Occurrence) of the Phase 2 SABE Local SWS (within Appendix E). Concentrations of the SWH occurrences were identified within the Greenbelt Plan Areas and were associated with the West Humber River valley and its associated tributary.

SWH is one of the more complex natural heritage features to identify and evaluate. There are several provincial documents that discuss identifying and evaluating SWH including the NHRM (MNR 2010), the SWH Technical Guide (MNR 2000), and the SWH Eco-Region Criterion Schedule (MNRF 2015). The Study Area is located in Eco-Region 6E and was therefore assessed using the 6E Criterion Schedule (MNRF 2015).

SWH has been evaluated as either candidate, present, or not-present relative to whether or not targeted field studies were completed. For the participating properties within the Study Area where targeted field investigations were completed; SWH was either present or not present. For non-participating properties and the Greenbelt Plan Area, if ELC ecosites are present and/or there is potential for SWH criteria to be met, it was considered candidate and will require further study to confirm. The fulsome evaluation of all SWH can be found in **Table 11** (**Appendix B2**).

There are four general types of SWH:

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

Seasonal Concentration Areas

Seasonal Concentration areas are those sites where large numbers of a species gather together at one time of the year, or where several species congregate. Seasonal concentration areas include deer yards; wintering sites for snakes, bats, raptors, and turtles; waterfowl staging and molting areas, bird nesting colonies, shorebird staging areas, and migratory stopover areas for passerines or butterflies. Only the best examples of these concentration areas are usually designated as SWH. Areas that support Special Concern species or provincially vulnerable to imperiled species (S1-S3), or if a large proportion of the population may be lost if the habitat is destroyed, are examples of seasonal concentration areas which should be designated as significant.

Turtle Wintering Areas were identified within Property 8 associated with the Greenbelt Plan Area; this SWH type was confirmed as one observation of a Snapping Turtle, a Special Concern species, occurred near BS1.

No other seasonal concentration areas were identified within the participating properties of the Study Area based on targeted field surveys, however the following seasonal concentration area types were investigated with targeted surveys based on candidate ecosite criteria:

Bat Maternity Colonies – not present: where there was a snag abundance of >10 suitable roosting trees/ha in trees >25 cm dbh, bat acoustic surveys were conducted for FOD and SWD communities (**Figure 7, Appendix B1**); however, due to relatively low call abundances in these communities of Big Brown Bat and Silver-Haired Bat, no Bat Maternity Colony SWH was identified on participating properties within the Study Area (**Table 8, Appendix B2**).

Colonial Bird Nesting Sites (tree/shrubs) – not present: breeding bird surveys did identify two indicator species for this SWH type: Great Blue Heron (*Ardea herodias*) during round 1 at Property 11 and Green Heron (*Butorides virescens*) during round 1 and 2 at Property 1 (Table 4, Appendix B2). The Great Blue Heron was not observed in suitable habitat. While there was evidence of one breeding pair of Green Herons at Property 1, the abundance of active nests (1) does not meet the minimum requirement of 5 active nests to be considered SWH.

Reptile Hibernacula – not present: candidate structures were identified for further study (**Figure 2, Appendix B1**) to inform subsequent visual encounter snake surveys (**Figure 5, Appendix B1**). No snake species were found within participating properties.

Where targeted field data was not available (with the Greenbelt Plan Area and non-participating properties) candidate seasonal concentration areas were identified in **Table 11** (**Appendix B2**) and include the following:

- Raptor Wintering Areas;
- Bat Maternity Colonies;
- Turtle Winter Areas; and
- Colonially- Nesting Bird Breeding Habitat (Tree and Shrub).

Rare or Specialized Habitats

Rare and specialized habitat are two separate components. Rare habitats are those vegetation communities that are considered rare in the province. S-Ranks 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 Natural Conservancy (Arlington, VA). Generally, community types with S-Ranks of S1 to S3 (extremely rare to rare-uncommon in Ontario), as defined by the NHIC (2021), could qualify. It is to be assumed that these habitats are at risk and that they are also likely to support additional wildlife species that are considered significant. Specialized habitats are microhabitats that are critical to some wildlife species. The NHRM (MNR 2010) defines specialized habitats as those that provide for species with highly specific habitat requirements; areas with exceptionally high species diversity or highly specialized habitat requirements; areas with exceptionally high species diversity or community diversity; and areas that provide habitat that greatly enhances species survival.

Seeps and springs were confirmed by the hydrogeology team within properties 2, 10 and 11. These were all located within the Greenbelt Plan Area and are further discussed in **Section 3.5.2**.

Targeted surveys were also conducted to help assess the presence of Woodland Amphibian Breeding Habitats and Wetland Amphibian Breeding Habitats. The criteria for species diversity and abundance were not met for either type of Amphibian Breeding Habitat.

Where targeted field data was not available (within the bulk of the Greenbelt Plan Area and non-participating properties) candidate rare or specialized habitats were identified in **Table 11 (Appendix B2**) and include the following:

- Waterfowl Nesting Areas;
- Bald Eagle and Osprey Nesting, Foraging and Perching Habitat;
- Turtle Nesting Habitat;
- Seeps and Springs
- Amphibian Breeding Habitat (Woodland); and
- Amphibian Breeding Habitat (Wetland).

Habitat for Species of Conservation Concern

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

Habitats of species of conservation concern do not include habitats of endangered or threatened species as identified by the ESA (2007). Endangered and threatened species are discussed in **Section 3.1.3**.

Through targeted field surveys, the following habitats for species of conservation concern were evaluated in the Participating Properties within the Study Area:

Terrestrial Crayfish – present: this SWH type was confirmed as terrestrial crayfish chimneys were observed during inventories within the MAM communities located with Property 2 and 8 (**Table 9, Appendix B2**).

Barn Swallow – present: habitat for Barn Swallow was identified within two shipping containers within Property 1 (**Figure 4, Appendix B2**).

Eastern Wood-Pewee – present: Habitat for to Eastern Wood-Pewees was identified within Property 1, associated with woodland communities within the West Humber River Valleylands, within the Greenbelt Plan Area (**BBS4,5, Figure 4, Appendix B2**). Habitat for this species was also identified in the FOD5-4 within Property 6 (**BBS19, Figure 4, Appendix B2)** which would provide suitable breeding habitat.

Snapping Turtle – present: Habitat for Snapping Turtle was identified within the anthropogenic ponds (**BS4,5,7; Figure 5 , Appendix B2**) at Property 1 and 8 as habitat and abundance criteria were met. The SWH guidelines do not preclude anthropogenic ponds from assessment for this habitat type.

Monarch – candidate: further studies are required to assess the presence of this SWH type. While small amounts of Common Milkweed were observed within participating properties of the Study Area, no incidental monarch observations were made. Targeted monarch surveys will be performed in late July-August and the results of these will be incorporated into future local SWS updates.

Marsh Breeding Bird Habitat – not present: while a pair of Green Herons was observed in suitable nesting habitat within Property 1 (**Table 4, Appendix B2**), they were observed next to the OA anthropogenic pond at Property 1, which is not a defining criterion to confirm this type of SWH.

Where targeted field data was not available (with the Greenbelt Plan Area and non-participating properties) habitat for species of conservation concern were identified in **Table 11 (Appendix B2**) and include the following:

- Marsh Bird Breeding Habitat;
- Terrestrial Crayfish Habitat;

- Special Concern and Rare Wildlife Species:
    - Barn Swallow;
    - Eastern Wood-Pewee;
    - Wood Thrush;
    - Common Nighthawk;
    - Golden-winged Warbler;
    - Grasshopper Sparrow;
    - Ruddy Duck;
    - Eastern Musk Turtle;
    - Northern Map Turtle;
    - Snapping Turtle;
    - Black Dash; and
    - Monarch.

Animal Movement Corridors

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

No Animal Movement Corridor SWH was identified within the participating properties in the Study Area. Candidate amphibian movement corridors are identified within the Greenbelt Plan Area and non-participating lands.

Table 11, (**Appendix B2**) assesses all types of SWH relevant to the Study Area considering the ecological data collected by GEI.

In summary, the following confirmed and candidate SWH types were found within the participating properties of the Study Area:

- Turtle Wintering Areas (Property 8);
- Seeps and Springs (Properties 2, 10 and 11);
- Terrestrial Crayfish Habitat (Properties 2 and 8);
- Species of Conservation Concern:
    - Barn Swallow;
    - Eastern Wood Pewee;
    - Snapping Turtle; and
    - Monarch (Candidate).

The following SWH types are considerate candidate within non-participating properties and the Greenbelt Plan Area, where targeted surveys were not completed:

- Raptor Wintering Areas;
- Bat Maternity Colonies;
- Turtle Wintering Areas;
- Colonial Bird Nesting (trees/shrubs);
- Waterfowl Nesting Area;
- Bald Eagle and Osprey Nesting, Foraging and Perching Habitat;
- Turtle Nesting Areas;
- Seeps and Springs;
- Amphibian Breeding Habitat (Woodland and Wetland);
- Marsh Bird Breeding Habitat;
- Terrestrial Crayfish Habitat;
- Special Concern and Rare Wildlife Species:
    - Barn Swallow;
    - Eastern Wood-Pewee;
    - Wood Thrush;
    - Common Nighthawk;
    - Golden-winged Warbler;
    - Grasshopper Sparrow;
    - Ruddy Duck;
    - Eastern Musk Turtle;
    - Northern Map Turtle;
    - Snapping Turtle;
    - Black Dash;
    - Monarch; and
    - Amphibian Movement Corridors.

Beacon Environmental completed a SWH assessment for Properties 9 and 10 (**Appendix B3**). Bat Maternity Colonies were noted as candidate SWH for these properties however GEI's bat acoustic surveys assessed Properties 9 and 10 and confirmed this SWH type is not present. The remaining SWH types identified as candidate within Table 6 (Beacon Environmental NHE, 2024) were located within the Greenbelt Plan Area.

Detailed assessments may be required to confirm candidate SWH types should development be proposed within or immediately adjacent to candidate features. If this is proposed, additional studies should be completed through site specific applications.

3.1.4.6 Habitat for Endangered and Threatened Species

The SABE Reports did not comprehensively map or identify SAR and SAR habitat as part of the SABE; rather, it was deferred to the local SWS to assess. The only exception to this is the identification of Redside Dace habitat within Figure DA2-8G (Redside Dace Component of the Preliminary Natural Heritage System) within the Phase 2 Report (Appendix E). As previously noted, Redside Dace habitat is identified within the main tributaries of the West Humber River (located centrally and within the southwest corner) as well as the tributary of the West Humber that flows west of Torbram Road.

Species designated as Threatened or Endangered in Ontario are afforded both individual and habitat protection under ESA (2007). Special Concern are not afforded protection under the ESA but are instead afforded protection and evaluated under SWH (as discussed above within **Section 3.1.4.4**). In order to identify the presence of any Threatened or Endangered species a background information review and detailed field investigations were completed within the Study Area.

A background information review identified that a number of SAR could potentially be present within the Study Area. In order to assess habitat suitability and species present/absence a number of surveys were undertaken. As noted within the background review, the wildlife atlas squares are large areas that span various habitats so additional investigations are required to confirm (1) whether suitable habitat is present and (2) whether the species is using the habitat.

The following SAR and/or SAR habitat was identified within the Study Area:

- Redside Dace – endangered in Ontario;
- Butternut – endangered in Ontario;
- SAR Bats – endangered in Ontario;
- Bobolink – threatened in Ontario; and
- Eastern Meadowlark – threatened in Ontario.

Each species and its occurrence are discussed below.

<u>Redside Dace</u>

Section 29 within O. Reg. 831/21 (Habitat) prescribes the regulated habitat limit for Redside Dace habitat. Subsection 1 (parts i through iv) defines occupied habitat as 30 m from the meander belt width of any watercourse used by Redside Dace within the last 20 years. As discussed within **Section 2.2**, DFO's mapping identifies the West Humber River valleyland from Bramalea Road to Torbram Road as occupied habitat, as well as its tributary that flows west of Torbram Road.

Part v of Subsection 1 defines contributing habitat as any stream, HDF, groundwater discharge area or wetland that augments or maintains baseflow, coarse sediment supply or surface water quality to occupied habitats. HDFs and riparian wetlands may be considered contributing habitat, as well as the West Humber River on the west side of Bramalea Road. Consultation with MECP during the site-specific investigations should be undertaken to confirm the extent of Redside Dace habitat within the Study Area.

Butternut

A total of 17 Butternut have been identified within Properties 1 and 2. These Butternut occurrences were largely located within the Greenbelt Plan Area and the West Humber River valleyland; however, two individuals were located within the active golf course at Property 1 that may require additional assessments.

Detailed Butternut Health Assessments were not completed for every stem. Butternut Health Assessments may be completed at the site-specific stage if alteration is proposed within 50 m of the stem. If alteration is proposed outside of the 50 m setback from the stem, then no habitat assessment is warranted. All Butternut Health Assessments should be submitted to MECP.

Myotis Bats

Two SAR bat species were recorded as part of detailed acoustic assessments. A total of 65 Eastern Small-footed Myotis and 13 Little Brown Myotis calls were recorded within treed communities across the entirety of the Study Area.

A total of two recordings of Eastern Small-footed Myotis was detected at station MTLOG-A (found on Property 1), 22 recordings at station MTLOG-D (found on Property 4), 2 recordings at station MTLOG-E (found on Property 1), 23 recordings at station MTLOG-F (found on Property 1), and 16 recordings at station MTLOG-J (found on Property 7). A total of 7 recordings of Little Brown bat were detected at station MTLOG-D (found on Property 4), two recordings at station MTLOG-F (found on Property 1), and four recordings at station MTLOG-J (found on Property 7). These are relatively low call abundances and while numbers of calls recorded do not necessarily correspond to numbers of individuals, it can be assumed the overall abundance of each species is low given that these calls were recorded over ten consecutive evenings.

As a result, no SAR maternity roosting habitat is likely within the treed communities within the tablelands of the Study Area. It is likely that the treed communities within the Greenbelt Plan Area support SAR and non-SAR bats as they are large, contiguous communities within immediate vicinity of water (for hydration and foraging opportunities).

Bobolink

This species was recorded at PC1 (Property 3) and PCs 14 and 15 (Property 4) during the first round. These individuals were not recorded again during the second round assessment. No suitable breeding habitat was identified within either property as both properties are actively managed agricultural fields. A third visit was not warranted since suitable breeding habitat is not present within either property.

This species was also recorded and habitat was confirmed within Property 9 by Beacon Environmental.

Incidental observations of Bobolink were recorded within CUM communities within the Greenbelt Plan Area during top of bank and treed limit staking. Targeted effort was not completed within the Greenbelt Plan Area for this species; as a result, CUM habitat within the Greenbelt Plan Area is identified as candidate Bobolink habitat.

Eastern Meadowlark

This species was recorded at PC 6 (Property 1) during both rounds of surveys and PCs 14 and 15 (Property 4) during round 1 survey. Property 1 is an actively managed golf course with a smaller CUM community that is not considered large enough to support breeding habitat. Property 4 is an actively managed agricultural field that does not provide suitable breeding habitat.

This species was also recorded and habitat was confirmed within Property 9 by Beacon Environmental.

No other SAR or SAR habitat was identified during detailed assessments.

3.1.4.7 Fish Habitat

Fish habitat, as defined in the federal Fisheries Act, C.F-14, means “spawning grounds and 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 eggs, sperm, larvae, spat and juvenile stages of fish, crustaceans and marine animals”.

The TRCA’s Humber River FMP (2005) identifies small and intermediate riverine habitat within the Study Area. The West Humber River and its main tributary along Torbram Road were identified as intermediate riverine habitat. All other drainage features were identified as small riverine habitat.

All medium and high constraint watercourses are assumed to support direct fish habitat. Depending on the seasonality of the features, these features may support seasonal or permanent fish habitat. Specifically, the medium constraint watercourse on Property 4 may be more seasonal in nature. Detailed fish community sampling will be completed within medium and high constraint watercourses in Summer 2024.

Detailed fish community sampling was completed within all seasonal HDFs in Spring 2024. No fish were captured within any HDFs. As a result, all HDFs provide indirect (contributing) fish habitat.

Additional assessments of the hydrologic connectivity of ponds will be explored during aquatic habitat assessments and summer fish community sampling. Where ponds are hydrologically connected, they will be evaluated to determine if they provide direct or indirect fish habitat. If ponds are not connected to any waterbody that contains fish at any time of year, DFO does not consider it to be fish habitat covered by the provisions of the *Fisheries Act,* and as such these ponds will not be considered fish habitat. As noted within Beacon Environmental’s NHE (Appendix B3), Ponds A and C are considered fish habitat; however, Pond B is not considered fish habitat.

Direct fish habitat is shown on **Figure 9D** (**Appendix B1**).

Please refer to the threatened and endangered species section (above) for discussion on Redside Dace habitat.

3.1.4.8 Areas of Natural and Scientific Interest

No ANSIs were identified on or within 120 m of the Study Area.

3.1.4.9 Summary of Natural Heritage Features

As was previously stated the Conservation Authorities O. Reg 41/24, Town of Caledon's OP (2024 Consolidation), Future Caledon Draft OP (2024), Peel Region's OP (2022) and the Greenbelt Plan (2017) were referenced to assess the potential significance of other natural features, and their associated forms and functions on the landscape. The significance and sensitivity of the features within the Study Area are summarized for each below.

TRCA Regulated Features

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.

Natural hazards found within the Study Area include:

1. Wetland hazards (associated with all wetland communities);
2. Flood hazards (associated with watercourses and valleylands);
3. Erosion hazards (associated with unconfined valleylands and watercourses); and
4. Slope stability hazards (associated with confined valleylands – includes staked top of bank and long term stable top of slope).

All wetlands (riparian and tableland) within the Study Area would be considered regulated by the TRCA. Wetlands are shown on **Figure 9A** (**Appendix B1**).

All watercourses (medium and high constraint) within the Study Area would be considered regulated watercourses as they have flood and/or erosion hazards associated with them. As discussed above within Section 3.1.2, HDFs would not be considered regulated watercourses as they do not meet the watercourse definition under the Conservation Authorities Act. Medium and high constraint watercourses are shown on **Figure 8** (**Appendix B1**).

There are both confined and unconfined valleylands identified within the Study Area. Where confined valleylands are found the greater of the staked top of bank or long term stable top of slope will define the limit of the valleyland. Where unconfined valleylands are found the meander belt (erosion hazard typically covers; however there is one instance within Property 1 where it was an unconfined valleyland but no meander belt width could be derived because it was associated with online ponds (as further discussed within **Section 3.2.4** of this report). As a result, the flood limit was used to delineate the valleyland limit for this unconfined portion. Valleyland constraints are shown on **Figure 9C** (**Appendix B1**).

Town of Caledon – Natural Environment System

Natural heritage features were assessed in the context of both the current in-force Caledon OP (2024 Consolidation) and the Future Caledon OP (Draft, 2024). Within the current in-force OP (Caledon, 2024 Consolidation), the following components make up the Town's Ecosystem Framework which includes Natural Core Areas, Natural Corridors, Supportive Natural Systems, and Natural Linkages, which are all identified within Table 3.1 of the OP. As evaluated within the sections above the following Core Areas are identified within the Study Area:

- Woodland Core Areas (areas meeting one or more of the criteria for Core and Natural Areas and Corridors Woodlands in Table 1 of the Region of Peel Official Plan) - (associated with all woodlands in the Greenbelt Plan Area);
- Wetland Core Areas (wetlands identified for protection through approved studies) - (PSWs associated with all wetlands in the Greenbelt Plan Area);
- SWH - candidate and confirmed SWH habitat has been identified within the Study Area. The following candidate and confirmed SWH types are present within the participating properties of the Study Area:
    - Turtle Wintering Areas;
    - Seeps and Springs;
    - Species of Conservation Concern:
        - Terrestrial Crayfish;
        - Barn Swallow;
        - Eastern Wood Pewee;
        - Snapping Turtle; and
        - Monarch (Candidate).

The following candidate SWH types may be present within the Greenbelt Plan Area and/or non-participating properties within the Study Area:

- Raptor Wintering Areas;
- Bat Maternity Colonies;
- Turtle Wintering Areas;
- Colonial Bird Nesting (trees/shrubs);
- Waterfowl Nesting Area;
- Bald Eagle and Osprey Nesting, Foraging and Perching Habitat;
- Turtle Nesting Areas;
- Seeps and Springs;
- Amphibian Breeding Habitat (Woodland and Wetland);

- Marsh Bird Breeding Habitat;
- Terrestrial Crayfish Habitat;
- Special Concern and Rare Wildlife Species:
- Barn Swallow;
- Eastern Wood-Pewee;
- Wood Thrush;
- Common Nighthawk;
- Golden-winged Warbler;
- Grasshopper Sparrow;
- Ruddy Duck;
- Eastern Musk Turtle;
- Northern Map Turtle;
- Snapping Turtle;
- Black Dash;
- Monarch; and
- Amphibian Movement Corridors.

Detailed assessments may be required to confirm candidate SWH types should development be proposed within or immediately adjacent to candidate features. If this is proposed, additional studies should be completed through site specific applications:

- Wildlife Habitat for Species at Risk: Eastern Meadowlark, Bobolink and Redside Dace was identified within the Study Area.
    - Candidate SAR bat habitat was identified within the Greenbelt Plan Area.
- KHNFs and KHFs as per the Greenbelt Plan – more details on these are in **Table 3-2** in the subsequent section evaluation the Greenbelt Plan NHS.

Natural Corridors include:

- Core Fishery Resource Areas: this includes any cold water, potential coldwater stream, or other stream identified for protection through an approved study. Direct fish habitat was identified within medium and high constraint watercourses. All HDFs were identified as indirect (contributing) fish habitat. Please refer to threatened and endangered species section for discussion on Redside Dace; and
- Valley and Stream Corridors: Present within the Greenbelt Plan Area on the Study Area. These systems are associated with medium and high constraint watercourses.

The Future Caledon OP (Draft 2024) defines a Natural Environment System as a comprehensive NHS and water resource system. The components of these align closely with the Region of Peel's Core Areas, NACs and PNACs.

Natural Features and Areas are defined within Section 13.3.1 of the OP as:

- Provincially Significant wetlands;
- Woodlands meeting one or more Core Area woodland in Table 1 of the OP;
- Significant Valleylands;
- Environmentally sensitive or significant areas;
- Provincial life science ANSIs;
- Escarpment natural areas of the Niagara Escarpment Plan; and
- Valley and stream corridors meeting one or more of the criteria for Core Area valley and stream corridors in Table 2 of the Pell Reion OP.

As evaluated within the sections above, the following Natural Features and Areas are identified within the Study Area:

- PSWs (associated with all wetlands in the Greenbelt Plan Area);
- Significant woodlands (associated with all woodlands in the Greenbelt Plan Area); and
- Valley and Stream Corridors (associated with all medium and high constraint watercourses).

Supporting Features and Areas are defined within Section 13.4.1 of the OP as:

- Evaluated non-provincially significant wetlands;
- Unevaluated wetlands;
- Woodlands meeting one or more of the criteria for NAC woodland in the Peel Region OP Table 1;
- Cultural woodlands and cultural savannahs within the Urban Systems meeting one or more of the criteria for PNAC woodland in Table 1;
- Any other woodlands greater than 0.,5 ha;
- SWH;
- Fish habitat;
- Habitat of aquatic SAR;
- Habitat of endangered and threatened species defined in accordance with the *Endangered Species Act*;
- Regionally significant life science ANSIs;
- Provincially significant earth science ANSIs;

- Escarpment Protection Areas of the Niagara Escarpment Plan;
- Any other valley and stream corridors that have not been defined as part of the Core Areas;
- Sensitive headwater areas and sensitive groundwater discharge areas;
- Enhancement Areas;
- Linkages;
- VPZs;
- Savannahs; and
- Alvars.

The following Supporting Features and Areas were identified within the Study Area:

- Non-significant wetlands (all wetlands outside of the Greenbelt Plan Area);
- SWH (candidate and confirmed, see Section 3.1.4.5);
- One FOD5-3 woodland;
- Fish habitat (direct and indirect);
- Habitat for aquatic SAR (Redside Dace); and
- Habitat for endangered and threatened species (Butternut, Eastern Meadowlark, Bobolink, Redside Dace and candidate SAR Bats).

Enhancement areas and linkages are also includes in the Future Caledon OP as Supporting Features and Areas; opportunities for these will be explored in subsequent phases of this local SWS.

Region of Peel – Greenland System

The Region of Peel's Greenland System is comprised of Core Areas, NACs and PNACs.

Core Areas are defined within Section 2.14.12 of the OP as:

- Significant wetlands;
- Significant coastal wetlands;
- Woodlands meeting one or more Core Area woodland in Table 1 of the OP;
- Environmentally sensitive or significant areas;
- Provincial life science ANSIs;
- Escarpment natural areas of the Niagara Escarpment Plan; and
- Valley and stream corridors meeting one or more of the criteria for Core Area valley and stream corridors in Table 2 of the OP.

As evaluated within the sections above, the following Core Areas are identified within the Study Area:

- PSWs (associated with all wetlands in the Greenbelt);
- Significant woodlands (associated with all woodlands in the Greenbelt); and
- Valley and Stream Corridors (associated with all medium and high constraint watercourses).

NACs are defined within Section 2.14.18 of the OP as:

- Evaluated non-provincially significant wetlands and coastal wetlands;
- Woodlands meeting one or more of the criteria for NAC woodland in Table 1;
- SWH;
- Fish habitat;
- Habitat of aquatic SAR:
- Habitat of endangered and threatened species defined in accordance with the Endangered Species Act;
- Regionally significant life science ANSIs;
- Provincially significant earth science ANSIs;
- Escarpment Protection Areas of the Niagara Escarpment Plan;
- The Lake Ontario shoreline and littoral zone and other natural lakes and their shorelines;
- Any other valley and stream corridors that have not been defined as part of the Core Areas;
- Sensitive headwater areas and sensitive groundwater discharge areas; and
- Any other natural features and functional areas interpretated as part of the Greenlands System Natural Areas and Corridors by the local municipalities, in consultation with the conservation authorities and MNR, including as appropriate, elements of the Potential Natural Areas and Corridors.

The following NACs were identified within the Study Area:

- Non-significant wetlands (all wetlands outside of the Greenbelt);
- SWH (candidate and confirmed, see **Section 3.1.4.5**);
- Fish habitat (direct and indirect);
- Habitat for aquatic SAR (Redside Dace); and
- Habitat for endangered and threatened species (Butternut, Eastern Meadowlark, Bobolink, Redside Dace and candidate SAR Bats).

PNACs are defined within Section 2.14.19 of the OP as:

- Unevaluated wetlands and coastal wetlands;
- Cultural woodlands and cultural savannahs within the Urban Systems meeting one or more of the criteria for PNAC woodland in Table 1;
- Any other woodlands greater than 0.,5 ha;
- Regionally significant earth science ANSIs;
- Sensitive groundwater recharge areas;
- Portions of historic shorelines;
- Open space portions of the Parkway Belt West Plan Area;
- Enhancement areas, buffers and linkages; and
- Any other natural features and functional areas interpreted as part of the Greenlands System Potential Natural Areas and Corridors, by the individual local municipalities in consultation with the conservation authorities.

One PNAC was identified within the Study Area associated with the FOD5-3 woodland.

Greenbelt Natural Heritage Features

A review of the Greenbelt Plan Area was completed to understand whether any components of the Greenbelt NHS are present within the eastern half of the Study Area (i.e., within the Greenbelt Plan Area designated lands).

In accordance with the Greenbelt Plan, the Greenbelt NHS is comprised of KNHF and KHFs. **Table 3-2** (below) reviews the presence of KNHF and KHFs.

Table 3-2: Review of KNHF and KHFs in accordance with the Greenbelt Plan (2017)

Feature Type	Present within the Study Area?
KNHF	
Wetlands	Yes – PSWs and Other ("Unevaluated") wetlands were identified within the Study Area. All wetlands within the Greenbelt Plan Area were identified as candidate PSWs and were not formally evaluated. All wetlands outside of the Greenbelt Plan Area were reviewed and determined to be non-significant (referred to in OWES as "unevaluated"). No significant coastal wetlands are present within or adjacent to the Study Area.
Habitat of endangered and threatened species	Yes – Butternut, Eastern Meadowlark, Bobolink and Redside Dace were confirmed present within the Study Area. Habitat for SAR Bats is identified as candidate within the Greenbelt Plan Area due to presence of treed communities.
Fish habitat	Yes – Direct fish habitat was identified within medium and high constraint watercourses. All HDFs were identified as indirect (contributing) fish habitat. Please refer to threatened and endangered species section for discussion on Redside Dace.
ANSIs	No – ANSIs are not present within or adjacent to the Study Area.
Significant valleylands	Yes – Present within the Greenbelt Plan Area on the Study Area
Significant woodlands	Yes – Present on the Study Area within the Greenbelt. All other woodlands located outside of the Greenbelt Plan Area are identified as non-significant.
SWH	Yes – Candidate and confirmed SWH habitat was identified within the Study Area. Turtle Wintering Areas Seeps and Springs

Feature Type	Present within the Study Area?

	Species of Conservation Concern:
	• Terrestrial Crayfish (Confirmed)
	• Barn Swallow (Confirmed)
	• Eastern Wood Pewee (Confirmed)
	• Snapping Turtle (Confirmed)
	• Monarch (Candidate)
	
	The following candidate SWH types may be present:
	
	• Raptor Wintering Areas
	• Bat Maternity Colonies
	• Turtle Wintering Areas
	• Colonial Bird Nesting (trees/shrubs)
	• Waterfowl Nesting Area
	• Bald Eagle and Osprey Habitat
	• Turtle Nesting Areas
	• Seeps and Springs
	• Amphibian Breeding Habitat (Woodland and Wetland)
	• Marsh Bird Breeding Habitat
	• Terrestrial Crayfish Habitat
	• Special Concern and Rare Wildlife Species:
	  ○ Barn Swallow
	  ○ Eastern Wood-Pewee
	  ○ Wood Thrush
	  ○ Common Nighthawk
	  ○ Golden-winged Warbler
	  ○ Grasshopper Sparrow
	  ○ Ruddy Duck
	  ○ Eastern Musk Turtle
	  ○ Northern Map Turtle
	  ○ Snapping Turtle
	  ○ Black Dash
	  ○ Monarch
	• Amphibian Movement Corridors
	
	Detailed assessments may be required to confirm candidate SWH types should development be proposed within or immediately adjacent to candidate features. If this is proposed, additional studies should be completed through site specific applications.

Feature Type	Present within the Study Area?
Sand barrens, savannahs and tallgrass prairies	No
KHF	
Permanent and intermittent streams	Yes – The medium constraint watercourse within Property 4 may be an intermittent stream. All other medium and high constraint watercourses are assumed to be permanent streams. This will be confirmed in subsequent reporting following summer assessment.
Wetlands	Yes - PSWs and Other ("Unevaluated") wetlands were identified within the Study Area. All wetlands within the Greenbelt Plan Area were identified as candidate PSWs and were not formally evaluated. All wetlands outside of the Greenbelt Plan Area were reviewed and determined to be non-significant (referred to in OWES as "unevaluated"). No significant coastal wetlands are present within or adjacent to the Study Area.
Kettle lakes	No
Seepage areas and springs	Yes – several noted within the watercourse valleys, particularly near where branches join together.

3.1.5 Summary of Findings

For the purposes of this SWS, the NHS features have been characterized through the ecological studies completed and through the analysis summarized in the sections above. The identified natural heritage features include the following:

- Provincially Significant Wetlands and Other Wetlands;
- Significant Woodlands and Non-significant Woodlands;
- Significant Valleylands and Non-significant Valleylands;
- SWH:
    - Participating properties:
        - Turtle Wintering Area; and
        - Springs and Seep.

        - Species of Special Concern:
            - Terrestrial Crayfish (Confirmed);
            - Barn Swallow (Confirmed);
            - Eastern Wood Pewee (Confirmed);
            - Snapping Turtle (Confirmed); and
            - Monarch (Candidate).
    - Greenbelt Plan Area & non-participating properties:
        - Raptor Wintering Areas;
        - Bat Maternity Colonies;
        - Turtle Wintering Areas;
        - Colonial Bird Nesting (trees/shrubs);
        - Waterfowl Nesting Area;
        - Bald Eagle and Osprey Habitat;
        - Turtle Nesting Areas;
        - Seeps and Springs;
        - Amphibian Breeding Habitat (Woodland and Wetland);
        - Marsh Bird Breeding Habitat;
        - Terrestrial Crayfish Habitat; and
        - Special Concern and Rare Wildlife Species:
            - Barn Swallow;
            - Eastern Wood-Pewee;
            - Wood Thrush;
            - Common Nighthawk;
            - Golden-winged Warbler;
            - Grasshopper Sparrow;
            - Ruddy Duck;
            - Eastern Musk Turtle;
            - Northern Map Turtle;
            - Snapping Turtle;
            - Black Dash; and
            - Monarch.
        - Amphibian Movement Corridors.
- Fish Habitat (direct and indirect);

- Habitat of Endangered and Threatened Species:
    - Butternut;
    - Redside Dace (occupied and contributing);
    - Eastern Meadowlark;
    - Bobolink; and
    - Candidate SAR Bats.

However, for the purposes of facilitating a robust and protected NHS, there are a number of features identified outside of the core NHS that may be further refined to support the future NHS, these features include the following:

- Non-significant ("Unevaluated") Wetlands;
- Non-significant Woodlands; and
- Non-significant Valleylands associated with medium constraint watercourses;

3.2 Stream Morphology and Erosion Analysis Existing Conditions

3.2.1 Scope Overview

Detailed fluvial geomorphic investigations and assessments were completed in support of this Phase 1 SWS in accordance with the TOR (**Appendix A**), including:

- Reviewing historic and recent aerial imagery, particularly with respect to deriving stream corridor dynamics such as meander belt, 100-year erosion risk;
- Review existing geomorphic mapping from the SABE and refining based on site specific investigations;
- Conducting reach delineations, rapid assessments and detailed geomorphic field assessments within watercourses; and
- Meander belt width assessments or higher order streams and occupied Redside Dace habitat.

As previously discussed, the SABE identified several low, medium and high constraint watercourses within the SABE. These watercourses are identified within Part B, Appendix C of the SABE and were based on desktop interpretations Within the SABE it acknowledges that the watercourse rankings may be refined through site specific investigations.

3.2.2 Desktop Studies

Watershed Characteristics

Several tributaries of the West Humber River traverse the Study Area, which falls within the jurisdiction of the TRCA. The Humber River watershed is the largest in the TRCA's jurisdiction, spanning over 900 km^2 and includes portions of local municipalities within the Regional Municipality of York, the Regional Municipality of Peel, the City of Toronto, and Simcoe County (TRCA 2008). The largest branch of the West Humber River flows through the southeastern portion of the Study Area, splitting into smaller tributaries upstream of this point.

At its most downstream point, this branch of the West Humber River has an upstream drainage area of 24.2 km^2 (MNRF 2024). Campbell's Cross Creek, another large tributary of the West Humber River, flows through a small portion of the southwestern corner of the Study Area. Although only a short stretch of the reach flows through the Study Area, the upstream drainage area spans 12.3 km^2 to the west of the site.

Climate and Geology

Climate and geology play an important role to influence the form and processes of the 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 and provide context to the active fluvial geomorphological processes in the Study Area.

The Study Area lies within the South Slope physiographic region (Chapman & Putnam 2007). This is a sloping plain that extends from the boundary with the Oak Ridges Moraine, southwards, and is underlain by glacial till. The soil types in this physiographic region are predominantly clay with some clay loam, and loam. The topography is relatively smooth, and infiltration is low due to the clay content. As a result, runoff rates are high. Surficial geology consists of clay to silt-textured till. Within the channel corridor, the surficial materials consist of modern alluvial deposits (OGS 2010).

Precipitation was calculated from climate normals (1981-2010) recorded at the Albion Field Centre (Environment Canada Climate ID 6150103), approximately 13 km northeast of the Study Area. Precipitation averaged 63 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.

Historical Assessment

Historical aerial photographs of the watercourse in the vicinity of the Study Area 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 1970 and 1988, obtained from the National Air Photo Library, were compared with digital imagery from 1954, obtained from the University of Toronto Aerial Imagery Database (University of Toronto, 2024), and from 2002, 2015, and 2022, obtained from First Base Solutions (**Appendix C2**).

Land use in 1954 was predominantly agricultural with some rural residences noted along Mayfield Road in the vicinity of the Study Area. The West Humber River tributaries could be discerned as several single-thread, meandering channels within the study area. Riparian vegetation appeared to be mainly non-woody vegetation, with trees observed within small patches of woodlots along the watercourses. Apart from agricultural and forested land, some unmaintained pastures are interspersed throughout Study Area. Several small dwellings are connected to main roads by agricultural lane ways.

By 1970, the most notable changes to land use within the Study Area occurred in the northwest area (Property 1). The tributary of the West Humber River was dammed upstream of the Bramalea Road crossing, effectively creating two large ponds within the pre-existing valley of the watercourse. The land surrounding the ponds remained agricultural, while small structures were constructed in the vicinity of the newly constructed dam. A lane way was built across the northeastern tributary, located in Property 8.

By 1988, additional ponds had been formed upstream of the existing waterbodies in Property 1. The Mayfield Golf Course had begun construction within Property 9, and as part of the development, a new pond had been created in the east of the property. A small stormwater management pond had also been constructed in the northeast corner of the Study Area, within Property 7. Additional ponds had also been constructed to the north of the Study Area's boundary. The tributary flowing through the northeastern corner of the Study Area had been significantly altered from its original planform, resulting in a much straighter watercourse. The watercourse flowing through Property 9 had also been altered.

Significant changes in land use between 1988 and 2002 can be observed. Both golf courses, within Properties 1 and 9, display significant development. Previously occupied by agricultural fields, the two golf courses had completely overtaken their respective parcels of land. Several new residential dwellings had been constructed along the vicinity of the Study Area, mainly along Dixie Road, Torbram Road, and Old School Road. Significant development was also undertaken to the south of Mayfield Road as Brampton expanded to the north.

Apart from some slight changes to residential and agricultural structures, no significant differences were observed between 2002 and 2022.

Reach Delineation

While the reaches delineated as part of the SABE Local SWS) were maintained for the most part, three reaches (reaches WHT4(3), WHT4(3)4 and WHT4(2)) were split into sub-reaches following a detailed desktop assessment and confirmation through the field investigation. The reach naming convention was adopted from the SABE / SWS.

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). The reaches and their extents are shown in **Figure 1** (**Appendix C1**).

Reach CCC(2), which traverses the southwest corner of the Study Area, is part of Campbell's Cross Creek, which itself is a tributary of the West Humber River. Reach CCC(2) begins at Dixie Road, flowing southeast through the Study Area before terminating at its crossing with Mayfield Road.

A plastic culvert at Old School Road conveys surface water flow from agricultural fields to the north into reach WHT4(3)5-2, which consists of a series of ponds existing throughout Property 1. The ponds discharge into reach WHT4(3)5-1, which crosses under Bramalea Road via a box culvert before draining into a main branch of the West Humber River.

Reach WHT4(3)6-1 collects surface water flow from Property 1 (HDF H26-S1) and conveys it into reach WHT4(3)-2, a larger branch of the West Humber River. WHT4(3)-2 continues through a large, confined valley before flowing onto non-participating lands to the east. This section of the watercourse flows through Properties 1 and 2.

Reach WHT4(3)4-2 flows from north to south through Property 4, initiating 50 m south of Old School Road before flowing through non-participating property, eventually feeding into the feature downstream of reach WHT4(3)-2. WHT4(3)4-3 is the portion of the watercourse that is piped, largely within the non-participating property but also continues onto Property 4 before becoming above-ground after a farm crossing. The reach break between WHT4(3)4-2 and WHT4(3)4-3 is where the feature is not piped and becomes a surface feature. WHT4(3)4-1 was not evaluated as it is located within a non-participating property.

Another large tributary of the West Humber River flows from north to south across the eastern half of the Study Area near Torbram Road. The system begins north of Old School Road, marking the beginning of reach WHT4(3)3-1. The upstream portions are located within a non-participating property. Based on aerial interpretation, it appears that the reach continues south in the form of a relatively straight channel flowing in between several agricultural ponds. Reach WHT4(3)3-1a, also located within the non-participating property, joins with reach WHT4(3)3-1 downstream of the series of ponds. It is possible that this feature could be considered a HDF and should be ground-truthed if the property becomes participating. After the confluence, the feature continues to the southeast before entering a treed area along the western side of Torbram Road (within Properties 7 and 8). Reach WHT4(3)3-1 ends at the terminus of the treed area and flows into reach WHT4(3)2-1. Reach WHT4(3)2-1 traverses Property 9 through the golf course, flowing from the northeast corner of Property 9to the southwest corner of the property. Several HDFs convey flow from the central agricultural fields and golf course towards the east, and into reach WHT4(3)2-1. These 12 HDFs were assessed by Beacon Environmental (as shown within their report; **Appendix B3**). Downstream of the inlets of the previous four reaches, reach WHT4(3)2-1 flows through a woodlot adjacent to the golf course, before eventually flowing into the large branch of the West Humber River (WHT4(3)-1).

Reach WHT4(3)-1 begins at the confluence of Reach WHT4(3)2-1 and is located downstream of reach WHT4(3)-2. The confluence is located between Properties 5 and 9. The feature continues flowing to the southeast through the remainder Property 9. Reach WHT4(3)-2 terminates at the southern border of Property 9 before flowing into Reach WHT4(2)-2 within Property 10. Reach WHT4(2)-2 exists in large valley, flowing through a meadow before ending at the northern edge of another treed area (within Property 11). At this point, reach WHT4(2)-1 begins, conveying flow to the east through the treed area, and off the Study Area under Torbram Road via a large span bridge.

All other watercourse reaches that were previously identified within the SABE were determined to be HDFs and are assessed using the HDFA Guidelines. Results of the HDFA are presented within **Section 3.1.3** of this report.

3.2.3 Field Investigation

Methods

A field assessment was completed for the features within the Study Area between March 26th and March 28th, 2024. The investigation consisted of a Rapid Geomorphic Assessment (RGA), a modified Rapid Stream Assessment Technique (RSAT) and classification of the reach using the Downs method. This assessment was completed within the participating properties within the Study Area.

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).

The RSAT (Galli, 1996) provides an assessment of the channel by also considering the ecological function of the stream. Observations under the modified RSAT include channel stability, channel scouring/sediment deposition, physical instream habitat, water quality, and riparian habitat condition. The RSAT scores rank the channel as maintaining a poor (<13), fair (13-24), good (25-34), or excellent (35-42) degree of stream health.

The Downs method, as outlined in Thorne et al. (1997), was developed based on adjustment processes and trends of channel change and links these processes and trends to the fluvial and sediment processes responsible for driving channel change. This system classifies streams as stable, depositional, laterally migrating, enlarging, compound, recovering, or undercutting.

Results

The field assessment focused on reaches within participating lands in the Study Area. Some portions within the Study Area were non-participating, and as such were not surveyed. The locations of non-participating properties are shown on the figures provided as part of this report. A few of the reaches previously designated as low constraint watercourses were investigated and found to show no evidence of morphological elements, such as defined banks, variation in substrate, or a defined topographical depression, along its mapped length. These features traverse fields with no defined channel (i.e., presence of distinct bed or banks), or exist as wetlands or ponds. A summary of these reaches is provided at the end of this section and were instead assessed as HDFs in accordance with the HDFA Guidelines (as discussed within **Section 3.1.3** of this report).

The following watercourses were reviewed within the Study Area:

- WHT4(2)-1 (within Property 11);
- WHT4(2)-2 (within Property 10);

- WHT4(3)-1 (within Property 9);
- WHT4(3)-2 (within Properties 1 and 2, and non-participating property);
- WHT4(3)2-1 (within Property 9);
- WHT4(3)3-1 (within Properties 7 and 8, and non-participating property);
- WHT4(3)4-2 (within Property 4);
- WHT4(3)5-1 (within Property 1 and non-participating property);
- WHT4(3)5-2 (within Property 1 and non-participating property);
- WHT4(3)6-1 (within Property 1); and
- CCC(2) (within Property 3).

All watercourses are shown on **Figure 1** (**Appendix C1**).

Reach CCC(2) was observed as a perennial watercourse situated in a confined valley, with moderate gradient and sinuosity. Only a small portion of the reach flowed through the Study Area, and as such, a complete field assessment including an RGA, RSAT, and Downs analysis was not possible. Distinct pool-riffle morphology could be observed, and riparian vegetation consisted mainly of grasses and herbaceous species adjacent to the channel, as well as trees and woody vegetation along the valley slope. The riparian buffer extended >5 channel widths in dimension. Adjacent land use was predominantly agricultural.

The upstream half of reach WHT4(3)6-1 conveyed flow from Property 1 offsite via an underground pipe. The pipe resurfaced to the south of the golf course's boundary, discharging into a poorly defined channel situated in a confined valley. A scour pool had formed at the pipe's outlet. The watercourse continued to the south before dissipating into a wetland, which eventually drains into reach WHT4(3)-2. The area adjacent to the watercourse was vegetated with woody shrubs, grasses, and herbaceous species. A woodlot existed beyond the immediate riparian buffer, which extended >5 channel widths in dimension. Pool-riffle morphology could be slightly discerned although the dominant habitat type was runs. On average, the bankfull width and depth of pools was measured to be approximately 0.9 m and 0.2 m respectively, while the width and depth of riffles was measured to be approximately 0.7 m and 0.2 m respectively. Pool substrate was composed mainly of clay and silt, while riffles contained mainly gravel and sand. A length of the pipe was found to be exposed upstream of its outfall. The RGA produced a score of 0.07, which indicated that the reach was in regime. Degradation was the dominant geomorphic process, with evidence of planform adjustment also observed. The RSAT score of 27 indicated that this reach was in a good state of ecological health. Physical instream habitat conditions were noted to be the main limiting factor, due to the limited definition. The Downs method classified this reach as S – stable.

Reach WHT4(3)-2 was a large and well-defined watercourse situated in a confined valley, with low gradient and high sinuosity. Two sections, both located in the downstream half of the reach, were observed to be anastomosing, with multiple occasions where the main branch would split into two separately defined channels, causing the formation of islands. The reach flowed through an uninterrupted deciduous woodlot, and the riparian buffer extended >5 channel widths in

dimension. Occurrences of tree falls, and woody debris were very common. Distinct pool-riffle morphology was observed throughout the reach. Bankfull widths ranged between 5.5 - 9.0 m for pools and 3.5 - 7.5 m for riffles, while bankfull depths ranged between 0.8 - 1.8 m for pools and 0.5 - 0.8 m for riffles. Substrate throughout the channel was well sorted, with riffles consisting mainly of gravel, cobbles, and some boulders, while pools contained sand and silt. Bank angles were steep on the outsides of bends, and relatively shallow throughout the remainder of the channel. Evidence of failure due to channel migration was observed throughout the channel, and there were numerous occasions of valley-toe impact. The RGA produced a score of 0.43, which indicated that the reach was in adjustment. Planimetric form adjustment was the dominant geomorphic process. The RSAT score of 35 indicated that this reach was in an excellent state of ecological health. Riparian habitat conditions were noted to be the main limiting factor, due to the absence of mature trees. The Downs method classified this reach as M – lateral migration, which is characterized by migration of most bends, but the cross-sectional dimensions are preserved.

Reach WHT4(3)4-2 was observed to be an intermittently defined watercourse, flowing through a confined valley setting. The watercourse was initiated downstream of a piped section, which conveyed water from northern agricultural fields to the upstream extent of the reach. Vegetation consisted mainly of grasses, and the thalweg of the watercourse was often obscured by matted vegetation. Some occasions of valley toe impact were observed along the outsides of bends, and basal scour existed along both banks of some riffles. Pools and riffles could not be discerned, and the main habitat type consisted of runs. Where defined, bankfull widths ranged between 0.9 - 2.1 m, while bankfull depths ranged between 0.2 - 0.6 m. Substrate within the channel was not observed due to the dense vegetation. The RGA produced a score of 0.18, which indicated that the reach was in regime. Widening was the dominant geomorphic process. The RSAT score of 24 indicated that this reach was in a fair state of ecological health. Riparian habitat conditions were noted to be the main limiting factor, due to the absence of trees. The Downs method classified this reach as M – lateral migration, which is characterized by migration of most bends, but the cross-sectional dimensions are preserved.

The upstream half of reach WHT4(3)3-1 was found to be a well-defined channel situated in a confined valley, with low gradient and high sinuosity. Hairpin bends were observed throughout the channel. The area immediately adjacent to the watercourse was vegetated with grasses and herbaceous species, while the valley slope was forested with coniferous trees. Woody debris was uncommon throughout the feature. Pools and riffles existed in some spots, but the feature consisted mainly of runs. Bankfull widths ranged between 2.9 - 3.8 m, while bankfull depths ranged between 0.7 - 1.9 m. Substrate within the channel was not observed due to the dense vegetation. The RGA produced a score of 0.07, which indicated that the reach was in regime. Planimetric form adjustment was the dominant geomorphic process. The RSAT score of 34 indicated that this reach was in a good state of ecological health. Physical instream habitat conditions were noted to be the main limiting factor, due to the absence of vertical variability. The Downs method classified this reach as M – lateral migration, which is characterized by migration of most bends, but the cross-sectional dimensions are preserved.

The downstream half of reach WHT4(3)3-1, separated from the upstream half by a dilapidated culvert. For the purpose of delineating occupied Redside Dace habitat, the two stretches of watercourses are considered to be the same reach, due to their similarities in the recent past. However, it is believed that the culvert is limiting sediment throughout, resulting in a severe state of degradation in the downstream portion of the reach. Basal scour exists along the majority of

both banks, and visible tree roots / tree falls are common. The downstream portion is much wider than the upstream portion, with bankfull widths ranging between 5.1 - 6.4 m. Bankfull depths range between 0.65 - 0.9. The RGA produced a score of 0.22, which indicated that the reach was in transition / stressed. Widening was the only geomorphic process, with all other categories scoring 0. The RSAT score of 33 indicated that this reach was in a good state of ecological health. Channel stability was noted to be the main limiting factor, due to the severe widening. The Downs method classified this reach as E – enlarging, observed through erosion along both banks.

Reach WHT4(3)2-1 was observed to be a well-defined channel situated in a confined valley, with medium gradient and medium sinuosity. The watercourse flowed through Property 9, between several ponds, and into a woodlot on the south end of the golf course. The riparian buffer extended 1-5 channel widths before encroaching onto the golf course. Riparian vegetation consisted mainly of grasses and herbaceous species, with some woody shrubs. Some pools and riffles existed, but the main feature was runs. Bankfull widths ranged between 2.7 - 4.4 m, while bankfull depths ranged between 0.5 - 1.3 m. Pool substrate consisted of silt and sand, while riffles consisted of sand, gravel, and some cobbles. The RGA produced a score of 0.19, which indicated that the reach was in regime. Planimetric form adjustment was the dominant geomorphic process. The RSAT score of 29 indicated that this reach was in a good state of ecological health. Physical instream habitat conditions were noted to be the main limiting factor, due to the absence of vertical variability. The Downs method classified this reach as M – lateral migration, which is characterized by migration of most bends, but the cross-sectional dimensions are preserved. The four features conveying flow from the western fields - WHT4(3)2-3, WHT4(3)2-2, WHT4(3)2-4, and WHT4(3)2-5 – were not observed to have sufficient definition to be classified as watercourses and should instead be deemed to be HDFs.

Reach WHT4(3)-1 was a large and well-defined watercourse situated in a confined valley, with low gradient and high sinuosity.The reach flowed through an uninterrupted deciduous woodlot, and the riparian buffer extended >5 channel widths in dimension. Occurrences of tree falls, and woody debris were common. Distinct pool-riffle morphology was observed throughout the reach. Bankfull widths ranged between 5.2 - 6.5 m, while bankfull depths ranged between 1.0 - 1.7. Substrate throughout the channel was well sorted, with riffles consisting mainly of gravel, cobbles, and some boulders, while pools contained sand and silt. Bank angles were steep on the outsides of bends, and relatively shallow throughout the remainder of the channel. Evidence of failure due to channel migration was observed throughout the channel, and there were numerous occasions of valley-toe impact. The RGA produced a score of 0.10, which indicated that the reach was in regime. Planimetric form adjustment was the dominant geomorphic process. The RSAT score of 34 indicated that this reach was in a good state of ecological health. Channel stability was noted to be the limiting factor due to valley slope instabilities. The Downs method classified this reach as M – lateral migration, which is characterized by migration of most bends, but the cross-sectional dimensions are preserved.

Reach WHT4(2)-2 was a large and well-defined watercourse situated in a confined valley, with low gradient and high sinuosity. The reach began at the terminus of reach WHT4(3)-1, ending at the boundary between the woodlot and a meadow. The reach flowed through an unforested meadow, and the riparian buffer extended >5 channel widths in dimension. Riparian vegetation consisted exclusively of grasses. Distinct pool-riffle morphology was observed throughout the reach. Bankfull widths ranged between 4.5 - 5.7 m, while bankfull depths ranged between 0.9 - 1.5 m. Substrate throughout the channel was well sorted, with riffles consisting mainly of

gravel, cobbles, and some boulders, while pools contained sand and silt. Bank angles were steep on the outsides of bends, and relatively shallow throughout the remainder of the channel. There were no occurrences of valley toe impact. The RGA produced a score of 0.19, which indicated that the reach was in regime. Planimetric form adjustment was the dominant geomorphic process. The RSAT score of 29 indicated that this reach was in a good state of ecological health. Riparian habitat conditions were noted to be the main limiting factor, due to the absence of trees. The Downs method classified this reach as M – lateral migration, which is characterized by migration of most bends, but the cross-sectional dimensions are preserved.

Reach WHT4(2)-1 was a large and well-defined watercourse situated in a confined valley, with moderate gradient and moderate sinuosity. The reach began at the downstream extent of reach WHT4(2)-2, at the end of the pasture. The reach flowed through an uninterrupted deciduous woodlot, and the riparian buffer extended >5 channel widths in dimension. Occurrences of tree falls, and woody debris were common. Distinct pool-riffle morphology was observed throughout the reach. Bankfull widths ranged between 6.0 - 8.5 m, while bankfull depths ranged between 1.0 - 1.5 m. Substrate throughout the channel was well sorted, with riffles consisting mainly of gravel, cobbles, and some boulders, while pools contained sand and silt. Bank angles were steep on the outsides of bends, and relatively shallow throughout the remainder of the channel. Evidence of failure due to channel migration was observed throughout the channel, and there were numerous occasions of valley-toe impact. Several flow paths, cutoff channels, and chutes were observed. Some knickpoints were also observed. The RGA produced a score of 0.37, which indicated that the reach was in transition / stressed. Planimetric form adjustment was the dominant geomorphic process. The RSAT score of 35 indicated that this reach was in an excellent state of ecological health. The Downs method classified this reach as M – lateral migration, which is characterized by migration of most bends, but the cross-sectional dimensions are preserved.

Reach WHT4(3)5-2 was not investigated further during the field assessment, as it consisted of a series of ponds with no fluvial components. Given the amount of alteration (series of pond construction), no fluvial assessment could be completed as these are treated as more stagnant features (unlike a meandering watercourse). Reach WHT4(3)5-1 was found to consist of a diffuse wetland with little geomorphic form up to Bramalea Road. However, as it enters the non-participating property downstream, channel definition could be observed. As this portion was on a non-participating property, it was not assessed, and the findings for this reach are based on the observations within the participating lands. Reach WHT4(3)3-1a was also discounted as it flows exclusively across non-participating property within the north-west corner of the Study Area. It is also possible that this feature is not a watercourse and instead a HDF.

As noted previously, a few reaches investigated showed no evidence of morphological elements, such as defined banks, variation in substrate, or a defined topographical depression, along their assessed length. The features traverse fields with no defined channel (i.e., presence of distinct bed or banks), or exist as ponds. These features included amongst these features were reaches WHT4(3)5-2, WHT4(3)5-1, WHT4(3)2-3, WHT4(3)2-2, WHT4(3)2-4, WHT4(3)2-5, WHT4(2)2-1, WHT4(1)6-1, WHT4(1)6-1b, and WHT4(1)6-1c, and WHT4(3)1-1. Due to the lack of channel definition, it is GEI's opinion that these reaches should not be considered a defined watercourse, and therefore would not have an erosion hazard associated with them. These features were instead assessed as HDFs (as discussed within **Section 3.1.3**).

In some cases, e.g., WHT4(1)6-1, small stretches of defined channel (~100 m or less) were observed in woodland areas. The defined sections flowed between undefined or poorly defined drainage features. These features provide very limited sediment supply functions, likely during periods of high flow, such as during the spring freshet. Given the short length and limited geomorphic function, these reaches should also not be considered watercourses given that they become undefined again downstream of the woodland.

Rapid assessment results are shown in **Table 3-3** below. A photographic record showing existing conditions of watercourses is appended to this report, in **Appendix C3**.

Table 3-3: Summary of Rapid Assessment Results for West Humber River Tributaries

Reach	RGA Score	Dominant Mode of Adjustment	RSAT Score	Limiting Factor	Downs Method
CCC(2)	N/A	N/A	N/A	N/A	N/A
WHT4(3)6-1	0.07	Planimetric Form Adjustment	27	Physical Instream Habitat	S – Stable
WHT4(3)-2	0.43	Planimetric Form Adjustment	35	Riparian Habitat Conditions	M – Lateral Migration
WHT4(3)4-2	0.18	Widening	24	Riparian Habitat Conditions	M – Lateral Migration
WHT4(3)3-1 (Northern half)	0.07	Planimetric Form Adjustment	34	Physical Instream Habitat	M – Lateral Migration
WHT4(3)3-1 (Southern half)	0.22	Widening	33	Channel Stability	E – Enlarging
WHT4(3)2-1	0.19	Planimetric Form Adjustment	29	Physical Instream Habitat	M – Lateral Migration
WHT4(3)-1	0.10	Planimetric Form Adjustment	34	Channel Stability	M – Lateral Migration
WHT4(2)-2	0.19	Planimetric Form Adjustment	29	Riparian Habitat Conditions	M – Lateral Migration
WHT4(2)-1	0.37	Planimetric Form Adjustment	35	Channel Stability	M – Lateral Migration

3.2.4 Characterization and Analysis

Watercourse Constraint Rankings

The SABE outlined a multi-disciplinary approach to rank the constraint level associated with watercourse reaches. The ranking system in the SABE results in classification of watercourses into one of three constraint levels (High, Medium or Low). These constraint levels are reflected in the Town of Caledon OP, which provides the following definitions for each:

- “High constraint watercourses as identified in Table 2.1.2.4 of the Region of Peel Scoped Subwatershed Study (Wood et al., 2022) and their corridors are to be protected in current form and location, with appropriate regulatory setbacks and ecological buffers. Realignments of high constraint watercourses are not permitted. Minor modification through rehabilitation/enhancement may be permitted at select locations where it provides an enhancement to the system, given sufficient rationale. Minor (local) rehabilitation or

enhancement could include such works as replacement of perched culverts with new structures that follow Conservation Authority crossing guidelines, removal of old farm crossings, re-naturalization of armoured channel banks (where appropriate), or local riparian plantings.

- Medium constraint watercourses as identified in Table 2.1.2.4 of the Region of Peel Scoped Subwatershed Study (Wood et al., 2022), are to remain open and protected with applicable hazard corridors, regulatory setbacks, and ecological buffers. Channel/corridor realignment (horizontal and vertical) may be permitted where there has been previous disturbance through anthropogenic activity, there is sufficient rationale for doing so, and provided there is a net ecological gain and subject to the approval of appropriate authorities. Restoration and enhancement must be included in design options. Local watercourse realignment/enhancement areas may include impacted, channelized reaches within historically agricultural lands, and upgrades to existing watercourse crossings. Local watercourse realignment/enhancement areas may also be required for portions of some reaches to accommodate new road alignments, to facilitate flood mitigation, or to address a need for enhancement.
- Low constraint watercourses as identified in Table 2.1.2.4 of the Region of Peel Scoped Subwatershed Study (Wood et al., 2022) should be re-evaluated as part of the subwatershed or equivalent study to confirm their constraint ranking. Features may be redesignated as HDFs as a consequence. Where a low constraint reach is reclassified as a HDF, the feature should be assessed and managed following the HDFA Guidelines (CVC and TRCA, 2014)".

The multi-disciplinary assessment approach identified in the SABE involves systematic assessment of each watercourse reach under categories including surface water (hydrology), geomorphology, aquatic (fisheries), hydrogeology (groundwater) and terrestrial/riparian. The SABE provided criteria on the values for each category to rank a reach as High or Medium Constraint. The SABE included the Low Constraint category to cover watercourses that didn't receive a High or Medium Constraint but noted that features identified as Low Constraint watercourses may be considered HDFs. No specific criteria within each discipline category was identified for Low Constraint watercourses in the SABE.

Table 1 (**Appendix C4**) identifies the criteria under each discipline to rank watercourse constraints as High or Medium Constraint. Once all discipline assessments have been completed, the overall constraint ranking for the reach is based on the highest ranked discipline category.

The SABE evaluated the constraint rankings of watercourses within the Study Area based solely on the geomorphic criteria (i.e., the other discipline-based criteria were not applied) and therefore, the constraint rankings from the SABE are considered preliminary.

This SWS builds upon the preliminary watercourse constraints assessment from the SABE. As previously noted, some of the reaches and reach breaks have been re-evaluated as part of the detailed site investigations. The addition of reach breaks occurred where differences in the feature morphology or riparian habitat occurred (as discussed above within **Section 3.2.2**). All watercourse reaches present on the Study Area identified in the SABE have been assessed in the field to confirm if they meet the O. Reg. 41/25 "watercourse" definition. Those features on the Study Area identified as Low Constraint watercourses in the SABE have generally been identified

and evaluated as HDFs in this SWS; however there are still some low constraint watercourses that were identified within the Study Area. These low constraint watercourses were largely associated with non-participating parcels where the feature was unable to be ground-truthed. The only instance where a low constraint watercourse was identified within participating properties was located within Property 4 where the watercourse had been piped (no above ground evidence of the watercourse). Features that have been identified as HDFs are assessed within **Section 3.1.3**. All features that continue to be identified as watercourses have been subject to the multi-disciplinary evaluation approach outlined in the SABE.

The results of this evaluation (i.e. constraint ranking for each watercourse reach) are provided in **Table 1** (**Appendix C4**) and depicted graphically in **Figure 3** (**Appendix C1**). The greatest of the constraints within the discipline watercourse ranking evaluation table determined the ultimate watercourse constraint ranks, except for WHT4(3)5-2. For this watercourse, while a high constraint criteria was technically met for the terrestrial/riparian discipline due to the presence of SWH, it is GEI's opinion that the threshold of "high ecological quality" was not met given that this feature, which is located on with Property 1 and is associated with several man-made golf course ponds, is highly altered. As discussed within Section **3.1.4**, SWH was identified is within the created golf course ponds; however, these habitats have been and continue to be altered as a result of golf course management.; thus the watercourse itself is highly altered and disturbed and was created to support the golf course. As such, this criteria should not drive the ultimate watercourse constraint ranking.

The following watercourses constraint rankings differed from that identified within the SABE:

- WHT4(3)3-1 was identified within the SABE as a medium constraint watercourse; however, it has been reassessed as a high constraint watercourse as part of this SWS. It was assessed as high constraint across all disciplines in accordance with criteria outlined within the SABE as it is a main tributary of the West Humber River with various habitat types and hosts occupied Redside Dace habitat.
- WHT4(3)4-2 was identified within the SABE as a low constraint watercourse; however, it has been reassessed as a medium constraint watercourse as part of this SWS. Within the SABE it suggests that the low constraint watercourse ranking was associated with the piped section; this has been assigned to the piped section (renamed as WHT4(3)4-3).
- WHT4(1)6-1 was a low constraint watercourse identified within the SABE that was assessed to be a HDF (H8) and therefore is not assessed as a watercourse. Please refer to Section 3.1.3 for discussions on the HDF.

As identified within the SABE and the Caledon OP, there are differing management approaches between medium and high constraint watercourses. Both watercourse corridors are to be maintained in an open channel corridor and protected with applicable hazard setbacks. Channel realignment using natural channel design principles is permitted within medium constraint watercourses; however, only minor (local) rehabilitation or enhancement is permitted within high constraint watercourses.

HDFs should be managed in accordance with the HDFA Guidelines (as discussed within **Section 3.1.3**).

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 complete natural meander and migration tendencies of 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.

As all West Humber River tributaries throughout the Study Area were situated in confined valleys, the meander belt width cannot be used to delineate the erosion hazard, which would be governed by geotechnical considerations. However, Section 29 of O. Reg. 832/21 of the Endangered Species Act defines Redside Dace habitat to be the meander belt width, plus vegetated areas or agricultural lands within 30 metres of the meander belt. Therefore, the meander belt width was delineated to identify the habitat for reaches identified as occupied Redside Dace habitat.

While GEI completed the erosion hazard assessment for Properties 1-8, in addition to Property 11, the assessment for Properties 9 and 10 was completed by Beacon Environmental. It should be noted that reach WHT4(3)2-1, assessed as one reach by GEI, was split into two separate reaches (named reaches WHT4(3)2-1a in the downstream portion and WHT4(3)2-1b in the upstream portion) at the woodlot in the southern portion of Property 9. This reach separation is shown on **Figure 1** (**Appendix C1**).

The TRCA (2004) *Belt Width Delineation Procedures* document was created to recommend a protocol for delineation of meander belt for river systems within the TRCA's jurisdiction but is accepted by Conservation Authorities throughout Ontario as a primary method for delineating the belt width. As the West Humber River tributaries that are outside of the Redside Dace habitat limits are classified as confined systems, the method involves drawing a line along the toe of the valley. In the case that the watercourse is within a distance defined by Table 3 in the MNR's *Technical Guide – River and Stream Systems: Erosion Hazard Limit* (MNR 2002), the limit is extended into the valley slope until the specified distance is satisfied. Erosion and habitat constraints are summarized in **Table 3-4** below, and are depicted in **Figure 2, Appendix C1**.

Table 3-4: Summary of Rapid Assessment Results for West Humber River Tributaries

Reach	Constraint Type	Width of Preliminary Meander Belt	Width of Constraint
CCC(2)	Occupied Redside Dace Habitat	50 m	110 m
WHT4(3)6-1	Confined	N/A	Varies
WHT4(3)-2	Confined	N/A	Varies
WHT4(3)4-2	Confined	N/A	Varies

Reach	Constraint Type	Width of Preliminary Meander Belt	Width of Constraint
WHT4(3)4-3	N/A	N/A	N/A
WHT4(3)3-1	Occupied Redside Dace Habitat	40 m	100 m
WHT4(3)2-1 A	Occupied Redside Dace Habitat	35 m	95 m
WHT4(3)2-1B	Occupied Redside Dace Habitat	50 m	110 m
WHT4(3)-1	Occupied Redside Dace Habitat	46 m	106 m
WHT4(2)-2	Occupied Redside Dace Habitat	44 m	104 m
WHT4(2)-1	Occupied Redside Dace Habitat	34 m	94 m
WHT4(3)5-1	N/A	N/A	N/A
WHT4(3)5-2	N/A	N/A	N/A

A meander belt with cannot be delineated on altered watercourses (e.g., ponds or piped features) or confined systems; therefore, they have been identified as N/A.

3.2.5 Summary of Findings

The fluvial geomorphic assessment serves to characterize existing conditions of watercourses within the Study Area, and delineate meander belt limits associated with the watercourses, to inform the determination of environmental constraint limits.

The following summarizes the key findings of the geomorphic assessment:

- Tributaries of Campbell's Cross Creek and the West Humber River traverse the Study Area. All the tributaries lie within the jurisdiction of the TRCA. Reaches were previously delineated as part of the Scoped SWS for the SABE. This delineation was generally maintained, with minor revisions based on field observations;
- Rapid assessments were performed on each reach, consisting of a RGA, RSAT, and the Down's method. The RGA results ranged from 0.07 (in regime) to 0.43 (in adjustment). The RSAT results for the reaches ranged between 27 (good) and 35 (excellent). The Downs method produced various results for the reaches, generally consistent with the findings of the RGA; and
- The TRCA (2004) meander belt width delineation procedures were followed to delineate the meander belt width for unconfined reaches, while Ontario's Technical Guide for River & Stream Systems: Erosion Hazard Limit (2002) was referred to for confined systems. The meander belt width was also determined within occupied Redside Dace reaches, as it defines a portion of the habitat limits for the endangered fish species.

3.3 Hydrology and Hydraulics Existing Conditions

3.3.1 Scope Overview

Per the MTLOG TOR (**Appendix A**) the hydrology and hydraulics existing characterization analysis will include:

- A summary of applicable stormwater management criteria for quantity, quality and erosion control will be provided including the Humber River unit rates for quantity control of 2 through 100 year storm events;
- The TRCA Humber River Watershed existing conditions hydrology model will be reviewed and verified based on existing land use and topography;
- The hydrology and hydraulics modelling updates will extend to the limits of the Secondary Plan Area;
- The Regional Storm event TRCA Humber River Watershed existing conditions hydrology model will be discretized for the purposes of establishing pre-development targets for stormwater management for the Study Area. Regional Storm event peak flows at key flow nodes downstream of the Study Area will be confirmed at key locations down to Lake Ontario;
- Existing Flood Vulnerable Areas (FVAs) downstream of the Study Area will be identified;
- The TRCA hydraulic models will be reviewed and updated as required for the tributaries of the Humber River located within the Study Area. The floodlines for watercourses (a defined channel, having a bed and banks or sides, in which a flow of water regularly or continuously occurs) will be delineated, as required. Any required modifications to the TRCA hydraulic model flows will be determined in accordance with the findings of the hydrologic assessment; and
- Additional field investigations via survey and field inspection of existing culverts will be conducted to verify existing drainage patterns and the TRCA hydraulic models.

3.3.2 Field/Desktop Studies

Detailed topographic survey of the Secondary Plan Area was conducted on the participating lands of the MTLOG throughout 2023 and 2024. The topography of the remaining areas was supplemented with open-data topographic contour mapping from the Region of Peel. Open-source orthographic photography of the Secondary Plan Area was obtained to confirm existing land-use characteristics to supplement where detailed topographic survey was unavailable.

The Geotechnical Investigations outlined in **Section 3.4** were utilized to confirm soil parameters on participating landowner properties.

3.3.3 Characterization and Analysis

The existing storm drainage boundaries as delineated in the Humber River Watershed hydrology model were refined based on the detailed topographic survey and LIDAR information obtained for the Secondary Plan Area and surrounding catchments. The refined drainage boundaries are delineated on **Figure D2-1** (**Appendix D2**). A summary of the catchment drainage areas that were modified is provided in the VO Parameter Summary table in **Appendix D3**.

In general, modifications to the existing drainage boundaries and catchment areas were minimal (<2%). The most significant changes occurred in and around Catchment 30.02 based on revisions to the drainage areas of smaller tributaries and more detailed survey of rural right-of-way ditch drainage including: Catchments 30.03, 30.08, and 30.10.

Three tributaries of the West Humber River identified as “General River” on the Humber River Hydrology map are located within the Secondary Plan extents. Each of the three reaches have associated floodplain constraints per the Engineered Floodplain Mapping provided by the TRCA (relevant excerpts provided in **Appendix D4**). Campbell’s Cross Creek is located at the southwestern corner of the Secondary Plan (Catchment 29.15 on **Figure D2-1**) and generally slopes from north to south before crossing Mayfield Road via an existing 10.67 m wide x 2.44 m high concrete box culvert. A tributary of the West Humber River (noted as Reaches WHT4(2)-1, WHT4(2)-2, and WHT4(3)-2) passes through the approximate center of the Secondary Plan (Catchments 30.04, 30.03, 30.01, and 32.27 on **Figure D2-1**) and generally slopes from west to southeast. The tributary crosses two arterial roads within the Secondary Plan, one crossing occurs at Bramalea Road via a 4.9 m wide x 1.8 m high concrete box culvert and the other crossing occurs at Torbram Road via a 8.0 m wide x 4.4 m high concrete elliptical culvert before leaving the Secondary Plan. A lesser tributary of the West Humber River (noted as Reaches WHT4(3)2-1a, WHT4(3)2-1b, and WHT4(3)3-1) is located along the eastern edge of the Secondary Plan (Catchment 31.01 on **Figure D2-1**) and generally slopes from north to south before joining the central West Humber River tributary at the upstream end of Reach WHT4(3)-1. The lesser West Humber River tributary enters the Secondary Plan via an existing 4.95 m wide x 1.72 m high concrete box culvert under Old School Road.

Several headwater drainage features (HDFs) of the West Humber River that potentially contain floodplain constraints were identified within the Secondary Plan including HDFs: H8 (Catchment 32.26), H3 (Catchment 31.01), H22 (Catchment 31.01), WHT4(3)4 (Catchment 30.02), and WHT4(3)5 (Catchment 30.02). The individual tributaries noted above were examined in further detail to determine if they met the drainage area criteria (>50 ha) and the watercourse definition (a defined channel, having a bed and banks or sides, in which a flow of water regularly or continuously occurs) to establish a floodplain constraint. A summary of the analysis is provided in **Table 3-5** below, drainage areas are delineated on **Figure D2-2** in **Appendix D2**.

Table 3-5: Floodplain Constraint Analysis Summary

West Humber River Tributary /HDF	HEC-RAS Tributary Label	Drainage Area (ha)	Classified as Watercourse	Floodplain Constraint Required
H8	F	111.51 (Catchment 32.26)	No	No
H3	K	53.54 (Catchments 301 and 302)	No	No
H22	L	14.85 (Catchment 303)	No	No
WHT4(3)4	O	123.89 (Catchments 201-203)	Yes	Yes
N/A	P – South Reach 3	37.17 (Catchment 101)	No	No
N/A	P – South Reach 2	34.08 (Catchment 102)	No	No
WHT4(3)5-2	P – South Reach 1	71.25 (Catchments 101 and 102)	Yes	Yes
WHT4(3)5-2	P – North Reach 1	58.05 (Catchment 103)	Yes	Yes
WHT4(3)5-1	P – Reach 1A-3A	193.41 (Catchments 101-106)	Yes	Yes

As indicated above, the only tributaries with floodplain constraints based on the associated criteria are WHT4(3)4 and WHT4(3)5.

Hydrologic modelling was undertaken using the Humber River Watershed Model with Visual Otthymo Version 6.4.1 software (VO6) to determine updated peak flows during the Regional Storm event based on the revised Catchment drainage areas noted above. A second standalone VO6 model was prepared to determine the peak flows during the Regional Storm event in the tributaries with floodplain constraints noted in **Table 3-5** above. The VO6 models and parameters are provided in **Appendix D3**. The updated peak flows and original model flows are provided in **Table D1-2** (**Appendix D1**).

Several catchments within the Secondary Plan Area were excluded from the update to the Humber River Watershed Model as it was determined that the land use assumptions and soil characteristics were consistent with those noted in the Humber River Hydrology Update (2015), and the increase or decrease in area was negligible and so would not impact flows significantly.

These catchments include: 29.13, 29.15, 32.24, 32.26, and 32.28. Where the area of a catchment was modified outside of the limit of the Secondary Plan Area, all other model parameters were maintained. These catchments include: 30.01, 30.03, 30.04, 30.08, 30.10, 31.02 and 32.27. Additionally, catchments with the Study Area, located outside of the Secondary Plan, were not updated.

It should be noted that the calculated CN value, N value, and time to peak were modified in accordance with the calibration parameters identified in Table 2.12 of the Humber River Hydrology Update (2015), relevant excerpts are provided in **Appendix D4**. The modification factors are noted in the parameter calculations in **Appendix D3**.

In general, the peak flows of the catchments that were modified did not change significantly throughout the Secondary Plan. A summary of the original and updated Regional Storm peak flows is provided in **Table D1-2** in **Appendix D1**. The peak flows during the Regional Storm event were either maintained or increased slightly. At the downstream end of West Humber River Tributary Reach WHT4(2)-1 where flows leave the Secondary Plan, the peak flow increased from 159.371 m^3/s to 162.781 m^3/s (2.1% increase) which is not anticipated to have a significant impact on downstream floodline elevations and conveyance structures. Therefore, no updates to downstream floodlines are warranted and any impacts to downstream flood vulnerable areas will be negligible based on the slight increase in peak flows.

The modified peak flows from the VO model were incorporated into the West Humber River HEC-RAS model to refine the floodplain elevations of the Regional Storm event through the Secondary Plan Area. Peak flows within the Study Area, outside of the Secondary Plan, were not revised as no updates were made to the VO model that would impact these reaches of the West Humber River. A summary of the updated HEC-RAS reaches is provided in **Table D1-2** (**Appendix D1**).

In addition to the Regional Storm event peak flows being refined, channel and crossing geometry, and Manning's n-values were refined based on the detailed topographic survey and orthographic imagery, where warranted. West Humber River tributaries that were determined to not have floodplain constraints were not updated. Detailed topographic survey of Campbell's Cross Creek and West Humber River reaches WHT4(2)-1, WHT4(3)-1, and WHT4(3)-2 could not be obtained due to access constraints where they passed through participating landowners. It is not anticipated that the limits of development will be governed by the floodplain constraints along these reaches, therefore the HEC-RAS geometry has not been updated. The HEC-RAS model for Campbell's Creek Tributaries WHT4(3)2, WHT4(3)3, WHT4(3)4, and WHT4(3)5 (including associated arterial road crossings) was updated. The updated HEC-RAS model and model results are provided in **Appendix D3**.

Floodplain mapping through the Secondary Plan has been prepared based on the updated hydraulic modelling. The revised Regional Storm floodplain has been provided on **Figures D2-3 to D2-8** (**Appendix D2**).

3.3.4 Summary of Findings

Existing storm drainage boundaries were delineated for the Secondary Plan and surrounding area based on detailed topographic survey and LIDAR mapping. The catchment parameters of affected catchments of the Humber River Hydrology Model were modified to reflect the revised areas. Catchments internal to the Secondary Plan were updated to reflect the more detailed land use and soils information available from participating landowners. The updated VO6 model and parameters are provided in **Appendix D3**.

In general, the peak flows of the catchments that were modified did not change significantly throughout the Secondary Plan. No updates to downstream floodlines are warranted and any impacts to downstream flood vulnerable areas will be negligible based on the slight increase in peak flows.

The revised peak flows from the Regional Storm event were input into the West Humber HEC-RAS model to prepare an updated Regional Storm floodline through the Secondary Plan. The updated HEC-RAS model and model results are provided in **Appendix D3**. The revised Regional Storm floodplain has been provided on **Figures D2-3 to D2-8** in **Appendix D2**.

3.3.5 Stormwater Management

The following stormwater runoff control criteria have been established based on the requirements of each of the design guidelines and standards listed in **Section 2.3**, and the MTLOG terms of reference in **Appendix A1**. The stormwater runoff criteria are summarized below in **Table 3-6**. Please note that the MECP CLI ECA SWM criteria is superseded by the Final Report Humber River Hydrology Update (June 2015).

Table 3-6: Stormwater Runoff Control Criteria

Criteria	Control Measure	Agency
Quantity Control	Per Table E.1 of the TRCA Stormwater Management Criteria, control post-development peak flow rates per unit flow Equation F Sub-Basin 36. Regional Storm controls are required.	TRCA, Town TRCA
Quality Control	MECP Enhanced Level Protection (80% TSS Removal).	TRCA, Town
Erosion Control	Minimum 5 mm on-site retention. Attenuation of the 25 mm rainfall runoff for a minimum of 48 hours.	TRCA TRCA, Town
Water Budget	Maintain existing groundwater recharge rates and appropriate distribution, ensuring the protection of related hydrology ecologic functions.	TRCA
Temperature Mitigation	SWM pond outflows should target discharge water temperatures below 24 degrees Celsius.	MECP

3.3.6 Climate Change Considerations

Stormwater management for the Secondary Plan Area will be designed based on the most current design guidelines and standards listed in **Section 2.3**. It is understood that the Town is currently incorporating climate change considerations into its engineering design criteria. Once available, the design of stormwater management infrastructure will incorporate the updated criteria.

The hydraulics and hydrology models prepared by the TRCA to determine the regulatory flood limit are based on the Regional Storm event which does not require modifications to incorporate climate change.

3.4 Geotechnical & Hydrogeological Existing Conditions

3.4.1 Scope Overview

Section 2.5 provides the background review and gap analysis completed to support developing the geotechnical and hydrogeological scope of work. In summary, 20 boreholes, 28 boreholes with monitoring wells, and 9 nested deep / shallow monitoring wells were advanced to supplement the existing borehole information, and to support the geotechnical and hydrogeological reporting requirements as part of the Local SWS. **Figures 2A to 2E (Appendix E2)** show the locations and depths of the boreholes and monitoring wells within the Study Area and **Figures 11A to 11E (Appendix E1)** show all hydrogeological monitoring locations (including surface water).

Subsurface investigations were conducted to determine the underlying soil and groundwater conditions, characterize the site geology, and to support the hydrogeological study. These investigations were only completed within the participating properties. Boreholes were previously advanced by others on Properties 2, 3, 9, and 10, and the results were included in site-specific reports by those consultants. It should be noted that continued monitoring, slope stability assessment and hydrogeological investigation will be completed by the respective consultant that constructed those monitoring locations for Properties 9 and 10 and the information reported will be reviewed and incorporated into GEI's investigation, where appropriate.

The proposed borehole and monitoring well locations were identified by GEI based on the gap analysis in **Section 2.5** and the borehole plans that were circulated to the Landowner's Group for review prior to drilling. The GEI borehole locations were laid out in the field by GEI staff prior to commencement of drilling operations. The locations of underground utilities were coordinated with private and public locating companies and drilling locations were cleared prior to the commencement of drilling activities.

Field investigations included the following:

- Advancing boreholes across the Study Area on participating properties and collecting soil samples using the Standard Penetration Test. Borehole depths were established to support typical development, with deeper boreholes in locations along the valley systems to support detailed slope stability analysis;
- Monitoring wells and nested wells were installed in strategic locations;

- The boreholes with monitoring wells/nested wells were instrumented with a 50 mm diameter PVC casing. All installations were conducted in accordance with O. Reg. 903 for subsequent monitoring and testing purposes;
- Conducting geotechnical laboratory testing on selected soil samples to determine soil index properties;
- Monitoring well development;
- Manual groundwater level measurements;
- Hydraulic conductivity testing (select locations);
- Groundwater sampling for Provincial Water Quality Objectives (PWQO) parameters (select locations);
- Instrumentation of monitoring well locations with dataloggers for long-term groundwater level monitoring (select locations);
- Installation and instrumentation of piezometers in creeks to monitor groundwater-surface water interactions (select locations). This was completed in collaboration with the surface water team; and
- Investigation and documentation of seeps at or near surface water features (indicative of upwelling groundwater). This was conducted in collaboration with the ecological and surface water teams during their work along the watercourses.

In order to prepare a preliminary characterization of the hydrogeology of the area, available mapping of the geological and hydrogeological and ecological conditions were reviewed in addition to completion of a preliminary field program. The preliminary field program is currently in progress, with the initial stages including the installation of a network of monitoring wells, nested monitoring wells, surface water/groundwater piezometers and staff gauge stations. A selection of these wells were hydraulically tested and sampled to provide background information across the site. Additionally, a selection of the monitoring wells and monitoring stations were instrumented with dataloggers to provide long-term continuous data for the site to provide input into variability and seasonality of groundwater and surface water levels.

While an initial characterization has been generated, long-term monitoring is underway for the groundwater levels and surface levels and this monitoring will continue for at least one year.

3.4.2 Subsurface Investigation Procedures and Methodology

All elevations in this report are geodetic/metric and expressed in metres (m). All measurements are also in metric and expressed in millimetres (mm), metres (m) or kilometers (km).

The proposed borehole and monitoring well locations were identified by GEI based on the gap analysis in **Section 2.5** and the borehole plans were circulated to the Landowner's Group for review prior to drilling. The GEI borehole locations were laid out in the field by GEI staff prior to commencement of drilling operations. The locations of underground utilities were coordinated with private and public locating companies.

Boreholes were previously advanced by others on Properties 2, 3, 9, and 10 and the results were included in site-specific reports. Those reports should be referenced for details on the field work procedures and methodology.

The GEI borehole ground surface elevations and coordinates (referencing NAD 83 geodetic datum) were surveyed by GEI with a Topcon HiPer SR GPS Survey unit. The elevations are provided on the GEI borehole logs in **Appendix E3**. Borehole locations are shown on **Figures 2A to 2E (Appendix E2)**.

The fieldwork for the GEI drilling program was carried out on April 22 to May 17, 2024. A total of 58 boreholes were advanced across the Study Area, with 29 of the boreholes instrumented with 50 mm diameter PVC monitoring wells, and 9 boreholes being instrumented with nested deep and shallow wells. The wells were installed in accordance with O. Reg. 903 and consisted of 50 mm diameter PVC screens and risers with monument protective well casings above grade. The borehole depths ranged from 6.2 to 20.3 m below existing grade.

The boreholes were advanced by a drilling subcontractor retained and supervised by GEI using a track mounted drill rig, solid and hollow stem augers, and standard soil sampling equipment. Soil sampling was conducted using a 51 mm O.D. Split Spoon (SS) sampler. Standard Penetration Test (SPT) “N” Values (N values) were recorded for the sampled intervals as the number of blows required to drive an SS sampler 305 mm into the soil using a 63.5 kg drop hammer falling 750 mm, in accordance with ASTM D1586. Soil sampling was conducted at 0.75 m intervals for the upper 3.0 m and at 1.5 m intervals thereafter.

The GEI field staff examined and classified characteristics of the soils encountered in the borehole, including the presence of fill materials, groundwater observations during and upon completion of the drilling, recorded observations of borehole construction, and processed the recovered samples. All recovered soil samples were logged in the field, carefully packaged, and transported to GEI’s laboratory for more detailed examination and classification.

The borehole backfilling / capping activities were performed in accordance with O. Reg. 903.

Following installation and surveying, groundwater level monitoring began in each of the monitoring wells constructed as part of this project. This included manual groundwater level measurements and select datalogger installations for long-term monitoring. Groundwater levels will be measured in each of the monitoring wells, including the nested monitoring wells for at least one (1) year to determine the seasonally high groundwater levels.

In GEI’s laboratory, the samples were classified as to their visual and textural characteristics. Twenty-three (23) soil samples were selected and submitted to our laboratory for grain size analysis. Grain size results are provided in **Appendix E5**. Four (4) samples were also tested for plasticity characteristics and the Atterberg limits report is in **Appendix E5**. Moisture contents were determined for all recovered soil samples and the results are shown on the borehole logs.

3.4.3 Subsurface Investigation Results and Site Characterization

The detailed soil profiles encountered in the GEI boreholes are indicated on the attached borehole logs in **Appendix E3**, with the results of geotechnical laboratory testing included in **Appendix E5**. The existing borehole logs located on the Study Area from other consultants are included in

Appendix E4. Borehole locations are shown on **Figures 2A to 2E** (**Appendix E2**). Subsurface profiles were cut through parts of the Study Area to show the estimated stratigraphy between the borehole locations and are shown on **Figures 3A to 3D** in **Appendix E2** (for illustrative purposes only).

The conditions indicated on the GEI borehole logs are for the specific locations only and can vary between and beyond the locations. The soil boundaries indicated on the borehole logs are inferred from non-continuous sampling and observations during drilling. These boundaries are intended to reflect approximate transition zones and should not be interpreted as exact planes of geological change. The conditions shown on the subsurface profiles are estimated between the borehole locations and are for illustrative purposes (not to be used for design).

In addition, the descriptions provided in the GEI borehole logs are inferred from a variety of factors, including: visual observations of the soil samples retrieved, laboratory testing, measurements prior to and after drilling, and the drilling process itself (speed of drilling, shaking/grinding of the augers, etc.). The passage of time also may result in changes in conditions interpreted to exist at locations where sampling was conducted.

The borehole logs from other consultants are included in engineering reports signed and sealed by professional engineers. GEI is relying on the borehole information from the other consultants to determine the subsurface conditions for the parts of Properties 2, 3, 9, and 10. Limitations, methodology, and other details can be found in the reports from the other consultants under separate covers.

The stratigraphy is described below separately for each property participating within the Study Area. In general, a regional deposit of stiff to hard cohesive glacial till was encountered across the Study Area, underlain at depth in some boreholes by very dense cohesionless glacial till. Underlying the glacial till, many boreholes encountered various cohesionless deposits of typically compact to dense sands and silts. Gravel deposits were locally encountered at depth in some of the boreholes advanced in the northern part of the Study Area, and locally in the eastern part of the Study Area.

Based on the background review and regional stratigraphic units (discussed in **Section 2.5**), the upper glacial till deposits are deduced to be the Halton Till formation, forming the Halton Aquitard. The deeper deposits of cohesionless glacial till underlying the upper cohesive till or the sands, silts, and gravels are deduced to be Newmarket Till, forming the Newmarket Aquitard. The deposits of sands and silts could be part of the Oak Ridges Aquifer Complex (ORAC), or where thinner, could be part of the Halton or Newmarket Till formations. The local gravels and gravelly deposits are deduced to be part of the ORAC.

Property 1

GEI Boreholes 1 to 16 were advanced on Property 1.

<u>Topsoil and Earth Fill</u>

Boreholes 1 to 16 encountered approximately 100 to 305 mm of topsoil at grade.

Earth fill was encountered underlying the topsoil in Boreholes 4D/S, 7, 11, 13, and 15D/S, and it extended to depths of 1.5 to 6.1 m below grade. The earth fill ranged in composition from clayey silt with some sand, to sandy with clayey silt pockets, to silt with trace gravel, and typically contained trace rootlets and trace organics. The fill was brown to dark brown, moist, and had a loose relative density or a firm to stiff consistency. Moisture contents measured in the earth fill ranged from 14 to 24%.

Glacial Till

The property was predominantly underlain by glacial till deposits with a cohesive matrix comprising clayey and sandy silt, with trace gravel. Some zones of the glacial till graded to some clay or some sand. Cobbles and boulders are inferred to be embedded within the deposits. The cohesive glacial till was encountered in Boreholes 1 to 3, 5, 6, 8D/S to 10, 12, and 14 to 16, extending to depths of 1.5 to 9.1 m below grade, or beyond the depth of drilling around 6.6 m below grade in some locations. The upper 0.5 to 0.8 m of the glacial till was weathered (potentially from frost action) or disturbed (possibly from historic farming practices prior to the golf course). The weathered / disturbed zone locally contained trace organics or trace rootlets.

The clayey and sandy silt glacial till was typically brown and moist, turning grey with depth. The SPT N values indicated a stiff to hard (but typically very stiff to hard) consistency. Grain size analysis was carried out on samples from Boreholes 9, 13. And 15, measuring 1 to 5% gravel, 26 to 32% sand, 44 to 60% silt and 13 to 26% clay as shown in **Appendix E5**. Moisture contents typically ranged from 9 to 21%.

Boreholes 1, 14 and 16 encountered cohesionless glacial till underlying the upper cohesive till. The cohesionless glacial till comprised sandy silt, with trace to some clay and trace gravel. It was encountered at depths of 6.1 to 9.1 m below grade, extending beyond the depth of drilling in Boreholes 1 and 14, and extended to 9.1 m in Borehole 16. The cohesionless glacial till was brown or grey and moist, with a very dense relative density.

Sands and Silts

Cohesionless deposits of sands and silts were encountered underlying the upper glacial till in Boreholes 2, 3, 6, 9, and 16, at depths of 1.5 to 9.1 m below grade. These deposits were encountered directly below the earth fill in Boreholes 4, 7, 11, and 13, at depths of 1.5 to 6.1 m. The composition of the deposits ranged from sand, to silt, to silty sand, to sandy silt, and distinct layering or seams of clayey silt to silty clay were noted in some locations. Where encountered, the sands and silts extended beyond the depth of drilling at 6.6 to 15.7 m below grade.

The sands and silts were brown to grey and damp, moist, or wet, with moisture contents ranging from 2 to 26%. SPT N values measured a very loose to very dense relative density, typically compact to very dense.

Grain size analysis was carried out on samples from Boreholes 3, 4, 9 and 16, as shown in **Appendix E5**. The sandy silt deposits measured 0% gravel, 23 to 27% sand, 72 to 74% silt, and 1 to 4% clay. The silty sand deposit measured 2% gravel, 67% sand, 29% silt, and 2% clay. The silt deposit measured 0% gravel, 4% sand, 90% silt, and 6% clay.

Groundwater Levels

Unstabilized groundwater level measurements and cave measurements were taken upon completion of drilling of each borehole as shown on the borehole logs in **Appendix E3.** These measurements provide a rough indication of behaviour during excavation, requirements for temporary groundwater control, and other constructability considerations. Initial groundwater elevations were collected and are shown below.

Table 3-7: Property 1 - Groundwater Level Data

Location	Date	Groundwater Level (Depth mbgs/ Elev. m)
BH/MW 2	May 22, 2024	Dry
BH/MW 3	May 22, 2024	5.74 / 269.43
BH/MW 5	May 22, 2024	3.16 / 264.36
BH/MW 7	May 22, 2024	Dry
BH/MW 9	May 24, 2024	10.33 / 255.81
BH/MW 11	May 22, 2024	Dry
BH/MW 13	May 22, 2024	Dry
BH/MW 14	May 22, 2024	8.37 / 255.16
BH/MW 16	May 22, 2024	10.49 / 249.07
NW 4D	May 24, 2024	5.58 / 261.52
NW 4S	May 22, 2024	Dry
NW 8D	May 24, 2024	4.8 / 259.15
NW 8S	May 24, 2024	1.33 / 262.52
NW 15D	May 22, 2024	3.38 / 258.57
NW 15S	May 22, 2024	Dry

For this property, the groundwater levels measured in May ranged from about 1.3 to 10.5 m below grade, with several monitoring wells remaining dry on the date of observation.

Based on preliminary data, groundwater flow is interpreted to flow locally towards the watercourses (including the online ponds) present across the site. The West Humber River tributary flows north to south through almost the middle of the site. Regional groundwater flow is expected to roughly follow this pattern, flowing towards the south-southeast. This is consistent with Drawing GW-7 in the Part A SWS SABE Report (Wood, 2022), which shows regional groundwater flow to the southeast.

Properties 2 and 3

GEI advanced Boreholes 17, 18, and 56D/S on Properties 2 and 3 to supplement the EXP Boreholes 1 to 15 advanced at 12442 Bramalea Road in 2022, and EXP Boreholes 1 to 30 advanced at 12282 Bramalea Road in 2021. Borehole locations and borehole logs for EXP drilled boreholes are attached in **Appendix E4**.

Topsoil and Earth Fill (Reworked Native Soils)

The boreholes encountered approximately 180 to 610 mm of topsoil at the ground surface.

EXP 2022 Boreholes 1 to 10, 14 and 15, and EXP 2021 Boreholes 9, 15, 17, 18, 20, 24 and 27 encountered earth fill below the topsoil layer. The earth fill was identified as reworked native soil, which is identified as disturbed soil on the GEI borehole logs. The earth fill typically extended to depths of about 1 to 1.5 m below grade, and consisted of brown clayey silt to sandy silt with trace gravel and trace rootlets.

Glacial Till

The property was underlain by glacial till deposits that extended beyond the depth of drilling at 6.6 to 9.6 m below grade.

The property is predominantly underlain by an upper glacial till deposit with a cohesive matrix comprising clayey silt, some sand to sandy, with trace gravel. Some EXP boreholes noted occasional sand or silt seams. Cobbles and boulders are inferred to be embedded within the deposits. The upper 0.5 to 1.5 m of the glacial till was weathered or disturbed (identified as earth fill on the EXP borehole logs, as noted previously). The clayey silt till was brown, turning grey with depth, and moist with measured moisture contents in the typical range of 8 to 20%. The SPT N values measured a generally stiff to hard consistency.

The clayey silt till extended beyond the depth of drilling in most boreholes, but was underlain by cohesionless glacial till in some locations. The cohesionless glacial till had a matrix consisting of sandy silt to sand and silt, with trace to some clay and trace gravel. It was encountered in GEI Borehole 17, and EXP 2021 Boreholes 6, 12, 13, 17, 20, 24, 26, and 29, at depths of 5.5 to 7.8 m and extended beyond the depth of drilling. The cohesionless glacial till was grey and moist, with moisture contents ranging from about 8 to 14%. The SPT N values measured a very dense relative density.

Grain size analysis was completed on three glacial till samples from the GEI boreholes, measuring 1 to 8% gravel, 16 to 39% sand, 43 to 52% silt, and 12 to 31% clay. Atterberg limits testing on a clayey silt till sample from Borehole 18 measured a liquid limit of 35.3%, a plastic limit of 18.5%, and a plasticity index of 16.8, indicating medium plasticity.

Groundwater Levels

Properties 2 and 3 were previously investigated in detail by EXP (2022). In order to provide further detail regarding the groundwater system relative to the watercourses located along the north end of the property and flowing across the southwest corner, GEI installed a nested monitoring well in the southwest and installed a monitoring well near the watercourse to the north. Initial groundwater elevations were measured and are shown below.

Table 3-8: Properties 2 & 3 - Groundwater Level Data

Location	Date	Groundwater Level (Depth mbgs/ Elev. m)
BH/MW 17	June 4, 2024	2.86 / 260.07
NW 56D	May 23, 2024	5.69 / 245.8
NW 56S	May 23, 2024	1.85 / 249.62
EXP2022-2	July 18, 2024	2.31 / 261.69
EXP2022-5	July 18, 2024	0.72 / 259.88
EXP2022-11	July 18, 2024	0.63 / 261.47
EXP2022-14	July 18, 2024	0.56 / 258.64
EXP2021-5	July 18, 2024	1.96 / 257.44
EXP2021-15	July 18, 2024	0.41 / 257.19

Groundwater levels were noted to range between 0.41 mbgs (EXP2021-15) to 5.69 mbgs (NW 56D). Groundwater likely flows locally towards the watercourses, but the overall trend in the groundwater elevations shows groundwater flow to the south or southeast on a more regional level. Drawing GW-7 within the Part A SWS SABE report (Wood, 2022) shows the regional groundwater flow is to the southeast.

Property 4

GEI Boreholes 19 to 26, 28, 32, 35, 36, 101 and 102 were advanced on Property 4.

Topsoil and Earth Fill

The boreholes encountered approximately 100 to 255 mm of topsoil at grade.

Borehole 20 was advanced near a residential dwelling and Old School Road, encountering earth fill beneath the topsoil. The earth fill consisted of clayey silt with some sand, trace gravel, trace organics and rootlets, extending to a depth of 0.8 m below grade. The fill was dark brown and moist with a firm consistency.

Glacial Till

The property was predominantly underlain by glacial till deposits with a cohesive matrix comprising clayey and sandy silt, with trace gravel. Some zones of the glacial till graded to some clay or some sand. Cobbles and boulders are inferred to be embedded within the deposits. The cohesive glacial till was encountered in Boreholes 19 to 26, 28, 32, 35, 36, and 102, extending to depths of 2.3 to 6.1 m below grade, or beyond the depth of drilling at 6.6 m below grade in some locations. The upper 0.5 to 0.8 m of the glacial till was weathered (potentially from frost action) or disturbed (possibly from historic farming practices). The weathered / disturbed zone locally contained trace organics or trace rootlets.

The clayey and sandy silt glacial till was typically brown and moist, turning grey with depth. The SPT N values indicated a firm to hard (but typically very stiff to hard) consistency. Moisture contents typically ranged from 8 to 22%.

Underlying the cohesive glacial till, Borehole 35 encountered cohesionless glacial till with a matrix consisting of sandy silt with trace clay and trace gravel, extending from 4.6 m to beyond the depth of drilling at 6.6 m. The deposit was grey, moist, and dense.

Borehole 102 encountered a deeper cohesionless deposit of glacial till from 13.7 to 18.3 m below grade, underlying a wet silt deposit. The glacial till had a matrix consisting of sand and silt, with trace clay and trace gravel. A sample was submitted for grain size analysis and measured 9% gravel, 44% sand, 43% silt and 4% clay, as shown in **Appendix E5**. The moisture contents ranged from 9 to 15%.

Sands, Silts, and Gravels

Various cohesionless deposits of sands, silts, and gravels were encountered underlying the upper glacial till in Boreholes 19, 21, 23, 25, 26, and 102, at depths of 2.3 to 6.1 m below grade. These deposits were encountered directly below the topsoil and weathered / disturbed soil in Borehole 101 at 1.2 m below grade.

The composition of the deposits ranged from sand, to silt, to silty sand, to sandy silt, to sandy gravel, to gravelly sand, with distinct layering noted in some locations. Where encountered, the cohesionless deposits extended beyond the depth of drilling at 6.6 to 20.3 m below grade. The layers of sand and gravel to gravelly sand were encountered in Boreholes 23 and 101 at depths of 9.1 to 10.7 m, extending beyond the depth of drilling in Borehole 23 at 12.6 m and extending to 16.8 m in Borehole 101.

The cohesionless deposits were brown to grey and moist, becoming wet with depth. Moisture contents typically ranged from 3 to 25%. SPT N values measured a loose to very dense relative density, typically compact to very dense.

Grain size analysis was carried out on samples from Boreholes 23, 101, and 102, as shown in **Appendix E5**. The silt deposit in Borehole 102 measured 0% gravel, 2% sand, 93% silt, and 5% clay. The gravel / gravelly deposits in Boreholes 23 and 101 measured 26 to 35% gravel, 52 to 66% sand, 8 to 10% silt, and 0 to 3% clay.

Groundwater Levels

Unstabilized groundwater level measurements and cave measurements were taken upon completion of drilling of each borehole as shown on the borehole logs in **Appendix E3**. These measurements provide a rough indication of behaviour during excavation, requirements for temporary groundwater control, and other constructability considerations. Initial groundwater elevations were collected and are shown below.

Table 3-9: Property 4 - Groundwater Level Data

Location	Date	Groundwater Level (Depth mbgs/ Elev. m)
BH/MW 20	May 22, 2024	1.08 / 267.48
BH/MW 21	May 22, 2024	4.46 / 261.93
BH/MW 23	May 22, 2024	11.14 / 257.0
BH/MW 26	May 22, 2024	1.34 / 259.45
BH/MW 28	May 22, 2024	2.44 / 261.42
BH/MW 35	May 22, 2024	2.71 / 257.27
BH/MW 101	May 22, 2024	10.54 / 256.56
BH/MW 102	May 22, 2024	5.98 / 259.41
NW 24D	May 22, 2024	2.4 / 261.45
NW 24S	May 22, 2024	0.93 / 262.84

BH/MW 101, 102, and 23 were screened deeper below grade (about 13 to 20 m deep), and measured groundwater levels at about 6 to 11.1 m below grade (Elev. 259.4 to 256.6 m). The other wells were screened near 6 m below grade and measured groundwater levels at 1.1 to 4.5 m below grade. Shallow NW 24 was screened at 2.2 m below grade and measured the groundwater level at 0.9 m depth.

Based on the preliminary data, groundwater is interpreted to flow locally towards the watercourses on the property. Regional groundwater flow is expected to roughly follow the tributary flow patterns, flowing towards the south, which is consistent with Drawing GW-7 within the Part A SWS SABE report (Wood, 2022).

Property 6

Boreholes 47, 51, and 55 were advanced on Property 6.

Topsoil

The boreholes encountered approximately 230 to 330 mm of topsoil at the ground surface.

Glacial Till

The property was predominantly underlain by glacial till deposits with a cohesive matrix comprising clayey and sandy silt, with trace gravel. Some zones of the glacial till graded to some clay or some sand. Cobbles and boulders are inferred to be embedded within the deposits. The glacial till was cohesionless at 6.1 m below grade in Borehole 51. The glacial till extended beyond the depth of drilling at 6.5 to 6.6 m below grade.

The upper 0.7 of the glacial till in Borehole 55 was weathered (potentially from frost action) or disturbed (possibly from historic farming practices).

The glacial till was brown, turning grey near 3 to 5 m below grade, and was moist with moisture contents ranging from 8 to 20%. The SPT N values indicated a very stiff to hard consistency, locally very dense.

Groundwater Levels

Unstabilized groundwater level measurements and cave measurements were taken upon completion of drilling of each borehole as shown on the borehole logs in **Appendix E3**. These measurements provide a rough indication of behaviour during excavation, requirements for temporary groundwater control, and other constructability considerations. Initial groundwater elevations were collected and are shown below.

Table 3-10: Property 6 - Groundwater Level Data

Location	Date	Groundwater Level (Depth mbgs/ Elev. m)
BH/MW 47	May 23, 2024	1.14 / 249.95
BH/MW 55	May 23, 2024	0.47 / 250.83

Based on the preliminary data from the property and from the adjacent properties, groundwater appears to flow generally to the east. Drawing GW-7 within the Part A SWS SABE report (Wood, 2022) does not show a more regional flow direction for this part of the Study Area, but nearby it notes that groundwater flows southwest towards the West Humber River tributary.

Properties 7 and 8

GEI Boreholes 27, 29, 30, 31, 33 and 34 were advanced on Properties 7 and 8.

Topsoil

The boreholes encountered approximately 205 to 815 mm of topsoil at the ground surface.

Glacial Till

Underlying the topsoil, the boreholes encountered a cohesive glacial till deposit with a matrix comprising silt, some clay to clayey, some sand to sandy, and trace gravel. Cobbles and boulders are inferred to be embedded within the deposits. The cohesive glacial till extended to depths of 2.3 to 6.1 m below grade, and was also encountered from 6.1 to beyond the depth of drilling at 6.6 m in Borehole 30 (underlying a sand deposit). In some boreholes, the upper 0.5 to 0.6 m of the glacial till was weathered (potentially from frost action) or disturbed (possibly from historic farming practices). The cohesive till was brown to grey and moist to wet, with moisture contents of about 7 to 18%. SPT N values measured a stiff to hard consistency. Grain size analysis on a sample from Borehole 31 measured 7% gravel, 29% sand, 50% silt, and 14% clay.

A deeper cohesionless glacial till deposit was encountered below the upper till in Borehole 34 at 6.1 m, and below sand and silts deposits at 12.2 m below grade in Borehole 29. The cohesionless till had a matrix consisting of sand and silt, with trace to some clay and trace gravel, and extended beyond the depth of drilling at 6.6 to 15.7 m below grade. The till was grey and moist to wet, with a very dense relative density. Moisture contents were 8 to 16%. Grain size analysis was completed on a sample from Borehole 29, measuring 9% gravel, 44% sand, 43% silt, and 5% clay.

Sands, Silts, and Gravel

Deposits of sands and silts were encountered underlying the upper glacial till in Boreholes 27 and 33, extending beyond the depth of drilling at 6.6 to 12.6 m below grade, or were interbedded between the glacial till deposits in Boreholes 29 and 30 from depths of 2.3 to 6.1 m, down to 6.1 to 12.2 m. The soils were typically grey and wet, with SPT N values measuring typically compact to very dense relative densities. The 3.1 m thick sand deposit in Borehole 33 and the silt deposit in Borehole 27 were layered with clayey silt.

A gravel and sand deposit was encountered locally at 4.6 m in Borehole 31, extending beyond the depth of drilling at 5.0 m. The gravel and sand was grey, wet, and dense.

Grain size analysis was carried out on samples from Boreholes 27, 29, and 31, as shown in **Appendix E5**. The silt deposit in Borehole 27 measured 0% gravel, 0% sand, 88% silt, and 12% clay. The sand deposit in Borehole 29 measured 0% gravel, 82% sand, 14% silt, and 4% clay. The gravel and sand deposit in Borehole 31 measured 37% gravel, 50% sand, 12% silt, and 1% clay.

Groundwater Levels

Unstabilized groundwater level measurements and cave measurements were taken upon completion of drilling of each borehole as shown on the borehole logs in **Appendix E3**. These measurements provide a rough indication of behaviour during excavation, requirements for temporary groundwater control, and other constructability considerations. Initial groundwater elevations were collected and are shown below.

Table 3-11: Properties 7 & 8 - Groundwater Level Data

Location	Date	Groundwater Level (Depth mbgs/ Elev. m)
BH/MW 27	May 22, 2024	0.97 / 256.84
BH/MW 29	May 22, 2024	- 0.93 / 259.78
NW 31D	May 22, 2024	-2.44 / 255.64
	June 24, 2024	-1.66 / 254.86
NW 31S	May 22, 2024	0.93 / 252.27
	June 24, 2024	0.79 / 252.41
NW 33D	May 22, 2024	-1.03 / 257.52
	June 24, 2024	-0.43 / 256.92
NW 33S	May 22, 2024	0.75 / 255.77
	June 24, 2024	0.14 / 256.38

Groundwater levels were noted to range between 2.44 m above ground surface (NW 31D) to 0.97 mbgs (BH/MW 27). Artesian conditions were encountered in BH/MW 29, NW 31D and NW 33D. BH/MW 29 was screened at 15 mbgs within a deeper glacial till deposit. This area may warrant further investigation and characterization of the potential to intersect an artesian aquifer. This would be conducted as part of future studies at the site during draft plan of subdivision or detailed design.

The West Humber River tributary flows roughly north to south through the east side of the site. Based on the preliminary data, groundwater flow is interpreted to flow locally towards the watercourse on the east side of the properties. The West Humber River tributary flows roughly north to south through the east side of the site. Regional groundwater flow is expected to roughly follow this pattern, flowing towards the south-southeast. This is relatively consistent with Drawing GW-7 within the Part A SWS SABE report (Wood, 2022).

Properties 5 and 11

Boreholes 38, 39, 42, 43, 46, 48 to 50, and 52 to 54 were advanced on Properties 5 and 11.

Topsoil and Earth Fill

The boreholes encountered approximately 115 to 610 mm of topsoil at the ground surface.

Borehole 49 encountered earth fill below the topsoil that extended to 4.6 m below grade. The earth fill consisted of clayey silt, with some sand, trace gravel, trace rootlets, trace organics, and varied from brown, dark brown, mottled grey to blackish-brown. The fill was moist to wet with moisture contents of 18 to 29%. The SPT N values measured a soft to stiff consistency.

Glacial Till

The property was predominantly underlain by glacial till deposits with a cohesive matrix comprising clayey and sandy silt, with trace gravel. Some zones of the glacial till graded to some clay or some sand. Cobbles and boulders are inferred to be embedded within the deposits. The glacial till was cohesionless at 8.1 m below grade in Borehole 50. The glacial till extended beyond the depth of drilling at 6.6 to 9.2 m below grade. The upper 0.5 to 0.7 m of the glacial till was weathered (potentially from frost action) or disturbed (possibly from historic farming practices).

The glacial till was brown, turning grey near 4 to 6 m below grade, and was moist with moisture contents ranging from 9 to 20%. The SPT N values indicated a stiff to hard consistency, locally very dense.

A sample from Borehole 52 was submitted for grain size analysis and measured 6% gravel, 33% sand, 40% silt, and 21% clay.

Groundwater Levels

Unstabilized groundwater level measurements and cave measurements were taken upon completion of drilling of each borehole as shown on the borehole logs in **Appendix E3**. These measurements provide a rough indication of behaviour during excavation, requirements for temporary groundwater control, and other constructability considerations. Initial groundwater elevations were collected and are shown below.

Table 3-12: Properties 5 & 11 - Groundwater Level Data

Location	Date	Groundwater Level (Depth mbgs/ Elev. m)
BH/MW 39	May 23, 2024	2.84 / 249.42
BH/MW 42	May 23, 2024	1.27 / 254.95
BH/MW 49	May 23, 2024	2.51 / 243.87
BH/MW 54	May 23, 2024	4.98 / 239.71
NW 52D	May 23, 2024	0.8 / 242.79
NW 52S	May 23, 2024	1.52 / 242.08

The groundwater elevations were noted to range between 254.95 m (BH/MW 42) to 239.71 m (BH/MW 54). Groundwater levels were noted to range between 0.8 mbgs (NW 52D) to 4.98 mbgs (BH/MW 54).

There is a tributary of the West Humber River flowing across the northeast corner of the properties. Based on the groundwater elevations, groundwater flow appears to be primarily to the east, towards the watercourse. Locally closer to the watercourse, flow could be to the northeast. Drawing GW-7 within the Part A SWS SABE report (Wood, 2022) shows regional groundwater flows to the south on the opposite side of the watercourse. Flow on the properties generally to the east is consistent with the SABE report showing flow towards the watercourse.

Property 9

GEI Boreholes 37 and 40, and GEMTEC Boreholes 23-1 to 23-22, 23-28, and 22-01 to 22-06 were advanced on Property 9.

Topsoil, Earth Fill and Organic Material

The boreholes generally encountered about 80 to 690 mm of topsoil at the ground surface.

Earth fill was encountered in various GEMTEC boreholes, extending to depths of about 0.9 to 4.0 m below grade. The composition of the fill ranged from silty clay, to silty sand, to sandy gravel and organics were noted throughout the zone. The fill was typically brown and moist, and SPT N values measured a soft to hard consistency for cohesive zones, to a compact relative density for cohesionless zones.

Distinct layers of organic silty clay were encountered in some borehole locations, typically underlying the earth fill. The organic deposits were about 0.3 to 2.1 m thick.

Silty Clay

Most GEMTEC boreholes encountered upper silty clay deposits, and some locations encountered deeper silty clay underlying or interbedded within the glacial till. The SPT N values indicated a typically firm to hard consistency. Laboratory testing from GEMTEC is appended, including moisture contents shown on the borehole logs, grain size analysis, and Atterberg limits testing.

Glacial Till

Glacial till deposits were encountered in almost every GEMTEC borehole. Glacial till was encountered in GEI Boreholes 37 and 40 from 0.5 to 1.5 m depth, extending to 4.6 m. The cohesive glacial till deposits had a matrix consisting of silty clay to clayey silt, with trace sand to sandy, and trace gravel. The cohesionless glacial till deposits consisted of silty sand, to sandy silt, to sand and silt, with trace to some clay and trace gravel. Cobbles and boulders are inferred to be embedded within the deposits.

The SPT N values measured in the glacial till deposits indicated a stiff to hard consistency for the cohesive zones, and a dense to very dense relative density for the cohesionless zones.

Moisture contents within the glacial till typically ranged from 8 to 18%. Laboratory testing from GEMTEC is appended, including grain size analysis and Atterberg limits testing.

Cohesionless Deposits

Cohesionless deposits were encountered in many of the GEMTEC boreholes at various depths. The deposits consisted of silty sand, sand, silt, to sandy silt. SPT N values indicated compact to very dense relative densities. Laboratory testing from GEMTEC is appended, including moisture contents shown on the borehole logs, grain size analysis, and Atterberg limits testing.

GEI Borehole 40 encountered wet and loose sandy silt below the topsoil and overlying the glacial till deposit. The sandy silt extended to 1.5 m below grade.

GEI Borehole 37 encountered a gravelly and silty sand deposit from 4.6 m to beyond the depth of drilling at 6.2 m. The deposit was grey, wet, and very dense. Grain size analysis is included in **Appendix E5**, measuring 21% gravel, 44% sand, 29% silt and 6% clay.

GEMTEC Boreholes 23-7, 23-10, and 23-19 encountered deposits of gravelly sand to sandy silt gravel, at depths of about 6.9 to 11.7 m and extending beyond the depth of drilling.

Bedrock

GEI Borehole 40 encountered weathered bedrock at 4.6 m below grade (Elev. 234.2 m), inferred to consist of weathered grey shale based on drilling observations and samples recovered in the split spoon sampler.

Several GEMTEC Boreholes estimated the weathered bedrock surface to be at Elev. 235.5 to 247.5 m. Rock core was recovered in Boreholes 23-11, 23-12 and 23-17, encountering bedrock of the Georgian Bay Formation consisting of interbedded limestone and shale. The upper 0.5 to 1 m of the bedrock was weathered. Compressive strength test results, rock core photos and rock core logs are appended.

Groundwater Levels

GEMTEC has conducted groundwater level monitoring for this property. Their report noted in May 2023 that groundwater ranged in depth of -0.6 mbgs (BH23-1) to 6.9 mbgs (BH23-26) with elevations of 258.5 m (BH23-1) to 241.8 m (BH23-26). They noted that artesian conditions were encountered in at least one nested monitoring well in both the shallow and deep wells (BH23-28S/D) and that the artesian conditions had not been characterized as part of the investigation.

GEI installed two additional wells to supplement the GEMTEC data. Initial groundwater elevations were collected and are shown below.

Table 3-13: Property 9 - Groundwater Level Data

Location	Date	Groundwater Level (Depth mbgs/ Elev. m)
BH/MW 40	June 3, 2024	0.9 / 237.92
NW 37D	June 3, 2024	- 0.87 / 250.64
NW 37S	June 3, 2024	0.39 / 249.32
GEMTEC 23-1	May 18, 2023	258.53
GEMTEC 23-2	May 18, 2023	255.25
GEMTEC 23-4	May 18, 2023	254.21
GEMTEC 23-5	May 18, 2023	254.88
GEMTEC 23-6D	May 18, 2023	252.78
GEMTEC 23-6S	May 18, 2023	253.96
GEMTEC 23-7	May 18, 2023	250.46
GEMTEC 23-8	May 18, 2023	249.68
GEMTEC 23-9	May 18, 2023	253.55
GEMTEC 23-10D	May 18, 2023	249.10
GEMTEC 23-10S	May 18, 2023	251.03
GEMTEC 23-11	May 18, 2023	245.53
GEMTEC 23-12	May 18, 2023	245.73
GEMTEC 23-15	May 18, 2023	252.54
GEMTEC 23-17D	May 18, 2023	251.55
GEMTEC 23-17S	May 18, 2023	251.82
GEMTEC 23-18	May 18, 2023	252.27
GEMTEC 23-19	May 18, 2023	246.82
GEMTEC 23-21D	May 18, 2023	248.87
GEMTEC 23-21S	May 18, 2023	249.04
GEMTEC 23-22	May 18, 2023	252.15

Location	Date	Groundwater Level (Depth mbgs/ Elev. m)
GEMTEC 22-2	May 18, 2023	256.11
GEMTEC 22-5	May 18, 2023	248.41
GEMTEC 22-6	May 18, 2023	252.49
GEMTEC DP23-1	May 18, 2023	249.48
GEMTEC DP23-2	May 18, 2023	254.44
GEMTEC DP23-3	May 18, 2023	247.16
GEMTEC DP23-4	May 18, 2023	244.58
GEMTEC 23-E1	May 18, 2023	253.42
GEMTEC 23-E2	May 18, 2023	252.59
GEMTEC 23-E3	May 18, 2023	252.27

Groundwater flow is expected to be complicated at this property and GEMTEC did not generate a groundwater contour map as part of their investigation. Likely local flow is towards either the stream network which is located approximately half of the property (northwest portion) or the multiple ponds onsite (northeast, east and south-southwest). Regional groundwater flow would be expected to be towards the south, towards the main West Humber River tributary. This is consistent with the regional flow direction to the south on Drawing GW-7 within the Part A SWS SABE report (Wood, 2022).

Property 10

GEI Boreholes 41, 44 and 45, and GEMTEC Boreholes 23-23 to 23-27 were advanced on Property 10.

Topsoil

The boreholes encountered approximately 125 to 500 mm of topsoil at the ground surface.

Glacial Till

The property was predominantly underlain by glacial till deposits with a cohesive matrix comprising clayey and sandy silt to sandy and silty clay, with trace gravel. Some zones of the glacial till graded to some clay or some sand. Cobbles and boulders are inferred to be embedded within the deposits. GEI Boreholes 41, 44 and 45 encountered the clayey silt till underlying the topsoil, extending beyond the depth of drilling at 9.2 to 9.6 m below grade. The upper 0.6 to 0.7 m of the glacial till was weathered (potentially from frost action) or disturbed (possibly from historic farming practices). GEMTEC Boreholes 23-23 to 23-27 encountered the silty clay till at depths of 0.7 to 4.0 m, underlying an upper silty clay deposit. The silty clay till extended to depths of 7.1 to 8.6 m below grade in the GEMTEC boreholes.

The cohesive glacial till was brown, turning grey with depth, and typically moist. Moisture contents ranged from about 8 to 20%. GEI geotechnical laboratory testing is in **Appendix E5**, and the GEMTEC laboratory testing is in Appendix F5.The cohesive glacial till samples measured 2 to 7% gravel, 20 to 27% sand, 32 to 47% silt, and 24 to 41% clay. Atterberg limits testing measured a liquid limit of 24 to 27%, a plastic limit of 13 to 16%, and a plasticity index of 11, indicating low plasticity.

GEMTEC Borehole 23-23 encountered a cohesionless glacial till deposit with a matrix consisting of gravelly sand and silt with trace clay, underlying the cohesive till. The moist to wet and very dense sand and silt till was encountered from 8.6 m below grade, extending to the weathered bedrock surface at 14.4 m (Elev. 235.51 m).

Silty Clay

Underlying the topsoil, the GEMTEC boreholes encountered silty clay with some sand and trace gravel extending to 0.7 to 4.0 m below grade. Boreholes 23-24, 23-25 and 23-26 also noted the silty clay below the silty clay glacial till at depths of 7.1 to 8.6 m. The silty clay was brown to grey, moist, and soft to hard. Atterberg limits testing measured a liquid limit of 30%, a plastic limit of 17%, and a plasticity index of 13, indicating low plasticity.

Silty Sand to Sand and Silt

GEMTEC Boreholes 23-26 and 23-27 encountered cohesionless deposits of grey and moist to wet sand and silt to silty sand, with trace to some gravel and trace clay. The deposits were encountered at 7.1 to 10 m below grade and extended beyond the depth of drilling at 8.0 to 15.3 m. SPT N values measured a very dense relative density and moisture contents were typically near 5%. Grain size analysis measured 10% gravel, 42% sand, 40% silt, and 8% clay.

Bedrock

GEMTEC Borehole 23-23 encountered highly weathered shale of the Georgian Bay Formation at 14.4 m below grade (Elev. 235.51 m). Rock coring was not conducted, and the bedrock was likely inferred from the split spoon sampler and drilling observations.

Groundwater Levels

Unstabilized groundwater level measurements and cave measurements were taken upon completion of drilling of each borehole as shown on the borehole logs in **Appendix E3**. These measurements provide a rough indication of behaviour during excavation, requirements for temporary groundwater control, and other constructability considerations.

Initial groundwater elevations were collected and are shown below.

Table 3-14: Property 10 - Groundwater Level Data

Location	Date	Groundwater Level (Depth mbgs/ Elev. m)
BH/MW 41	May 23, 2024	8.47 / 241.4
BH/MW 45	May 23, 2024	4.5 / 243.7
GEMTEC 23-23D	May 18, 2023	244.91
GEMTEC 23-23S	May 18, 2023	247.79
GEMTEC 23-24	May 18, 2023	248.21
GEMTEC 23-26	May 18, 2023	241.84

The groundwater elevations were noted to range between 241.84 m (GEMTEC 23-26) to 248.21 m (GEMTEC 23-24). Based on the data, the eastern half of the property appears to have groundwater flowing south toward the West Humber River tributary. This is consistent with Drawing GW-7 within the Part A SWS SABE report (Wood, 2022), which shows regional flow to the south in this area. On the opposite side of the watercourse (western half of the property), there are no specific wells on the property but groundwater elevations from wells on adjacent properties indicate groundwater flows east toward the watercourse.

3.4.4 Groundwater Testing

Hydraulic Conductivity Testing

Rising head tests were completed in select monitoring wells across the area between May 24 and June 12, 2024. Wells were selected during this phase of study to provide a selection of results with relatively equal coverage across the Study Area. A sufficient water column in the monitoring well was required in order to conduct a test.

Rising head tests were conducted by manually purged from monitoring wells using an inertial pump. The static water level was measured prior to the start of testing, and the change in water level was monitored using an electronic level logger. The level loggers were left in the monitoring wells for several hours to allow for adequate recovery of the groundwater. The tests were completed to estimate the horizontal hydraulic conductivity (K) of the soils at the well screen depths.

Hydraulic conductivity values were calculated from the rising head test data using Hvorslev's solution (1951) where the well screen was fully saturated and Dagan's solution (1978) where the groundwater table straddled the well screen. The semi-log plots for the results are provided in **Appendix E6** and are summarized in the table below.

Table 3-15: Hydraulic Conductivity Testing Results

Property	Monitoring Wells	Well Screen Location		Strata Screened	Hydraulic Conductivity (K) (m/s)
		Depth (m)	Elev. (m)		
1	MW 16	13.1 to 15.2	246.5 to 244.4	Sandy Silt; Silt	7.4×10^{-7}
2	MW 17	7.6 to 9.1	255.3 to 253.8	Sand and Silt Glacial Till	5.5×10^{-6}
4	NW 24S	3.5 to 4.1	270.6 to 269.2	Clayey & Sandy Silt Glacial Till	3.2×10^{-7}
4	NW 24D	4.6 to 6.1	268.1 to 266.6	Clayey & Sandy Silt Glacial Till	2.7×10^{-7}
4	BH/MW 101	4.6 to 6.1	265.9 to 264.4	Sand & Silt	5.6×10^{-8}
4	BH/MW 102	4.6 to 6.1	264.7 to 267.1	Sand & Silt Glacial Till; Silt	7.8×10^{-8}
5	BH/MW 42	4.6 to 6.1	265.9 to 264.4	Clayey Silt Glacial Till	4.6×10^{-7}
6	BH/MW 55	4.6 to 6.1	221.7 to 220.2	Clayey Silt Glacial Till	3.9×10^{-7}
7 & 8	BH/MW 29	13.9 to 15.0	255.7 to 254.2	Silt; Sand & Silt Glacial Till	6.5×10^{-8}
7 & 8	BH/MW 33S	2.6 to 4.0	263.1 to 265.6	Clayey Silt Glacial Till	2.2×10^{-7}
7 & 8	BH/MW 33D	4.6 to 6.1	265.9 to 264.4	Sand Layered with Clayey Silt	3.2×10^{-8}
7 & 8	BH/MW 31S	4.6 to 6.1	254.7 to 257.1	Sandy Silt Glacial Till, Some Clay	4.0×10^{-7}
11	BH/MW 52S	2.6 to 4.0	263.1 to 265.6	Clayey Silt Glacial Till	4.2×10^{-7}
11	BH/MW 52D	4.6 to 6.1	265.9 to 264.4	Clayey Silt Glacial Till	3.2×10^{-7}
9	GEMTEC BH23-2	9.1 to 10.7	247.3 to 245.8	Silty Sand Till; Sandy Silt	5×10^{-7}
9	GEMTEC BH23-5	7.6 to 10.7	250.2 to 247.2	Silty Clay	4×10^{-8}
9	GEMTEC BH23-6D	10.7 to 12.2	246.1 to 244.5	Gravelly Sandy Silt	2×10^{-7}
9	GEMTEC BH23-9	9.1 to 10.7	245.2 to 243.6	Silt	8×10^{-7}
9	GEMTEC BH23-10D	10.7 to 12.2	242.2 to 240.6	Silt; Sandy Silt Gravel Till	2×10^{-7}
9	GEMTEC BH23-11	4.6 to 6.1	241.4 to 239.9	Sandy Silty Gravel Till	1×10^{-7}
9	GEMTEC BH23-12	7.9 to 9.8	237.9 to 236.0	Limestone	2×10^{-8}

Property	Monitoring Wells	Well Screen Location		Strata Screened	Hydraulic Conductivity (K) (m/s)
		Depth (m)	Elev. (m)		
9	GEMTEC BH23-21S	3.0 to 4.6	246.2 to 244.7	Sandy Silty Clay Till	1×10^{-8}
9	GEMTEC BH23-21D	9.1 to 10.7	240.1 to 238.6	Silty Sand Till	3×10^{-6}
10	GEMTEC BH23-23S	5.2 to 6.7	244.7 to 243.2	Sandy Silty Clay Till	1×10^{-8}
10	GEMTEC BH23-23D	13.7 to 15.2	236.2 to 234.7	Gravelly Sand and Silt Till; Shale	1×10^{-7}
10	GEMTEC BH23-26	13.1 to 14.6	235.6 to 234.1	Sand and Silt	9×10^{-8}
9	GEMTEC BH22-02	6.1 to 7.6	250.2 to 248.7	Silty Sand Till	5×10^{-8}
9	GEMTEC BH22-05	6.1 to 7.6	245.1 to 243.6	Silt	3×10^{-8}
9	GEMTEC BH22-06	6.1 to 7.6	247.4 to 245.9	Silty Clay; Silty Clay Till	7×10^{-9}

The GEI results measured a hydraulic conductivity typically on the order of 5×10^{-7} to 5×10^{-8} m/s for the site soils tested.

Hydraulic conductivity testing was completed by GEMTEC as part of their site investigation for Property 9. More information on the methodology they employed is available from their report (2023) but the results indicated silt and/or sand or silt and/or sand till with a geometric result of 3×10^{-7} m/s (based on 7 tests), silty clay and silty clay till with a geometric result of 2×10^{-8} m/s, sand and silt till and bedrock with a result of 1×10^{-7} m/s (based on 1 test) and bedrock with a result of 2×10^{-8} m/s (based on 1 test). The GEMTEC results are included in the table above.

According to Freeze and Cherry (1979), the typical range in hydraulic conductivity is as follows:

- Glacial Till: 10^{-6} m/s to 10^{-12} m/s
- Clay: 10^{-9} m/s to 10^{-12} m/s
- Silt: 10^{-5} m/s to 10^{-9} m/s
- Sand: 10^{-2} m/s to 10^{-5} m/s

The in-situ hydraulic conductivities measured in the field are within the expected ranges for the various deposits consisting of sand and silt to clayey silt glacial till, sand and silt, silt, or silty clay based on Freeze and Cherry.

It is noted that there are some properties where no hydraulic conductivity testing was completed. Given the relatively uniform nature of the near surface soils described during drilling across the site, it is expected that soils at this site will also exhibit low hydraulic conductivities and groundwater would be expected to move through shallow subsurface, where the upper till may be fractured, overland or through seams or zones of coarser material that may exist on the site, but tend to be highly localized where they occur.

Groundwater Chemistry

To establish background chemistry across the study area, groundwater samples were collected across the study area, roughly one per property during the hydrogeological field investigation, and tested relative to the Provincial Water Quality Objectives (PWQO) for metals.

Prior to collection of the samples, approximately three (3) standing well volumes of groundwater were purged from the well. The samples were collected and placed into pre-cleaned laboratory-supplied vials and/or bottles provided with analytical test group specific preservatives, as required. Dedicated nitrile gloves were used during sample handling. The field filtered samples were run through a 75 µm filter. The samples were submitted to CALA- accredited Eurofins Environmental Laboratory for analysis.

The laboratory Certificates of Analysis are provided in **Appendix E7** and the results are summarized below.

Table 3-16: Groundwater Chemistry Testing Results

Property	Monitoring Well Sample Location	Parameters Tested	Exceedances of PWQO
1	BH/MW 8S	PWQO Metals	Cobolt, Iron
	BH/MW 8D	PWQO Metals	Aluminum, Cobolt, Copper, Iron, Uranium, Vanadiam
	BH/MW 9	PWQO Metals	Cobolt, Copper, Iron, Zinc
4	NW 24D	PWQO Metals	Aluminum, Cobalt, Iron, Vanadium
	NW 24D (Filtered)	PWQO Metals	None
	NW 24S	PWQO Metals	Aluminum, Cobalt, Copper, Iron, Vanadium
	BH/MW 101	PWQO Metals	None
	BH/MW 102	PWQO Metals	Aluminum, Cobalt, Copper, Iron, Lead
5	BH/MW 42	PWQO Metals	Aluminum, Cobalt, Copper, Iron, Vanadium, Zinc
	BH/MW 42 (Filtered)	PWQO Metals	None
7 & 8	BH/MW 29	PWQO Metals	Cobalt, Iron, Zirconium
	BH/MW 31S	PWQO Metals	Cobalt, Copper, Iron, Lead, Vanadium
	BH/MW 33D	PWQO Metals	Copper, Iron, Zirconium
9	BH/MW 37S	PWQO Metals	Cobolt, Copper, Iron, Lead, Vanadium
	BH/MW 37D	PWQO Metals	Silver*, Boron, Cadmuim*, Cobolt, Iron, Thallium*, Zinc*, Zirconium*

Property	Monitoring Well Sample Location	Parameters Tested	Exceedances of PWQO
11	NW 52D	PWQO Metals	Aluminum, Cobalt, Copper, Iron
	NW 52D (Filtered)	PWQO Metals	None
	NW 52S	PWQO Metals	Aluminum, Cobalt, Copper, Iron
	NW 52S (Filtered)	PWQO Metals	None
	BH/MW 49	PWQO Metals	Aluminum, Cobalt, Cadmuim, Copper, Iron, Lead, Vanadium
	BH/MW 49 (Filtered)	PWQO Metals	Cadmium, Copper, Iron

*PWQO exceedance shown on Certificate of Analysis due to detection limit available for the sample being higher than the PWQO guideline value.

The filtered groundwater results show that filtration will reduce the amount of metal exceedances within the groundwater. Metals often bind to sediments, which are removed by filtering.

It should be noted that GEMTEC did not conduct any groundwater sampling as part of their field investigation.

3.4.5 Existing Conditions Water Balance

A water balance is an accounting of the water resources within a given area. 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:

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 a 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, and as such, approximations and simplifications are made to characterize the water balance of a property. Field observations of the drainage conditions, land cover and soil types, groundwater levels and local climatic records are important inputs to the water balance calculations.

- Precipitation (P): For the purposes of approximating the annual precipitation at this site, the monthly rainfall between 1981 and 2010 was used based on Environment Canada historical weather data for the Albion Field Center climate station (Climate ID 6152695, Latitude 43°55' N, Longitude 79°50' W, Elevation 281.9 metres), which is located about 13 km north of 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.

- 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. Evaporation occurs from a hard surface (such as flat rooftops, asphalt, gravel parking areas, etc.).
- 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: as surface or overland runoff (R) and the infiltration into the surficial soil (I). The infiltration is comprised of two end member components: one component that moves vertically downward to underlying aquifers (referred to as percolation, deep infiltration or net recharge) and a second component that moves laterally through the near surface soil profile or shallow soils as interflow that re-emerges locally to surface (i.e., as runoff) at some short distance and time following precipitation.

3.4.6 Approach and Methodology

The analytical approach (Thornwaite and Mather) to calculate the water balance involves monthly soil-moisture balance calculations to determine the pre-development infiltration volumes. The detailed water balance calculation is provided in **Appendix E9**, 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 soils do 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 near surface soils (clayey silt / clayey silt glacial till), a soil moisture storage capacity of 75 mm was used for the site which is vegetated with mainly with agricultural crops.
- 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).

Monthly potential evapotranspiration calculations accounting for latitude, climate and the actual evapotranspiration and water surplus components of the water balance based on the monthly precipitation and soil moisture conditions were calculated. 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. The water surplus was multiplied by the infiltration factor to determine both the pre-existing annual volumes for run-off and infiltration for the property.

ELC mapping completed as part of GEI's ecological investigations (**Section 3.1**) was used in the water balance calculations; each ELC polygon was assigned a corresponding vegetation, soil and topography type. Where multiple ELC polygons had identical vegetation, soil and topography infiltration factors, they were combined into a single line entry in the water balance calculations.

Water balance calculations for the entire study area considered all ELC polygons mapped as part of the ecological investigation, including non-participating lands.

It is noted that the infiltration and runoff values presented are estimates only. Single values are used for the 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 preliminary water balance calculations are included in **Appendix E9**. The existing conditions calculations are summarized in this section are preliminary only at this time. The table below summarizes the existing conditions water balance for the entire Study Area, and for each participating property.

Table 3-17: Existing Conditions Water Balance Results

Property	Approx. Property Size (ha)	Average Annual Runoff Volume (m3/year)	Average Annual Infiltration Volume (m3/year)
Entire Study Area	641	1,099,029	935,451
1	75	151,856	97,839
2	40	49,611	64,941
3	40	72,182	56,897
4	68	102,681	103,443
5	41	52,022	64,013
6	16	20,750	25,398
7	10	12,302	16,482
8	20	25,016	32,254
9	70	86,835	99,822
10	21	26,100	32,958
11	39	46,756	61,404

These calculations suggest that the total yearly target for infiltration across the Study Area (including participating and non-participating properties) is 935,451 m^3/year.

Based on the calculations in Appendix **E9**, the potential infiltration for the ranges from about 143 mm/year (golf course areas) to 228 mm/year (swamp wetland areas).

Water balance calculations for the West Humber River Subwatershed were completed and published within the Source Water Protection Draft Accepted Conceptual Understanding Water Budget Report (TRCA, 2007).

The published TRCA water balance reports a precipitation amount of 827 mm/year, evapotranspiration of 550 mm/year, infiltration of 147 mm/year, and runoff of 320 mm/year for the subwatershed. The water balance results determined for the entire study area showed a precipitation of 821 mm/year, evapotranspiration of 504 mm/year, infiltration of 146 mm/year, and runoff of 171 mm/year. The calculated runoff was approximately 150 mm lower than the published runoff value, and it is expected that this is due to differing methodologies. GEI's water balance calculations assume that the precipitation amount is equal to the sum of the evapotranspiration, infiltration, and runoff amounts. However, the TRCA published precipitation value is approximately 190 mm less than the sum of the published infiltration, runoff, and evapotranspiration. Therefore, it is interpreted that the TRCA published water balance does not utilize the same base assumptions as the GEI water balance, and the difference in the runoff values are attributed to this difference. The precipitation, evapotranspiration, and infiltration values are comparable to the published TRCA values, and therefore the results from the Thornthwaite and Mather methodology are considered to be validated.

3.4.7 Preliminary Slope Stability Study

The scope also includes a preliminary erosion hazard assessment and slope stability study to determine the long-term stable top of slope (LTSTOS) position for confined valley systems on the Study Area. The Study Area is within TCRA jurisdiction; therefore, the slope stability study will follow TRCA guidelines within *"The Living City Policies,"* dated November 28, 2014. The study will also follow provincial guidelines within *"Technical Guide – River and Stream Systems: Erosion Hazard Limit,"* dated 2002, by Ministry of Natural Resources. This is consistent with discussion on slope stability within the SABE Scoped SWS reports.

To support preliminary constraints and opportunities mapping, the preliminary slope stability assessment included:

- A visual slope inspection of the valleylands on the participating properties;
- Top of Bank staking with TRCA;
- Cutting cross-sections through the slopes, watercourses and valleylands using the topographic LiDAR data available for the Study Area;
- Conservative estimates for the toe erosion allowance and stable slope allowance were used to estimate the LTSTOS;

- Assessment of the erosion access allowance and total development setbacks related to slope and erosion hazards; and
- Plan and profile views of the preliminary setback distances to assist with development constraint mapping.

GEI completed a preliminary slope stability study for the confined valley systems across most of the Study Area. The report is provided in **Appendix E10** and must be referenced for the full discussion on the site conditions, assessment, and results. A summary is provided in the sections below.

GEMTEC provided erosion and slope hazard setbacks specifically for Properties 9 and 10. GEMTEC provided a figure: *"Erosion Hazzard Analysis (Whole Site)",* Figure No. 1, Project No. 101987.001, dated June 2024, which shows the Top of Stable Slope and Erosion Access Allowance. A report discussing how the linework was established was not provided to GEI for review. The GEMTEC drawing is included in **Appendix E11**.

Overview on Scope of Work

The Study Area is within the West Humber River Watershed. Several watercourses flow through the Study Area, and typically converge near the middle of the Study Area. Two of the larger watercourses are within the Greenbelt Plan Area. Online Regulation Mapping from TRCA shows that most of the watercourses are Regulated Areas, and therefore the methodology to determine long-term development setbacks must comply with TRCA policy guidelines (see Section 3 in **Appendix E10** for more details). Many of the watercourses are within confined valley systems, which typically consist of a watercourse, floodplain, and slope.

GEI completed a preliminary slope stability study to determine the LTSTOS position following TRCA policy requirements for the various confined valley systems for participating lands within the Study Area (excluding Property 9 and 10). The preliminary assessment included visual slope inspections, review of aerial images and LiDAR data, and preliminary analysis for the LTSTOS using conservative assumptions and limited data from preliminary boreholes completed at this time, given that a detailed subsurface investigation has not been fully completed at this time. Following the completion of the detailed subsurface investigation, additional stability analysis can be completed to potentially refine the setback locations.

Slope Stability Setbacks and Policy

The TRCA provides policy requirements and technical guidance for developments within slope and erosion hazard zones based on the following documents:

- "The Living City Policies for Planning and Development in the Watersheds of the Toronto and Region Conservation Authority," by TRCA, dated November 28, 2014; and
- "Technical Guide on River and Stream Systems: Erosion Hazard Limit," by the Ministry of Natural Resources (MNR), dated 2002.

The mapped watercourses are within TRCA Regulated Areas and are subject to these policy guidelines. Included in these policy guidelines are setbacks in which all new development must be set behind. The following allowances are applicable for the confined valley systems at the Study Area:

- Toe Erosion Allowance: This setback is an estimate of the distance the toe of slope will move over the next 100 years. This can be based on a site-specific fluvial geomorphology study, average annual recession rate based on 25 years of data or based on set values provided by the MNR depending on the soil type encountered. If the watercourse is greater than 15 m away from the slope toe, no toe erosion allowance is typically required;
- Stable Slope Allowance: This setback is associated with determining the inclination of the slope that achieves a minimum factor of safety of 1.5. In some cases, the existing slope inclination may meet this minimum requirement. In lieu of detailed geotechnical engineering analysis, a conservative estimate for the stable slope inclination of 3H:1V can typically be applied; and
- Erosion Access Allowance: An additional 10 m setback (for development, new buildings) is applied to allow for emergency access, routine maintenance of the slope and potential erosion areas, and to create an additional buffer between the development and the potential erosion hazard.

The toe erosion allowance and stable slope allowance combine to form the LTSTOS. When the LTSTOS is combined with the erosion access allowance, this total setback line is the Erosion Hazard Limit from which all new development or redevelopment must be set behind, per TRCA guidelines. The above setbacks are applicable to sites where there is a confined valley system. **Figure 4 (Appendix E10)** shows a typical LTSTOS model.

These policies are not applicable for unconfined systems, where the Erosion Hazard Limit is defined by the meander belt allowance or flooding hazard limit, plus an additional allowance (beyond the scope of work in this report). Unconfined systems are located on Property 1, 3, 4 and 7. The majority of Property 4 was confined except for a small area on the northwest end of the valley system near Old School Road.

Slope Stability Results

The visual slope inspections identified low to moderate risk for instability for the various confined valley slopes in the Study Area. The assessment estimated the toe erosion allowance, stable slope allowance, and LTSTOS position for the confined valleys within the Subject Area (for participating properties), following TRCA and MNR guidelines. The LTSTOS position ranged from coinciding with the existing top of slope to being set back 23.8 m from the top of slope. The results and methodology are discussed in detail within the report in **Appendix F10**, including a summary of the setbacks, and plan / profile drawings showing the setback locations.

Slope Stability Results on Property 9 and 10

For Properties 9 and 10, geotechnical limits of the valleylands were assessed by GEMTEC (for LTSTOS) or staked by Beacon Environmental (for top of bank). It is understood that TRCA was on site with Beacon for the top of bank staking at Properties 9 and 10. Although the complete geotechnical report was not provided to GEI for review, a final figure including the slope stability setbacks was provided to support delineation of a preliminary NHS. The drawing did not show the TRCA staked top of bank.

It is noted that there are discrepancies between the staked top of bank and the GEMTEC LTSTOS position in some locations. Properties 9 and 10 are within TRCA jurisdiction, and TRCA is ultimately responsible for reviewing and confirming the approach taken by GEMTEC for the slope stability study and results specific to these properties.

TRCA's Field Staking Protocol (TRCA, 2017), states the following:

> *Typically, staking takes place as part of the planning process (under the Planning Act) or the section 28 Conservation Authorities Act permitting process (TRCA's Ontario Regulation 166/06). This technical guideline supports the Natural System policies of The Living City Policies for Planning and Development in the Watersheds of the Toronto and Region Conservation Authority (LCP), and supports TRCA's partner municipalities in defining their natural heritage systems.*

The staking occurs with TRCA staff, Ontario Land Surveyors, the landowner or agents of the landowner, at a minimum. If there are disputes or disagreements with the TRCA staked top of bank, GEMTEC will need to coordinate with TRCA directly. Per TRCA's Living City Policy, the staked top of bank is to be referenced during the assessment for setbacks within a valley corridor.

For the purposes of NHS mapping at this time, when the LTSTOS is less than the limits of the staked top of bank, or if no LTSTOS was calculated where a top of bank was staked, the development limits will be based on the staked top of bank.

3.4.8 Summary of Geotechnical Findings

A summary of the geotechnical findings is below:

- Subsurface investigations were conducted to determine the underlying soil and groundwater conditions, characterize the site geology, and to support the hydrogeological study.
- 20 boreholes, 29 boreholes with monitoring wells, and 9 nested deep / shallow monitoring wells were advanced within the Study Area to supplement the existing borehole information, and to support the geotechnical and hydrogeological reporting requirements as part of the Local SWS.
- Figures 2A to 2E (Appendix E2) show the locations and depths of the boreholes and monitoring wells.
- In general, a regional deposit of stiff to hard cohesive glacial till was encountered across the Study Area, underlain at depth in some boreholes by very dense cohesionless glacial till.
- Underlying the glacial till, many boreholes encountered various cohesionless deposits of typically compact to dense sands and silts. Gravel deposits were locally encountered at depth in some of the boreholes advanced in the northern part of the Study Area, and locally in the eastern part of the Study Area.
- The upper glacial till deposits are interpretated to be the Halton Till formation, forming the Halton Aquitard. The deeper deposits of cohesionless glacial till underlying the upper cohesive till or the sands, silts, and gravels are interpretated to be Newmarket Till, forming

the Newmarket Aquitard. The deposits of sands and silts, could be part of the Oak Ridges Aquifer Complex (ORAC), or where thinner, could be part of the Halton or Newmarket Till formations. The local gravels and gravelly deposits are interpretated to be part of the ORAC.

- A preliminary slope stability study was completed following TRCA and MNR guidelines. The visual slope inspections identified low to moderate risk for instability for the various confined valley slopes in the Study Area. The preliminary analysis estimated that the LTSTOS position ranged from coinciding with the existing top of slope to being set back 23.8 m from the top of slope. GEMTEC provided slope stability setbacks specific to Properties 9 and 10.

3.4.9 Summary of Hydrogeological Findings

The Study Area is predominantly covered by fine-grained till soils which are interpreted as Halton Till. In the SABE Scoped SWS, this was subdivided into multiple subunits, the uppermost of which consisted of a fractured till within the uppermost 5 m.

Groundwater levels ranged across the site. In general, the expected regional groundwater flow directions based on the Study Area data was relatively consistent with the SABE Scoped SWS reporting. Groundwater level monitoring completed to date has been limited and continued monitoring of these monitoring locations will provide more input on the potential connections between these systems, particularly seasonally. Additional monthly groundwater levels are being monitored for one year.

Artesian groundwater conditions were encountered in several locations, particularly along the watercourse or near a Headwater Drainage Feature on Properties 8 and 9.

The GEI results measured a hydraulic conductivity typically on the order of 5×10^{-7} to 5×10^{-8} m/s for the site soils tested.

Some exceedances for PWQO metals were encountered in the groundwater samples tested. The filtered groundwater results show that filtration will reduce the amount of metal exceedances within the groundwater. Metals often bind to sediments, which are removed by filtering.

The preliminary water balance calculations for existing (pre-development) conditions found that the total yearly target for infiltration across the Study Area (including participating and non-participating properties) is 935,451 m^3/year.

The published TRCA water balance reports infiltration of 147 mm/year for the subwatershed. The water balance results for existing conditions for the entire study area showed infiltration of 146 mm/year. Infiltration values are comparable to the published TRCA values, and therefore the results from the Thornthwaite and Mather methodology used for the analysis are considered to be validated.

The results of the surface water conditions, including groundwater/surface water interaction, hydraulic gradients, seepages, and surface water chemistry, are discussed in **Section 3.5.**

3.5 Surface Water Existing Conditions

3.5.1 Scope Overview

A surface water level monitoring program has been initiated using drive-point/mini piezometers, staff gauges and data loggers installed in or near select locations in the tributaries and wetlands to evaluate shallow groundwater elevations and baseflow conditions in the nearby surface water features. This will help to determine the groundwater baseflow conditions to tributaries/wetlands, the impact that development may have on these features, and to complete a feature-based water balance. Monitoring of these features will continue into the fall until the streams freeze and then will resume in the spring once the streams thaw.

To establish baseline chemistry conditions, surface water samples were collected from SG/MP64, SG/MP65, SG/MP66, and SG/MP67 on May 13, 14 and 24, 2024 and tested relative to the PWQO. The laboratory Certificates of Analysis are provided in **Appendix F**. Samples collected on May 13 and May 14 are representative of a "wet" sample event; samples were taken at the onset and end of a precipitation event. Samples collected on May 24 are representative of a "dry" sample event; samples were taken when no rain had occurred for at least 3 days prior to sampling. Samples taken in May 2024 are considered to be representative of spring conditions in the Study Area. "Wet" and "Dry" event sampling will be repeated in summer and fall of 2024 to obtain information on the seasonal changes of surface water quality.

Stage-discharge measurements are on-going at the time of reporting and will continue to be taken from spring to fall to ensure that measurements encompass a wide variety of seasonal and precipitation conditions. A total of ten (10) stage-discharge profile measurements will be taken at SG/MP64, SG/MP65, SG/MP66, and SG/MP67 and a rating curve will be created to relate water level to volumetric discharge in the feature. It should be noted that spot baseflow measurements are still to be conducted at select locations. At the time of the field investigation that has been completed, it was anticipated that conditions may still exhibit at least some influence from the spring freshet. True baseflow conditions are more commonly encountered in the summer months such as July and August.

3.5.2 Characterization and Analysis

To provide a background characterization of the surface water conditions, a selection of measurements were collected across the Study Area and the results are summarized by Property in the sections below. More detailed characterization of the surface water quality, depth and discharge is continuing throughout the year to capture a range of seasonal and weather conditions. Additional investigation may be required at future development stages.

As it relates to groundwater/surface water interaction, in the SABE SWS, a shallow flow regime was noted due to heavily fractured upper Halton Till (or equivalent) near the ground surface. Given the low hydraulic conductivity results in the monitoring wells installed deeper in the fine-grained glacial till soils, if sufficient fractures are present and they are connected to nearby surface water features, this is the most likely route of movement of local groundwater flow, with the groundwater ultimately releasing into nearby wetlands or watercourses or even local ground surface depressions. The next most likely alternative flow regime would include overland flow from higher elevations to lower elevations (typically watercourses, wetlands or local depressions).

Property 1

Surface Water Levels

One staff gauge (SG4), and three drive point mini-piezometers (MP4, MP8, and MP15) are present on this property. SG4 and MP4 are installed adjacent to one another within the duckweed floating-leaved shallow aquatic (ELC code SAF1-3) community at the north end of the property, near the start of the watercourse at Old School Road. SAF communities are consistently flooded and therefore are typically fed by significant, consistent surface water inflow and/or groundwater discharge. SG4/MP4 are installed in close proximity to NW4D/4S to correlate the deeper hydraulic gradient measured at the nested monitoring well to the shallow hydraulic gradient measured within the feature at the drive point mini-piezometer. Continuous dataloggers were installed at SG4 and MP4 to obtain continuous groundwater and surface water levels at this monitoring point. MP8 is installed within the open aquatic (OAO) community, in the central portion of the property. OAO communities are consistently flooded and therefore are typically fed by significant, consistent surface water inflow and/or groundwater discharge. MP8 is located in close proximity to NW8D/8S to correlate the deeper hydraulic gradient measured at NW8D/8S adjacent to the feature with the shallow hydraulic gradient measured at MP8 within the feature. MP15 is installed within the watercourse surrounded by a mineral cultural woodland (CUW1) community at the south end of the property. MP15 is located in close proximity to NW15D/15S to correlate the deeper hydraulic gradient measured at the nested well adjacent to the feature with the shallow hydraulic gradient measured within the feature. The monitoring locations are illustrated on **Figure 11A** and **11B, Appendix E1** and the ELC communities are shown on **Figure 3, Appendix B1**.

SG/MP4: One manual monitoring event was completed at SG4/MP4 on June 25, 2024. During this event, no standing water was recorded at the monitoring station. The groundwater within MP4 was measured at a depth of 0.9 mbgs. Since only one hydraulic head could be measured due to the lack of standing water, a hydraulic gradient could not be calculated, however no groundwater discharge to the feature was observed. A GPS survey is planned for August 2024 to allow reporting of piezometer measurements relative to sea level. The surface water levels presented as depths are included in **Appendix E3**.

MP8: One manual monitoring event was completed at MP8 on June 25, 2024. Surface water within the feature was measured at 0.77 m below top of pipe (mbtop), and groundwater was measured at 0.75 mbtop. Given the potential for manual measurement error, a difference of 2 cm between the groundwater and surface water measurement is interpreted to represent a neutral hydraulic gradient. Therefore, this measurement represents a connection to the groundwater table with the surface water feature, but does not necessarily represent groundwater discharge or recharge.

MP15: One manual monitoring event was completed at MP15 on June 25, 2024. Surface water was measured at 1.39 mbtop and groundwater was measured at 1.54 mbtop. This measurement represents a negative (downwards) hydraulic gradient, indicating groundwater recharge.

Surface Water/Groundwater Interactions

Groundwater Seepage

Groundwater seeps were noted along the slope wall at the southwest portion of this property during all site visits from May and June 2024. Groundwater seepage was slow and subtle, occurring over a large surface area (the face of the slope), and no obvious distinct groundwater springs (i.e., a concentrated single groundwater discharge point) were encountered.

Hydraulic Gradients

A preliminary assessment of hydraulic gradients, based on a minimal number of groundwater and surface water level measurements have been calculated for this property in the nested monitoring wells and mini piezometers.

Table 3-18: Property 1 - Hydraulic Gradient Data

Monitoring Well / Piezometer ID	Date	Hydraulic Gradient (m/m)
NW4D/4S	May 22 & June 25, 2024	No gradient calculated but assumed to be negative as NW4S was dry
SG/MP4	June 25, 2024	No gradient calculated but assumed to be negative as SG4 was dry
NW8D/8S	May 22, 2024	-0.93
	May 24, 2024	-0.91
	June 25, 2024	-0.95
MP8	June 25, 2024	Neutral
NW15D/15S	May 22, 2024	-0.29
MP15	June 25, 2024	-0.28
	June 25, 2024	Negative

These results suggest downward flow of groundwater at all above monitoring locations. Monitoring will continue for one year until May 2025 to confirm these results.

As noted in the SABE SWS, a shallow flow regime was noted due to heavily fractured upper Halton Till (or equivalent) near the ground surface. Given the low hydraulic conductivity results in the monitoring wells installed deeper in the fine-grained glacial till soils, if sufficient fractures are present and they are connected to nearby surface water features, this is the most likely route of movement of local groundwater flow, with the groundwater ultimately releasing into nearby wetlands or watercourses or even local ground surface depressions. The next most likely alternative flow regime would include overland flow from higher elevations to lower elevations (typically watercourses, wetlands or local depressions).

Surface Water Chemical Analysis Results

No surface water samples were collected at this site.

Property 2

Surface Water Levels

One staff gauge (SG65) and one drive-point mini piezometer (MP65) were installed within the watercourse surrounded by a fresh-moist manitoba maple lowland deciduous forest (FODM7-7) in the northwest corner of the property (**Figure 11A** and **11B, Appendix E** and **Figure 3, Appendix B1**). SG65 was installed about 5 m upstream of MP65 where flow was most consistent across the channel and free of sudden bends. MP65 was installed closer to areas where several groundwater seeps were observed in order to measure a hydraulic gradient closer to this active location. A continuous datalogger was installed at both locations to continuously monitor groundwater and surface water levels. The SG65 and MP65 monitoring location is located at the base of a significant slope feature, and groundwater seepage was observed along the slope between the upland area and the watercourse and the base of the slope.

SG65: Six manual monitoring events were completed at SG65 on May 9, 10, 13, 14, and 28, and June 25, 2024. The surface water level ranged from 0.31 to 0.52 m above ground surface (mags), with the highest water level recorded on May 28 and the lowest water level recorded on June 25. This watercourse had consistent standing water throughout the monitoring period. Frequent manual monitoring events were completed at SG65 because it served as a chemistry monitoring point as well as a flow monitoring point and therefore additional site visits were made to this location and data was collected at the same time.

MP65: Two manual monitoring events were completed at MP65 on May 28 and June 25, 2024. Surface water was measured at 1.22 mbtop and groundwater was measured at 1.24 to 1.27 mbtop. Thus, a very weak negative (downwards) hydraulic gradient was observed at this point, indicating groundwater recharge or a connection to the water table.

Surface Water/Groundwater Interactions

Groundwater seeps were noted along the slope wall at the northwest portion of this property during all site visits from May and June 2024. Groundwater seepage was slow and subtle, occurring over a large surface area (the face of the slope), and no obvious distinct groundwater springs (i.e., a concentrated single groundwater discharge point) were encountered.

A preliminary assessment of hydraulic gradients, based on a minimal number of groundwater and surface water level measurements have been calculated for this property in the mini piezometer.

Table 3-19: Property 2 - Hydraulic Gradient Data

Monitoring Well / Piezometer ID	Date	Hydraulic Gradient (m/m)
MP65	May 28, 2024	Negative
	June 25, 2024	Negative

These results suggest downward flow of groundwater at the above monitoring location. Monitoring will continue for one year until May 2025 to confirm these results.

Surface Water Chemical Analysis Results

One surface water quality monitoring station (SG/MP65) is located on this property. Surface water quality samples were taken from the SG/MP65 location on May 13, 14, and 24, 2024 and compared to PWQO. The following exceedances were found at SW-65:

Table 3-20: Property 2 - Surface Water Quality Data

Sampling Location	Parameter (Unit)	PWQO	May 13, 2024 Result	May 14, 2024 Result	May 24, 2024 Result
SG/MP65	E.Coli (CFU/100mL)	100	114	66 (did not exceed PWQO)	>200
	Total rePhosphorus (µg/L)	10 (Interim PWQO)	50	60	60

*Note: that the detection limit for Benzo[a]anthracene, Benzo(g,h,i)perylene, Chrysene, Dibenzo(a,h)anthracene, Fluoranthene and Phenanthrene exceed the PWQO, therefore these parameters cannot be assessed with respect to PWQO.

E.Coli concentration at SG/MP65 was lowest following the precipitation event on May 14, and highest during the dry sampling event on May 24. Phosphorus concentration remained relatively constant throughout all sampling events.

Property 3

Surface Water Levels

One drive-point mini piezometer (MP56) was installed within the watercourse surrounded by a fresh-moist manitoba maple lowland deciduous forest (FODM7-7) in the southwest corner of the property (**Figure 11A and 11D, Appendix E1** and **Figure 3, Appendix B1**). MP56 was installed in close proximity to nested well NW56D/56S in order to correlate the shallow hydraulic gradient within the feature to the deeper hydraulic gradient adjacent to the feature.

MP56: One manual monitoring event was completed at MP56 on June 25, 2024. Surface water was measured at 0.43 mags and groundwater was measured at 0.37 mags. Thus, a very weak negative (downwards) hydraulic gradient was observed at this point, indicating groundwater recharge or a connection to the water table.

Surface Water/Groundwater Interactions

Groundwater seeps and/or springs were not noted on this property.

A preliminary assessment of hydraulic gradients, based on a minimal number of groundwater and surface water level measurements have been calculated for this property in the mini piezometer.

Table 3-21: Property 3 - Hydraulic Gradient Data

Monitoring Well / Piezometer ID	Date	Hydraulic Gradient (m/m)
MP56	June 25, 2024	-0.06

Groundwater/Surface Water Connections

These results suggest downward flow of groundwater at the above monitoring location. Monitoring will continue for one year until May 2025 to confirm these results.

Surface Water Chemical Analysis Results

No surface water samples were collected at this site.

Property 4

Surface Water Levels

GEI has installed a surface water monitoring station in the middle of the creek on the property (SG/MP 21). The drive-point mini piezometer MP21 was installed in close proximity to the monitoring well MW21 and the nested well NW24D/24S to correlate the shallow hydraulic gradient within the feature to the deeper hydraulic gradient adjacent to the feature.

SG21: One manual monitoring event was completed at SG21 on June 25, 2024, where no standing water was recorded at SG21.

MP21: Two manual monitoring events were completed at MP21 on May 10 and June 25, 2024, when groundwater was measured at 0.01 mbgs and 0.11 mags, respectively. No groundwater discharge to the surface was observed at this location.

Surface Water/Groundwater Interactions

There were no seeps noted during field work at this site.

A preliminary assessment of hydraulic gradients, based on a minimal number of groundwater and surface water level measurements have been calculated for this property in the nested wells and mini piezometers.

Table 3-22: Property 4- Hydraulic Gradient Data

Monitoring Well / Piezometer ID	Date	Hydraulic Gradient (m/m)
SG/MP21	May 10, 2024	No gradient calculated but assumed to be neautral as SG21 was dry and MP21 groundwater was measured at 1 cm bgs.
	June 25, 2024	No gradient calculated but assumed to be positive as SG21 was dry and MP21 groundwater was measured above ground surface.
NW24D/24S	May 22, 2024	-0.37
	June 25, 2024	-0.13

Groundwater/Surface Water Connections

These results suggest upward flow of groundwater or a connection to the groundwater table within the shallow subsurface at SG/MP21, but a downward flow of groundwater within the deeper subsurface at NW24D/24S. Monitoring will continue for one year until May 2025 to confirm these results.

Surface Water Chemical Analysis Results

No surface water samples were collected at this site.

Property 5, 6 & 10

No surface water investigation has been initiated as there are no permanent surface water features located on these properties. There were no groundwater seeps noted during field work at these properties.

As there are no nested monitoring wells at this site, it is not possible at this time to determine hydraulic gradients. It is presumed that groundwater at this site moves downward into the deeper subsurface.

Property 7 and 8

Surface Water Levels

One staff gauge (SG64) and one drive-point mini piezometer (MP64) were installed within the watercourse surrounded by a meadow marsh (MAM) community north of the properties, within the road right of way of Old School Road. One mini-piezometer (MP31) was installed within the reed-canary grass mineral meadow marsh (MAM2-2) community in the eastern portion of the properties. Meadow marsh communities are tolerant of periods of dry-down and flooding, and therefore typically form in low-lying areas underlain by low-permeability sediments with poor drainage and may be fed primarily by surface water runoff. MP31 was installed in close proximity to NW31D/31S in order to correlate the deeper hydraulic gradient measured adjacent to the feature to the shallow hydraulic gradient measured within the feature. One mini-piezometer (MP33) was installed within the cattail mineral shallow marsh (MAS2-1) community at the southern end of Property 8. Shallow marsh communities are tolerant of short periods of dry-down, with extended periods of flooding and therefore typically form in low-lying areas underlain by low-permeability sediments with poor drainage and may be fed primarily by surface water runoff and/or groundwater discharge. MP33 was installed in close proximity to NW33D/33S to correlate the deeper hydraulic gradient measured within the nested well to the shallow hydraulic gradient measured within the mini-piezometer (**Figure 2A, Appendix E1** and **Figure 3, Appendix B1**).

SG64: Five manual monitoring events were completed at SG64 on May 9, 13, 14, and 28, and June 24, 2024. The surface water level ranged from 0.22 to 0.49 mags, with the highest water level recorded on May 28 and the lowest water level recorded on June 24. This watercourse had consistent standing water throughout the monitoring period. Frequent manual monitoring events were completed at SG64 because it served as a chemistry monitoring point as well as a flow monitoring point and therefore additional site visits were made to this location and data was collected at the same time.

MP64: Two manual monitoring events were completed at MP64 on May 28 and June 24, 2024. Surface water levels were not measured at MP64, given that SG64 is located adjacent to this monitoring point and would therefore provide duplication of data. Groundwater at MP64 was measured at 0.31 mags on May 28 and 0.07 mags on June 24. Thus, a negative (downwards) hydraulic gradient was observed at this point, indicating groundwater recharge.

MP31: One monitoring event was completed at MP31 on May 10, 2024. The groundwater level was measured at 0.46 mags. The surface water level was not recorded during this monitoring event.

MP33: No information was collected at this monitoring location in May and June 2024.

Surface Water/Groundwater Interactions

There were no seeps noted in this area during the field investigation.

A preliminary assessment of hydraulic gradients, based on a minimal number of groundwater and surface water level measurements have been calculated for this property in the nested wells and mini piezometers.

Table 3-23: Property 7 & 8 - Hydraulic Gradient Data

Monitoring Well / Piezometer ID	Date	Hydraulic Gradient (m/m)
SG/MP64	May 10, 2024	-0.20
	June 25, 2024	-0.17
NW31D/31S	May 22, 2024	No gradient calculated but assumed to be positive as NW31D was flowing/artesian and NW31S groundwater was measured below ground surface
	June 24, 2024	No gradient calculated but assumed to be positive as NW31D was flowing/artesian and NW31S groundwater was measured below ground surfacet
NW33D/33S	May 22, 2024	No gradient calculated but assumed to be positive as NW33D was flowing/artesian and NW33S groundwater was measured below ground surface
NW33D/33S	June 3, 2024	+0.28
NW33D/33S	June 24, 2024	+0.15

Groundwater/Surface Water Connections

These results suggest downward flow of groundwater within the shallow subsurface at SG/MP64, but an upward flow of groundwater within the deeper subsurface at NW31D/31S and NW33D/33S. Monitoring will continue for one year until May 2025 to confirm these results.

Surface Water Chemical Analysis Results

One surface water quality station (SG/MP 64) is present on this property, situated in the watercourse at the north end of the property, near the start of the watercourse at Old School Road.

Surface water quality samples were taken from this location on May 13 and 14, 2024 at the start and finish of a precipitation event, and on May 24, 2024 after no precipitation had occurred for 3 days. The following exceedances were found at SW-64:

Table 3-24: Property 7 & 8 - Surface Water Quality Data

Monitoring Location	Parameter	PWQO	May 13, 2024 Result	May 14, 2024 Result	May 24, 2024 Result
SG/MP64	E.Coli (CFU/100mL)	100	13 (Did not exceed PWQO)	23 (Did not exceed PWQO)	188
	Total Phosphorus (µg/L)	10 (Interim PWQO)	50	90	100
	Total Iron (µg/L)	300 (Interim PWQO)	291 (Did not exceed Interim PWQO)	409	287 (Did not exceed Interim PWQO)

* Note that the detection limit for Benzo[a]anthracene, Benzo(g,h,i)perylene, Chrysene, Dibenzo(a,h)anthracene, Fluoranthene and Phenanthrene exceed the PWQO, therefore these parameters cannot be assessed with respect to PWQO

E.Coli concentration was highest at SG/MP64 during the dry sampling event, and lowest at the onset of the wet sampling event. Total phosphorus was highest during the dry sampling event and lowest at the onset of the wet sampling event. Total iron was highest following the precipitation event on May 14, and lowest during the dry sampling event.

Property 9

Surface Water Levels

GEMTEC included 4 surface water monitoring stations, including drivepoints and staff gauges. They noted in May 2023 that vertical gradients indicated recharging conditions (downward gradient) at 3 of the locations (DP/SG23-1, DP/SG23-3, and DP/SG23-4) while the 4th location, DP/SG23-2 indicated discharging conditions (upward gradient). The GEMTEC instrumentation was generally installed immediately adjacent to the watercourse/drainage feature and therefore the GEMTEC instrumentation is not considered to be ideal for assessing the hydraulic gradient within the feature itself. GEI instrumented the property with two mini-piezometers and one staff gauge. MP37 is located in the northeast corner of the property within the watercourse surrounded

by a reed-canary grass mineral meadow marsh (MAM2-2) community. Meadow marsh communities are tolerant of periods of dry-down and flooding, and therefore typically form in low-lying areas underlain by low-permeability sediments with poor drainage and may be fed primarily by surface water runoff. MP37 was installed in close proximity to NW37D/37S to compare the shallow hydraulic gradient to the deeper hydraulic gradient measured by the nested well. MP/SG67 was installed in the southwest part of the property, within an area of low elevation compared to the majority of the site. MP/SG67 was installed within the watercourse surrounded by a dry-fresh poplar-white birch deciduous forest (FOD3) community.

DP/SG23-1: One monitoring event was completed at DP/SG23-1 on June 24, 2024. The groundwater level was measured at 0.82 mags. The surface water level was not measured on this date.

DP/SG23-2: One monitoring event was completed at DP/SG23-2 on June 24, 2024. The groundwater level was measured at 0.86 mbgs. The surface water level was not measured on this date.

DP/SG23-3: One monitoring event was completed at DP/SG23-3 on June 24, 2024. The groundwater level was measured at 0.41 mbgs. The surface water level was not measured on this date.

DP/SG23-4: One monitoring event was completed at DP/SG23-4 on June 24, 2024. The groundwater level was measured at 0.76 mags. The surface water level was not measured on this date.

MP37: No data was recorded at MP37 in May and June 2024.

SG67: Five monitoring events were completed at SG67 on May 10, 13, 14, and 28, and June 24, 2024. The surface water level at SG67 ranged from 0.28 to 0.53 mags. The water level was highest on May 28 and lowest on June 24. Frequent manual monitoring events were completed at SG67 because it served as a chemistry monitoring point as well as a flow monitoring point and therefore additional site visits were made to this location and data was collected at the same time.

MP67: Two monitoring events were completed at MP67 on May 10 and 28, 2024. The groundwater level was measured at 0.41 mags on May 10 and 0.59 mags on May 28. Since MP67 was installed adjacent to SG67, surface water level measurements were not taken at MP67 as they would duplicate the SG67 data. Based on the SG/MP67 data, a weak upwards (positive) gradient was measured in May and June, indicating groundwater discharge.

Surface Water/Groundwater Interactions

One groundwater seep was noted by GEI as part of its investigation along the watercourse along the southwest edge of the site. Marsh Marigold *(Caltha palustris),* a groundwater indicator species, was also observed along the watercourse. Significant erosion was also noted along the slope wall southwest of the watercourse, indicating groundwater seepage may occur along the face of the slope wall.

A preliminary assessment of hydraulic gradients, based on a minimal number of groundwater and surface water level measurements have been calculated for this property in the nested wells and mini piezometers.

Table 3-25: Property 9 - Hydraulic Gradient Data

Monitoring Well / Piezometer ID	Date	Hydraulic Gradient (m/m)
NW37D/37S	May 23, 2024	+0.49
	June 3, 2024	+0.38
	June 5, 2024	+0.69
	June 24, 2024	+0.15
SG/MP67	May 10, 2024	+0.06
	May 28, 2024	+0.07

Groundwater/Surface Water Connections

These results suggest upward flow of groundwater within the shallow and deep subsurface at NW37D/37S and SG/MP67. Monitoring will continue for 1 year until May 2025 to confirm these results.

Surface Water Chemical Analysis Results

Surface water samples were collected at the location of SG/MP 67. The following exceedances were noted.

Table 3-26: Property 9 - Surface Water Quality Data

Monitoring Location	Parameter	PWQO	May 13, 2024 Result	May 14, 2024 Result	May 24, 2024 Result
SG/MP67	E.Coli (CFU/100 mL)	100	150	62	103
	Total Phosphorus (µg/L)	10 (Interim PWQO)	50	40	60

Note: that the detection limit for Benzo[a]anthracene, Benzo(g,h,i)perylene, Chrysene, Dibenzo(a,h)anthracene, Fluoranthene and Phenanthrene exceed the PWQO, therefore these parameters cannot be assessed with respect to PWQO

E.Coli concentration was highest at SG/MP67 at the onset of the wet sampling event, and lowest at the end of the wet sampling event. Total phosphorus was highest during the dry sampling event and lowest at the end of the wet sampling event.

Property 11

GEI instrumented this property with two mini-piezometers and one staff gauge. SG/MP66 is located in the northeast corner of the property within the watercourse surrounded by a willow mineral deciduous swamp (SWD4-1) community. Mineral swamp communities are tolerant of flooding conditions in the spring and late fall/winter, and dry conditions in the summer. They may be primarily fed by seasonal fluctuations in precipitation and surface water runoff, and/or

seasonally high groundwater table elevation resulting in groundwater discharge. MP52 was installed within the watercourse, adjacent to the culvert along the southern edge of the property, surrounded by a reed-canary grass mineral meadow marsh. Meadow marsh communities are tolerant of periods of dry-down and flooding, and therefore typically form in low-lying areas underlain by low-permeability sediments with poor drainage and may be fed primarily by surface water runoff. MP52 was installed in close proximity to NW52D/52S to compare the shallow hydraulic gradient to the deeper hydraulic gradient measured by the nested well.

SG66: Four manual monitoring events were completed at SG66 on May 10, 13, and 28, and June 25, 2024. Surface water levels at SG66 ranged from 0.19 to 0.46 mags. The highest water level was measured on May 28, and the lowest water level was measured on June 25. Frequent manual monitoring events were completed at SG67 because it served as a chemistry monitoring point as well as a flow monitoring point and therefore additional site visits were made to this location and data was collected at the same time

MP66: Two manual monitoring events were completed at MP66 on May 10 and June 25, 2024. Since MP66 was installed adjacent to SG66, surface water levels were not recorded at MP66 to avoid duplication of data. Groundwater levels at MP66 were measured at 0.14 and 0.03 mags on May 10 and June 25, respectively. Thus, a negative (downwards) hydraulic gradient was measured at SG/MP66 in May and June.

MP52: Two manual monitoring events were completed at MP52 on May 3, June 24, and June 25, 2024. The surface water level at MP52 ranged from 0 mags on June 25 to 0.03 mags on May 3. The groundwater level at MP52 was not measured on May 3 and was measured at 0.2 mags on June 25. Thus, an upwards (positive) hydraulic gradient was measured on June 25, indicating groundwater discharge.

Surface Water/Groundwater Interactions

There were no seeps noted during field work at this property.

A preliminary assessment of hydraulic gradients, based on a minimal number of groundwater level measurements have been calculated for this property in the nested monitoring wells.

Table 3-27: Property 11 - Hydraulic Gradient Data

Table 3-16 Borehole / Monitoring Well	Date	Hydraulic Gradient (cm/cm)
SG/MP66	May 10, 2024	-0.18
SG/MP66	June 25, 2024	-0.23
MP52	June 25, 2024	+0.17
NW52D/52S	May 23, 2024	+0.19
	June 25, 2024	-0.02

Groundwater/Surface Water Connections

These results suggest downward flow of groundwater within the shallow subsurface at Sg/MP66 upward flow of groundwater within the shallow subsurface at MP52. The results suggest a variable hydraulic gradient at NW52D/52S in the deep subsurface. Monitoring will continue for 1 year until May 2025 to confirm these results.

Surface Water Chemical Analysis Results

One surface water monitoring station was installed at this site, at Torbram Road (SG/MP 66). Surface water samples were collected at the location of SG/MP 66 on May 13 and 14 at the onset and recession of a precipitation event, and on May 24, 2024, when no precipitation had occurred for at least 3 days. The following exceedances were noted:

Table 3-28: Property 11- Surface Water Quality Data

Monitoring Location	Parameter	PWQO	May 13, 2024 Result	May 14, 2024 Result	May 24, 2024 Result
SG/MP66	E.Coli (CFU/100mL)	100	77 (Did not exceed PWQO)	53 (Did not exceed PWQO)	>200
	Total Phosphorus (µg/L)	10 (Interim PWQO)	40	50	70

Note: that the detection limit for Benzo[a]anthracene, Benzo(g,h,i)perylene, Chrysene, Dibenzo(a,h)anthracene, Fluoranthene and Phenanthrene exceed the PWQO, therefore these parameters cannot be assessed with respect to PWQO

E.Coli concentration was highest at SG/MP66 during the dry sampling event, and lowest at the end of the wet sampling event. Total phosphorus was highest during the dry sampling event and lowest at the beginning of the wet sampling event.

3.5.3 Summary of Surface Water Findings

The monitoring of surface water, both in terms of levels and chemistry is early in the monitoring program. Monitoring of both surface water levels and chemistry will continue to obtain a minimum of one year's worth of data. Surface water chemistry sampling will be once per season (each for one wet and one dry event), to characterize changes in the water quality throughout seasonal and precipitation changes. Future work phases may include more frequent sampling or additional sampling locations depending on the outcome of this preliminary field program.

3.6 Climate Change Assessment

3.6.1 Scope Overview

Climate change poses significant risks to the natural and built environment, people, and communities. Climate change is increasing average temperatures, shifting historical precipitation patterns, and changing the intensity, duration, and frequency of storm events. Natural systems play a vital role in enhancing urban resilience to climate change. They function as essential assets by providing ecosystem services, mitigating the urban heat island effect, improving air quality, and offering opportunities for recreation.

The TRCA and CVC have undertaken considerable climate change impact assessment work over the last that will be incorporated in subsequent reporting. Two climate scenarios will be used going forward, including the most recent climate change scenarios produced by the Intergovernmental Panel on Climate Change (IPCC) in their Sixth Assessment Report (AR6 2021), known as Shared Socioeconomic Pathways (SSPs).

Determining how much the climate will change in the future strongly depends on how society grows and develops. SSPs make assumptions of how population, education, energy use, technology, land-use changes, and other human-caused climate drivers may change over the next century, and pair them with assumptions about the level of ambition for mitigating climate change. SSPs expand on the previous RCPs to allow for a standardized comparison of society's choices and their resulting levels of climate change.

The use of multiple climate scenarios is best practice to provide a range of future climate change scenarios that encompass various levels of greenhouse gas emissions.

As previously discussed within **Section 2.5**, the SABE's technical climate change study focused on energy and mitigation instead of climate adaptation, risk and resilience. As a result, this section focuses in on these components.

3.6.2 Desktop Studies

A review of relevant historical climate trends within the region sourced from observed station data, future climate projections, and local climate reports was undertaken.

The Town conducted a future climate study and community-wide Risk and Vulnerability Assessment (RVA) in 2018 to identify expected weather patterns in Caledon up to 2090 and understand the most significant local climate risks. These include:

- Increased precipitation, particularly in summer, leading to higher risk of localized flooding;
- Warmer temperatures in all seasons, with increases in freeze/thaw cycles in winter impacting local infrastructure and reduced snowpack leading to reduced Spring melt;
- Increased extreme heat days (above 35C) in summer, exacerbating urban heat island effect and impacting vulnerable residents in particular;
- More volatile weather systems including high winds impacting buildings and infrastructure, and leading to power outages; and
- The above impacts also lead to increased stress on NHS and wildlife.

Further analysis was completed using a "business as usual" Representative Concentration Pathway (RCP) 8.5 emission scenario. The RCP 8.5 emission scenario represents little action being undertaken to reduce greenhouse gas emissions at a global scale and is the recommended pathway by most institutions for climate change adaptation planning since it takes a precautionary approach, and corresponds to SSP5-8.5 . Climate Normal station data from Environment and Climate Change Canada for the period of 1981-2010 was summarized from the Region of Peel's Climate Trends and Projections Report (2016), which used a combination of station data from Orangeville MOE (6155790) and Toronto Lester B Pearson Int'l A (6158733) based on data

availability. Climate projections typically consider scenarios for the 2050's (for the period of 2041-2070) and 2080's (for the period of 2071-2100) and came from Climatedata.ca for the Town of Caledon, unless otherwise indicated. Historic and future projected Intensity-Duration-Frequency (IDF) values came from the IDF climate change lookup tool produced by Western University and the Institute of Catastrophic Loss Reduction (ICLR).

3.6.3 Characterization and Analysis

Increasing Temperatures and Extreme Heat

Under a changing climate, temperatures are increasing across all seasons resulting in warmer winters, hotter summers, and an increased variability in extreme temperatures. These changes can have implications for both terrestrial and aquatic systems. A heightened temperature regime can lead to warmer surface waters, resulting in implications for cold-water species, increasing the potential for algal blooms, and exacerbating water quality issues. Warmer temperatures and extreme heat events can trigger an early onset of spring, impacting the phenology of plants, pose risks of heat stress as temperatures rise beyond optimal ranges, and untimely impact ranges and distribution of species. Moreover, urban areas face intensified urban heat island effects, exacerbating hazards for natural areas with low adaptive capacity.

Historically, the annual average temperature in Caledon was 6.9°C. By the 2050s, that average is anticipated to rise to 10.3°C, and up to 12.5°C by the end of the century. Similarly, the yearly number of days where the daytime high temperature is warmer than 30°C is expected to increase. Historical records indicate an average count of 12.0 hot days, which is projected to more than triple to 44.2 days by the 2050s and 72.6 hot days in the 2080s, representing a substantial increase from historical norms.

Cold Weather

As temperatures increase across all seasons, it is expected that average cold temperatures and the number of extreme cold days will decrease in response. Warmer temperatures can disrupt winter dormancy patterns in plants and animals, affecting their phenology, growth, and reproduction. Warmer winters can disrupt the regulatory mechanisms that help keep pests and invasive species populations in check by allowing greater survival rates, range expansion, increased reproduction, and decreased control measures. A decrease in cold temperatures can lead to reduced ice cover on lakes, rivers, and streams and changes in the timing of traditional ice in and out patterns. This can impact aquatic ecosystems by altering habitat availability for fish and other aquatic organisms, affecting water temperature regimes, and potentially leading to increased erosion along shorelines, among other impacts.

The annual average winter (December-February) temperature across the region is projected to rise from negative degrees to positive degrees come the end of the century. Historically, annual winter temperatures were -4.8°C. That value is anticipated to increase to -2.6°C by the 2050s, and up to 0.6°C by the 2080s. Similarly, the frequency of extreme cold events (the number of days per year with temperatures <-15°C) is decreasing. Historically, Caledon experienced approximately 23.5 cold days per year. This value is expected to decrease by more than half come the mid-century, with only 6.6 cold days expected in the 2050s, and 1.1 cold days annually by end of the century, highlighting the substantial shift to warmer winters.

Table 3-29: Average Seasonal Temperatures Across Peel Region (Auld, et. al. 2016)

Season Period	Spring (March-May) °C	Summer (June-August) °C	Fall (September-November) °C	Winter (December-February) °C
Historic	6.1	19.3	9.1	-4.8
2050s	7.8	21.3	11.0	-2.6
2080s	10.4	24.3	13.7	0.6

Precipitation and Extreme Rainfall

Changes in precipitation patterns and the occurrence of extreme rainfall events pose significant challenges to the natural environment and communities. These changes elevate the risk of erosion and compromise ecosystem health due to altered water availability and quality. Changes in water availability, including when and how precipitating is fall can impact river and stream flow and alter wetland and groundwater levels. Alterations in precipitation patters may also affect plant growth, distribution and composition of vegetation communities. Sudden and intense rainfall events can lead to flooding and increased pollutant loading from stormwater runoff, ultimately impacting water quality.

Annual average total precipitation values are projected to increase from a historic value of 852.0 mm to 896.9 mm in the 2050s, up to 940.7 mm by the end of the century. The average number of annual wet days in Caledon where at least 20 mm of precipitation (rain or snow) falls has been 6.2 days. By the 2050s, the number of wet days is expected to rise to 7.5 annually, with a continued increase to 8.7 days annual by the end of the century.

Future IDF

Rainfall IDF statistics are used in many water management applications, including watershed and stormwater planning, drainage design, delineation of floodplains, flooding and erosion risk management, and infrastructure operations. With climate projections indicating an increase in extreme rainfall across the province, IDF curves based on historical observations alone are not appropriate for long-term decision making and planning. This is particularly relevant to the design and planning of natural and built water management infrastructure.

The Resilient CCCAP proposed to update the Town's stormwater management master plan to improve resilience to flood related climate change impacts, with a supporting action to incorporate updated floodplain maps and climate change adjusted IDF curves into stormwater practices (Action 17.1.).

When comparing the historical IDF versus IDF under future climate change using a RCP 8.5 scenario for Heart Lake, total precipitation values under various time frames and return periods are anticipated to increase. For example, total precipitation for the 100-year return period storm, for a 12-hour duration was historically 100.9 mm. Come the 2050s, total precipitation is expected to increase to 116.9 mm and up to 126.8 mm by the 2080s for the same storm duration and return period.

Growing Season

Growing season is expected to lengthen over the coming decades. Growing degree days (GDD) are a measure of whether climate conditions are warm enough to support plant and insect growth. Once the daily average temperature is warmer than the threshold temperature (5°C), growing degree days are accumulated. The benefits of greater GDD may be offset by greater unpredictability of extreme weather events, heat waves and droughts, and the potential for increased pests, diseases and invasive species. Historically, Caledon had a value of 2077.3 GDDs. That value is anticipated to rise to 2782.3 GDD in the 2050s, and 3310.2 GDD by the end of the century.

Growing season start date (day of year) was historically day 124 of the calendar year. This date is expected to shift earlier to 112 by the 2050s and 104 by the 2080s, meaning the growing season is starting earlier, which aligns with the trend of increasing temperatures across all seasons.

Drought

While patterns for how and when precipitation is falling are changing across the Region, summer months are likely to be drier, but interrupted by heavy and intense rainfall events. Warmer temperatures and increasing occurrences of extreme heat events can compound issues of dry conditions. There is no singular standard for what classifies as drought, as severity and duration indicators vary between regions and countries. While precipitation patterns play a critically key role in ecosystem health and function, dry conditions pose potential risks for terrestrial and aquatic systems. Drought can lead to decreased water levels and stream flow in aquatic systems, and cause heat stress in vegetation.

The Region of Peel's climate trend report indicated that on an annual basis, no significant trend was found to be either increasing or decreasing from historic conditions, which identified an average of 234 dry days a year. Dry days was measured by the total number of days in a year that received no precipitation, or less than 1 mm. However, as average, maximum and minimum temperatures increase, evaporation and evapotranspiration rates could increase in response, particularly in summer months.

3.6.4 Summary of Findings

The following recommendations for bolstering climate change resilience should be considered as part of the local SWS.

Adaptive management strategies that consider the impacts of climate change are needed to support resilience and conservation of the built and natural environment. The Region of Peel's Natural Systems Vulnerability Assessment (2017) identified a series of priorities for action relevant to planning and watershed management that can assist in adapting to and mitigating the effects of the of climate change, including:

- Increase habitat connectivity to conserve biological diversity and foster resilient landscapes;

- Protect and restore natural features that provide numerous protective mechanisms against climate change;
- Enhance urban forest canopy to provide shading and reduce the urban heat island effect;
- Lower maximum water temperatures through management initiatives such as riparian planting for shade and infiltration of runoff;
- Protect and improve stream baseflow to minimize vulnerability to aquatic systems;
- Reduce surface water pollution through targeted management and initiatives such as low impact development, pollution offsetting, and the restoration of wetlands;
- Protect shallow water flow paths between shallow groundwater and surface features, such as streams and wetlands;
- Review natural system monitoring programs to ensure they include climate change impacts;
- Implement and update conservation policies and programs related to sustainability, natural system protection and climate change; and
- Promote effective collaboration to encourage widespread adaptation planning and implementation.

The Resilient CCAP includes a series of actions to protect and restore natural systems to enhance carbon sequestration potential, adaptive capacity and resiliency to climate impacts.

Strategies for protection of natural areas include:

- Protecting green spaces that already exist through conservation and land-use planning;
- Restoring and maintaining key features through careful management and ecosystem restoration and expanding natural areas through initiatives like tree planting and wetland restoration;
- Applying a green infrastructure approach to town initiatives, such as stormwater management, urban development, and asset management;
- Enhancing protection of agricultural lands, natural features, and water resources through planning and zoning policies;
- Exploring a tree protection by-law to prevent loss of the town's tree canopy and provide guidelines for tree replacement where appropriate;
- Work with Conservation Authorities to manage priority invasive species in Caledon;
- Identify and implement alternative land procurement approaches;
- Create an open space strategy for parks and green space in Caledon that considers future climate conditions in land acquisition, as well as park development and management;
- Work with Conservation Authorities and other partners to develop restoration strategies that enhance ecosystem resilience to climate change;

- Expand restoration efforts on private land (residential, commercial, rural, and marginally productive agricultural), including tree planting, wetland restoration, stream rehabilitation, etc. Increase tree planting and restoration of wetlands, streams, and meadows on public lands including town-owned parks, conservation areas, public right of ways, and other areas; and
- Explore an offsetting program to require that new developments compensate for loss or degradation of natural features.

Recommendations for watershed and natural system management, implementation and monitoring should address the climate change trends noted above and demonstrate compliance with Peel Region's Climate Change Master Plan, as well as supporting plans and assessments, such as the Natural Systems Vulnerability Assessment, and targets and goals set out in the Resilient Caledon Plan (2021), and The Future Caledon – Our Official Plan (2024). By encouraging sustainable development, natural heritage protection, restoration and creation with a climate lens, communities can help safeguard the essential ecosystem services that provide climate change adaptation, mitigation and resilience bolstering services.

Table 3-30: Summary of Climate Trends

Variable	Historical Value	2050s	2080s
Annual average temperature (C°)	6.9	10.3	12.5
Annual number of days with temperatures >30C°	12.0	44.2	72.6
Annual number of days with temperatures <-15 C°	23.5	6.6	1.1
Annual average Spring temperature (C°)	6.1	7.8	10.4
Annual average Summer temperature (C°)	19.3	21.3	24.3
Annual average fall temperature (C°)	9.1	11.0	13.7
Annual average winter temperature (C°)	-4.8	-2.6	0.6
Annual average total precipitation (mm)	852.0	896.9	950.7
Annual number of days with precipitation >20mm/day	6.2	7.5	8.7
IDF: 100yr return period, 12-hour storm (total mm)	100.9	116.9	126.8
Growing Degree Days (GDD): daily average temperature >5 C°	2077.3	2782.3	3310.2
Growing season start date (day of year)	124	112	104

4. Natural Heritage System

Natural Heritage Systems (NHSs) are defined within the NHRM (2010) as “an ecologically based delineation of nature and natural function – a system of connected or to be connected green and natural areas that provide ecological functions over a longer period of time and enable movement of species”. The Mayfield Tullamore Secondary Plan NHS will contain both natural heritage and natural hazards along with their associated setbacks. The NHS protects and enhances all natural heritage features and ecological functions that are identified in the PPS as “significant” under relevant criteria in guiding documents (NHRM 2010, Town OP 2024, Region OP 2022, SWH 6E Ecoregion Criteria 2015). The intention of the NHS is to ensure that the Mayfield Tullamore corridors continue to provide for passage, foraging and residency for as many species as possible. Refinements to the boundaries of the NHS may occur within future studies to include ecological offsetting or enhancement areas. The recommended NHS may be refined during site specific applications.

The existing NHS is illustrated on **Figure 4-1** (below) and further described below.

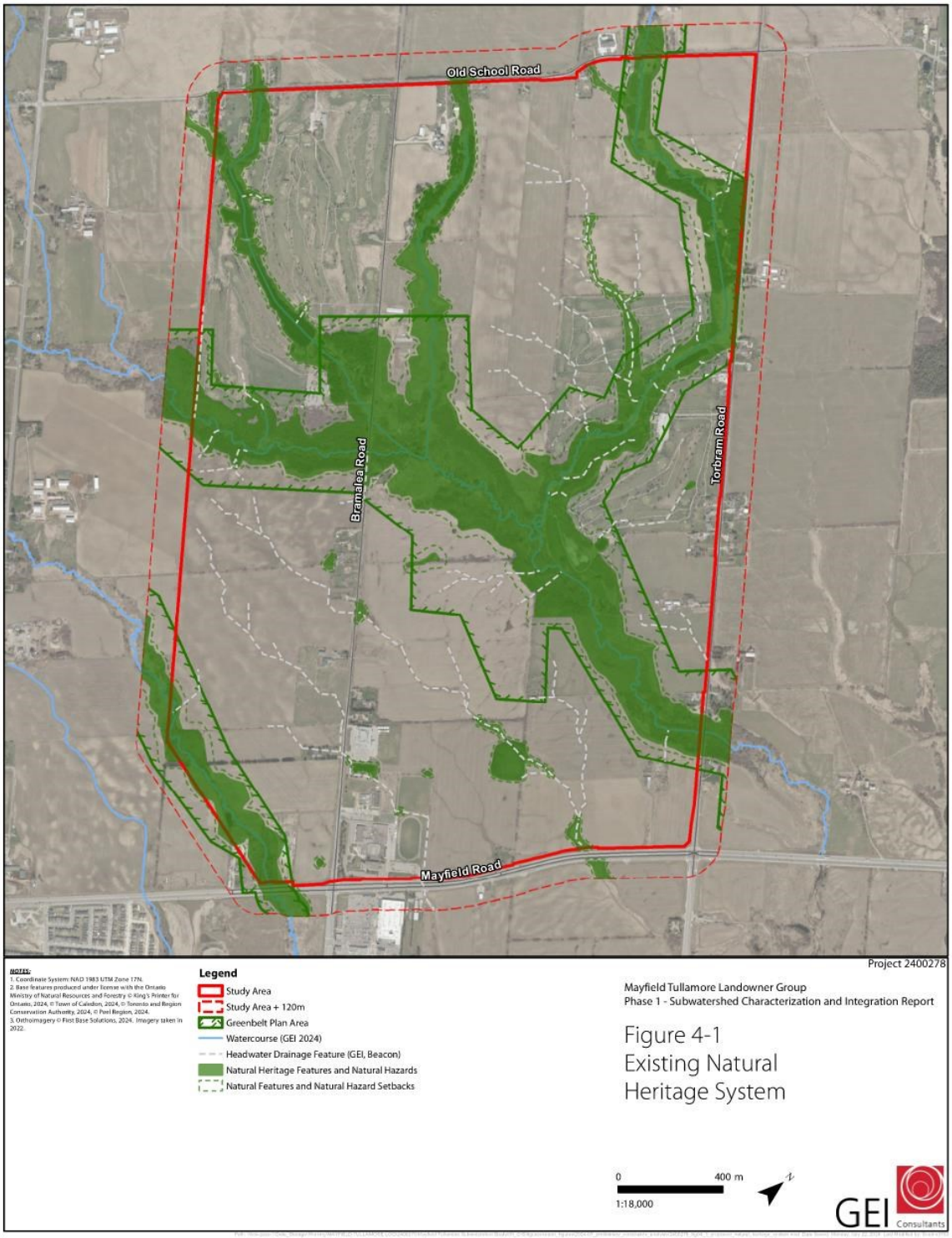


Figure 4-1: Existing Natural Heritage System

It is recognized that Figure DA2-14 “Preliminary NHS Linkage and Enhancements” of the Phase 2 SABE Scoped SWS provided a preliminary NHS boundary for the Study Area; however, the SABE recognizes that its NHS boundary is based largely on aerial interpretation and is subject to refinement upon the completion of targeted field investigations. As a result, the Mayfield Tullamore Secondary Plan recommended NHS is intended to supersede the NHS boundary illustrated within the SABE.

A review of the existing NHS as determined by GEI and the preliminary NHS as determined through the SABE is provided within **Figure 10** (**Appendix B1**). As shown on this figure, the preliminary NHS and the existing NHS are very similar throughout the Study Area. The key differences between the preliminary and existing NHS are discussed below:

- Property 1:
    - A supporting feature was identified along HDF H26-S1, which was previously identified within the SABE as a medium constraint watercourse (WHT4(3)6-1). Through the detailed investigations the upper portion of this drainage feature was confirmed to be an HDF. This linework was also further refined through the staked top of bank (with TRCA) and LTSOS delineation.
    - Another feature was identified within a CUM1-1 vegetation community near Bramalea Road. This report determined that this community was not significant and, therefore, was not incorporated into the existing NHS.
    - A key feature was identified within a CUM1-1 and Orchard vegetation community near Bramalea Road. This report determined that these communities were not significant and, therefore, was not incorporated into the existing NHS.
    - A supporting feature was identified within a CUM1-1 vegetation community near Old School Road. This report determined that this community was not significant and, therefore, was not incorporated into the existing NHS.
- Property 3:
    - The key feature that was identified along the Campbell’s Cross Creek corridor (CCC2) has been refined through detailed investigations. The valleyland limits have been refined through LTSOS and meander belt delineation.
- Property 4:
    - A supporting feature was identified within a CUM1-1 vegetation community along the western limit of the Greenbelt Plan Area. This report determined that this community was not significant and, therefore, was not incorporated into the existing NHS.
- Properties 5, 6 and 11:
    - One longer supporting feature was identified along HDF H8 and is associated with CUM1-1, THDM2-6, MAM2-2 and FOD5-4 vegetation communities. The limits of the woodland was refined through the treed limit staking with the Town of Caledon. The limits of the wetland communities was refined through wetland staking with the TRCA. The CUM1-1 and THDM2-6 vegetation communities were not determined to be significant and, therefore, were not incorporated into the existing NHS.

- Property 9:
    - A supporting feature was identified within a CUM1-1 vegetation community along the northern limit of the Greenbelt Plan Area. Beacon Environmental's report (**Appendix B3**) determined that this community was not significant and, therefore, was not incorporated into the existing NHS.
    - The key feature limit differences within this property are likely associated with the interpreted top of bank for the valleyland. Through detailed investigations the valleyland limits were refined through top of bank staking (Beacon Environmental and TRCA) and LTSOS delineation (GEMTEC).
- Property 10:
    - A supporting feature was identified within an agricultural area that also captured a smaller CUM1-1 vegetation community on the western side of the West Humber River valleyland. Beacon Environmental's report (**Appendix B3**) determined that the CUM1-1 community was not significant and, therefore, was not incorporated into the existing NHS. Agricultural areas should not be incorporated into the existing NHS linework.

Additional areas located on non-participating properties within the Greenbelt Plan Areas had also been identified within the preliminary NHS as supporting areas. These supporting areas align with either CUM vegetation communities or agricultural areas; therefore, they would not be considered significant and have not been incorporated into the Existing NHS. The presence of natural heritage features and hazards within non-participating properties must be confirmed and refined through site specific investigations (as discussed within **Section 5**).

Within the Phase 2 SWS, a Proposed NHS map will be prepared to incorporate restoration and enhancement areas. This will reflect the proposed Structure Plan including potential SWM pond locations, watercourse crossings and any non-significant natural feature reconfigurations.

4.1 Key Components of the Existing NHS

4.1.1 NHS Watercourse Corridors

All watercourses that have been identified to remain on the landscape through the multi-disciplinary ranking are included within the existing NHS. These watercourses include the medium (blue) and high (red) constraint watercourses. Some watercourses may be relocated but in all cases where significant natural features are located along the existing watercourses, the intention is that the riparian connections will be maintained and enhanced, where feasible, and the watercourse reaches located along the natural features will not be significantly disturbed or modified. The exception is the medium constraint watercourse identified on Property 1 where significant alteration has occurred as a result of the golf course construction/maintenance/ practices and instead significant restoration efforts are recommended to realign that watercourse corridor's natural trajectory.

The NHS watercourse corridors will contain all natural hazards including flood, erosion and wetland (where present) hazards.

4.1.2 Natural Heritage Features

As discussed within **Section 3.1.6**, the following significant natural heritage features were identified within the Study Area:

- Significant wetlands;
    - All wetlands located within the Greenbelt Plan Area will be retained and protected as part of the NHS; these wetlands are considered candidate PSWs and were not evaluated.
- Significant coastal wetlands;
    - No significant coastal wetlands are identified on or adjacent to the Study Area and would not be expected given the distance of the Study Area from the waterbodies considered coastal.
- Significant woodlands;
    - The majority of woodland communities identified are found within the Greenbelt Plan Area. All woodlands located within the tablelands of the Study Area have been identified as non-significant woodlands since they do not meet significant woodland criteria.
- Significant valleylands;
    - Only valleylands located within the Greenbelt Plan Area meet the criteria of significance. The main West Humber River valleyland, Campbell's Cross Creek and the tributary along Torbram Road are considered significant.
- SWH;
    - Turtle Wintering Areas (seasonal concentration areas) were identified within the participating properties of the Study Area. Where targeted field data was not available (with the Greenbelt Plan Area and non-participating properties) candidate seasonal concentration areas were identified;
    - Seeps and Springs (specialized wildlife habitat) were identified within the participating properties of the Study Area. Where targeted field data was not available (with the Greenbelt Plan Area and non-participating properties) candidate seasonal concentration areas were identified;
    - The following SWH types for species of conservation concern (SOCC) were present in the Participating Properties within the Study Area: Terrestrial Crayfish, Barn Swallow, Eastern Wood-Pewee, Snapping Turtle and Monarch (candidate). Additional Candidate SWH within non-participating properties and the Greenbelt Plan Area can be found in **Table 11** (**Appendix B2**); and
    - No Animal Movement Corridor SWH was identified within the participating properties in the Study Area.

- Fish habitat;
    - Direct fish habitat was identified within medium and high constraint watercourses. All other drainage features were Identified as HDFs that provide indirect (contributing) fish habitat.
- Habitat of endangered and threatened species:
    - The following SAR and/or SAR habitat was identified within the Study Area:
        - Redside Dace – endangered in Ontario;
        - Butternut – endangered in Ontario;
        - Eastern Small Footed Myotis – endangered in Ontario;
        - Little Brown Myotis – endangered in Ontario;
        - Bobolink – threatened in Ontario; and
        - Eastern Meadowlark – threatened in Ontario.
- Significant ANSIs
    - No ANSIs were identified on or within 120 m of the Study Area.

All significant natural heritage features have been protected within the existing NHS. Non-significant features (e.g., non-significant wetlands) have been identified on Figure 4-1. These areas will be further reviewed as part of the Phase 2 SWS Report (Impact Assessment) and opportunities for restoration/enhancement areas will be further defined as part of the NHS to ensure that there is no net loss in ecosystem area and/or functions. This will be shown within the Proposed NHS within the Phase 2 SWS Report.

Opportunities to connect fragmented components of non-significant natural heritage features to the NHS will be considered as part of the Phase 2 SWS Report.

4.1.3 Vegetation Protection Zones and Setbacks

Minimum VPZs are to be established in accordance with municipal, regional and provincial policies. All natural heritage features (significant and non-significant) will require VPZs to ensure the protection of their form and function over the long-term. Final VPZs cannot be confirmed within the SWS process until detailed investigations (e.g., final feature-based water balance assessments) have been completed.

It is recognized that buffers play an important role in mitigation where development is proposed adjacent; however, vegetated buffers can provide further benefits than simply protection to the NHS. Table 13-1 of the NHRM (2010) identifies several functions and benefits of buffers including reduction of light and noise, space for tree-fall, protection of root zones, enhancement of woodland interior, attenuation of runoff, etc. Setbacks are established to preserve natural hazards from potential development pressures.

The VPZs and setbacks are based on the following policy guidance:

- TRCA's Living City Policies (2014);
- Town of Caledon's OP (2024 Consolidation);
- Peel Region's OP (2022);
- The Greenbelt Plan (2017); and
- Section 29 of O. Reg. 831/21 (Habitat).

The SABE Scoped SWS does not provide any VPZ or setback recommendations.

For the purposes of the Secondary Plan, minimum VPZs are recommended within this local SWS. It is anticipated that final VPZs will be established through site specific EISs.

TRCA Review

Within Section 7.3.1.4 of the Living City Policies (2014), the following setbacks are prescribed for natural hazards:

- 10 m buffer from the greater of long term stable top of slope/bank, stable toe of slope, regulatory flood plain and/or meander belt; and
- 30 m buffer from PSWs or a 10 m buffer for all other wetlands.

Other natural heritage setbacks provided within the Living City Policies are not included since the Conservation Authority no longer provides commentary on natural heritage considerations.

Town OP Review

The current in-force Caledon OP (2024 Consolidation) has no defined buffer/setback width requirements for natural heritage features; instead, it outlines that secondary plans require a subwatershed study to include "confirmation of the boundaries and appropriate buffers for protection, restoration and enhancement of the Natural Environment System" (Section 5.5.9).

Section 13.9.5 of the Future Caledon Draft OP (2024) states that "minimum buffer widths will be established in local subwatershed or equivalent studies prepared to the satisfaction of the Town". Section 13.9.6 further states that "final buffer width(s) within New Community Areas and New Employment Areas will be determined through an environmental impact study, prepared to the satisfaction of the Town". As a result, minimum buffer widths presented within Section 13.8 of the Official Plan do not apply.

Region OP Review

The Region does not provide buffer/setback requirements; rather, it defers to the Greenbelt Plan or Town's requirements.

Greenbelt Plan Review

In accordance with Section 3.2.5 of the Greenbelt Plan (2017), a minimum VPZ of 30 m is required for wetlands, seepage areas and springs, fish habitat, permanent and intermittent streams, lakes and significant woodlands. All other KNHFs and KHFs (e.g., valleylands) require a VPZ which "is of sufficient width to protect the key natural heritage feature or key hydrologic feature and its functions form the impacts of the proposed change and associated activities".

Species at Risk Requirements

Section 29 of O. Reg. 831/21 defines the limits of occupied (regulated) Redside Dace habitat as 30 m from meander belt width. No setback requirement is provided for contributing Redside Dace habitat.

No other setbacks are prescribed for other noted SAR. No Butternut Health Assessments have been completed to understand the health of the stems. It is recommended that these assessments be completed at a site-specific stage if alteration is proposed within the vicinity of these stems. Health assessments are not warranted for retained stems located well within the NHS (>50 m from proposed site alteration and development). Butternut may be removed only in accordance with Part 5 of O. Reg. 830/21.

Candidate SAR bat habitat was identified within the Greenbelt Plan Area and is expected to be retained. There are no setback requirements prescribed by MECP for SAR bats; however, suitable woodlands may be prescribed protection in accordance with Woodland policies.

Eastern Meadowlark and Bobolink habitat may only be removed in accordance with Part 4 of O. Reg. 830/21.

Summary

In accordance with Section 3.2.5.1 of the Greenbelt Plan (2017), wetlands, seepage areas and springs, fish habitat, permanent and intermittent streams, lakes and significant woodlands will have a minimum of a 30 m VPZ applied. Valleylands and other features/hazards located outside of the Greenbelt Plan Area will have the following minimum VPZs and setbacks:

- 30 m from PSWs or 10 m from non-significant wetlands (using the staked wetland boundary);
- 10 m from woodlands (using the staked dripline boundary);
- 15 m from significant valleylands or 10 m from non-significant valleylands (using the greater of long-term stable top of slope or staked top of bank boundary for confined systems; or the greater of meander belt or floodline boundary for unconfined systems);
- 15 m from warmwater baitfish habitat (medium constraint watercourses) or 30 m from cool/cold water fish habitat (high constraint watercourses); and
- 30 m from the meander belt width of occupied Redside Dace watercourses.

Additional discussion by feature type is provided below.

Wetlands

A 30 m setback from PSWs is the standard recommended VPZ to ensure that these features are protected from adjacent land-uses. This is also required as part of the Greenbelt Plan policies.

A 10 m setback from non-significant wetlands is in accordance with the TRCA's Living City Policies and considered sufficient to protect the feature from a natural hazard perspective. From a natural heritage perspective, a 10 m VPZ is sufficient given that the wetlands are commonly disturbed from ongoing site management (e.g., golf course or agricultural). These communities are relatively monocultural, have lower biodiversity and habitat functions. As a result, a 10 m buffer is warranted to protect the ecological form and function of non-significant wetlands.

Woodlands

A 10 m VPZ from all woodlands is sufficient as it will protect the health and condition of the trees. By applying a 10 m VPZ it will also protect critical root zones for individual trees within the woodland community from potential impacts during construction (Carolinian Canada 2003). The 10 m buffer will also enhance the feature through restoration of natural self-sustaining vegetation within the Study Area in areas that are currently either actively managed agricultural fields or golf courses. In summary, a 10 m buffer is sufficient to protect the woodland feature and its functions.

A 30 m VPZ will be applied to significant woodlands in accordance with Greenbelt Plan policies.

Valleylands

The majority of the watercourse corridors are located within confined systems; for these systems, a setback from the meander belt is not necessary, rather long-term stable top of slope and/or top of bank (staked or LiDAR) was applied instead.

For unconfined systems within participating properties in the Study Area (Property 1, 3, 4, and 7), meander belt was the guiding constraint. However, in some locations, it was not feasible to delineate meander belt features, and slope features do not exist in unconfined systems. As such, for these systems, the greater of the available limits was used to define the valleyland system (including the TRCA floodline). Of note, the TRCA floodline is expected to be replaced by an updated floodline developed by SCS, this will be incorporated in subsequent reporting.

As no long-term stable top of slope or top of bank was delineated for non-participating properties, the TRCA's crest of slope was used to support valleyland delineation in these areas. Additional investigation will be required on non-participating lands in the future to ground-truth these limits.

For Properties 9 and 10, geotechnical limits of the valleylands were assessed by GEMTEC (for LTSTOS) or staked by Beacon Environmental (for top of bank). It is understood that TRCA staked with top of bank on these properties with Beacon. Some discrepancies are noted between the LTSTOS and staked top of bank on these properties. When the LTSTOS is less than the limits of the staked top of bank, or if no LTSTOS was calculated in an area with a staked top of bank, the development limits will be based on the staked top of bank. This direction was provided by GEMTEC for Properties 9 and 10. The properties are within the jurisdiction of TRCA who will need to review and confirm this approach taken by GEMTEC, and the results of their slope stability study. Addition details are provided in the Section **Preliminary Slope Stability Study,** above.

All valleyland constraints discussed above for constrained and unconstrained valleylands are shown on **Figure 9C** (**Appendix B1**).

The above noted setbacks will meet the minimum setback requirements required by the TRCA to maintain the natural hazard, while also protecting the valleylands form and function. An additional 5 m buffer is applied to significant valleylands in accordance with the Town's requirements within existing settlement areas outside of Provincial Plan areas. This is also a consistent setback requirement within other jurisdictions for significant valleylands (e.g., Halton Region).

Fish and Fish Habitat

VPZs are applied to direct (occupied) fish habitat. A 15 m VPZ is recommended from warmwater fish habitat (associated with medium constraint watercourses) and a 30 m VPZ is recommended from cool/cold water fish habitat (associated with high constraint watercourses). High constraint watercourses are also identified as permanent watercourses within the Greenbelt; therefore, a 30 m VPZ would be required. These are the standard setbacks for warmwater and cool/cold water fish habitat. Specified VPZs were not provided within the above noted documents. Cool and cold water habitats are more sensitive to anthropogenic influences and site alteration, as a result a larger VPZ is required to protect these habitats. Warmwater fish habitats are generally less sensitive and require smaller VPZs.The VPZs were applied from the centreline of the watercourses, except on Property 1 where the VPZ was applied to the edge of the ponds.

Fish habitat is illustrated on **Figure 9D** (**Appendix B1**).

Redside Dace

These setbacks are provincially legislated within O. Reg. 831/21.

Summary

The greatest constraint and its VPZ guided the limit of the recommended NHS. The above noted VPZs and setbacks are commonly accepted throughout the Greater Toronto Area.

It is acknowledged that no prescribed setback specific to SWH is provided. This is in alignment with provincial and municipal policies; however, candidate and confirmed SWH types are generally associated with significant natural heritage features that have their own prescribed setbacks. The requirement under the PPS is to meet a "no negative impact" to the feature and its functions. This will be further reviewed as part of the Phase 2 SWS.

4.1.4 Restoration and Enhancement Areas

Any non-significant natural heritage features that are proposed for removal must be compensated within and connected to the NHS to prevent fragmented portions of natural features across the landscape. Removal of natural features should be considered a last-case resort where no other alternatives are viable or feasible to maintain the features in place.

Section 13.9.9 of the Future Caledon Draft OP (2024) states that "replication of features may be considered through local subwatershed studies, prepared to the satisfaction of the Town, except where features are required to be protected in accordance with the policies of this Plan".

It is recognized that the Town does not consider VPZs/buffers as enhancements instead they consider them to be mitigation measures against future development.

Restoration and enhancement areas will be identified as part of the Phase 2 SWS Report within the Proposed NHS; this will include a review of enhancement areas proposed in the SABE Scoped SWS Part B (Figure DA2-14; Wood, 2022) and Schedule D2a of the Future Caledon Draft OP (Town of Caledon, 2024) in alignment with the targets, criteria, and guidance from the SABE Scoped SWS .

4.1.5 NHS Linkages

The West Humber River corridors would act as primary (regional) linkage features that provide large patches of habitat for a variety of flora and fauna, and also serves as an important wildlife corridor across the landscape. The non-significant valleylands associated with medium constraint watercourses WHT4(3)4-2 and WHT4(3)5-2 (Properties 1 and 4) provides a secondary (local) linkage function, especially as it connects into the West Humber River downstream of the properties. Wildlife passage underneath the surrounding road networks appears to be facilitated based on the presence of bridge crossing at Torbram Road.

All linkages and their associated functions will be protected within the NHS; however, refinements to the linkages on Properties 1 and 4 may occur to permit ecological restoration (including channel realignment).

All linkages identified within the SABE were shown within the Greenbelt Plan Area and are included in the recommended NHS.

4.1.6 Enhanced Wildlife Crossings

Existing wildlife crossings will be maintained along Torbram, Mayfield, Bramalea and Old School Roads.

New proposed road crossings will be explored as part of the Phase 2 SWS Report. Where possible, the number of crossings will be minimized and each crossing will be designed to facilitate the movement of aquatic and terrestrial species found within the Mayfield Tullamore Study Area.

5. Next Steps

5.1 Phase 2 Reporting

The objectives for Phase 2 (Detailed Update to Existing Conditions and Impact Assessment) are to build on the outputs from Phase 1 to develop an integrated and iterative impact assessment across all disciplines. Phase 2 will introduce a land use plan and include a fulsome assessment of potential impacts on natural heritage and water resource features and functions as a result of land use changes. The Phase 2 report will also review the goals, objectives, and targets set within the SABE SWS, and will include an exploration of climate smart mitigation and management strategies for the proposed land uses.

Natural Heritage

To better understand the potential impacts on the existing NHS as part of the Secondary Plan land use plan, Phase 2 of the local SWS will examine natural heritage features and potential negative impacts and explore best management approaches for design, implementation and management of corridors, buffers, and restoration areas to avoid or mitigate impacts, including assessment of NHS/urban interface (i.e., fencing, directional lighting, interpretive signage, etc.). This will include identifying principles for integrating buffers and infrastructure into the Study Area (i.e., stormwater management facilities and low impact development). In addition to addressing potential impacts to terrestrial and aquatic features and functions, Phase 2 will provide preliminary mitigation and management recommendations to protect these features. Mitigation strategies will be guided by the net benefit mitigation hierarchy outlined in the SABE SWS.

The existing NHS (**Figure 4-1**; presented within **Section 4**) identifies both significant and non-significant natural heritage features, natural hazards and their associated VPZs/setbacks. Within the Phase 2 SWS, a Proposed NHS will be provided, which will include restoration and enhancement areas. These will be expanded upon from those identified within the SABE. Phase 2 will seek to highlight opportunities for the enhancement of aquatic and riparian habitats to help support the identification and protection of a robust NHS for the Secondary Plan Area.

Using the Proposed NHS, a feature-based water balance risk assessment will be completed for all retained features to confirm that there will be no impact to the hydrology of natural heritage features. The feature-based water balance will explore the changes in the pre to post development catchment area and determine if mitigation measures are required to maintain the hydroperiod requirements based on the risk assessment. A number of mitigation measures will be identified, as necessary, for consideration during the detailed design phase.

For created wetlands, a hydroperiod review will be completed to confirm the viability of any areas identified for wetland restoration. Specifically, a targeted wetland community type will be identified for the created wetland and detailed hydrologic modelling will be completed to determine if the selected wetland community can be supported at that location. The hydrologic modelling may consider preliminary mitigation measures to support the hydroperiod (e.g., rooftop contributions, LID inputs).

Where aquatic habitats may be impacted (e.g. watercourse realignments, watercourse crossings, etc.), an assessment of changes to the hydrologic and hydrogeologic regimes, to thermal regime, species diversity, water quality and quantity and long-term protection of these habitats will be considered. This assessment will also incorporate fisheries mitigation and compensation for drainage features or watercourses that are candidates to be eliminated or realigned, in consultation with appropriate agencies.

Fluvial Geomorphology

As part of Phase 2 of the SWS, a detailed erosion assessment will be performed for all watercourses where SWM outfalls are proposed. The assessment will include determining erosion thresholds and completing an erosion exceedance analysis for each watercourse.

The erosion threshold represents a discharge at which sediment within the reach is entrained. This is determined using different methods that rely on channel and sediment characteristics. A detailed geomorphic assessment will be completed for each downstream receiving reach, based on the locations of the proposed stormwater management ponds. The detailed assessment will collect stream characteristics, such as a longitudinal profile, cross sections, bed and bank substrate characteristics, riparian conditions, and flow characteristics on the day of the assessment, to calibrate the erosion threshold model.

An erosion exceedance analysis will be completed for the reaches downstream of the proposed stormwater management facilities. This will rely on the results of the continuous hydrological model based on the proposed stormwater management assessment described herein. Based on the previously determined erosion threshold, the hydrograph flows will be inputted through a representative cross section for the downstream receiving watercourse in order to calculate the cumulative exceedances of different hydraulic parameters. The pre- to post-development exceedance will be compared using the following criteria:

- Cumulative time of exceedance;
- Cumulative effective velocity;
- Cumulative effective discharge; and
- Cumulative effective work.

A match is considered when exceedances in the pre- and post-development conditions are within 5% of each other. It is rare that exceedances are matched in the first model iteration. Therefore, it assumed that two pond configurations with varying volumes and/or drawdown times will need to be considered for each reach, as part of this analysis.

In addition to the two analyses, any recommendations in light of the performed analyses will be provided for the proposed realignment on Property 1.

Hydraulics/Hydrology

The following hydraulics and hydrology analysis will be prepared in the Phase 2 report:

- Discretize the TRCA Humber River Watershed future conditions hydrology model for the purposes of establishing post-development uncontrolled flows for the Study Area;

- Update the TRCA future conditions hydrologic model for the 2 through 100 year and Regional storm events, to reflect proposed future land uses within the Study Area in accordance with the land use; and
- Report post development uncontrolled peak flows and compare to pre-development peak flows for the 2 through 100 year and Regional storm events at key nodes downstream of the Study Area to Lake Ontario.
- Assess the implications of uncontrolled future flows in existing downstream flood vulnerable areas.

Hydrogeology

The Phase 2 report will review the proposed land use plan relative to the existing hydrogeological conditions identified in the Phase 1 report. The impact assessment would address potential impacts from development such as:

- Infiltration deficit and reduced groundwater recharge from an increase in impermeable land cover. A post-development water balance will be completed;
- Changes to groundwater/surface water connections, and potential reduction in baseflow to watercourses or surface water features;
- Potential changes to groundwater levels;
- Discussion on potential mitigation measures such as LIDs, to reduce or mitigate groundwater quantity and quality impacts; an
- High-level dewatering assessment to assess radius of influence and potential impacts to nearby groundwater users, water features, or land settlement. Commentary on regulatory considerations will be provided.

Geotechnical

Phase 2 will offer high-level geotechnical recommendations based on the proposed land use plans and pinpoint areas requiring further subsurface investigations. The geotechnical team will collaborate with planners throughout Phase 2, providing guidance on slope stability setbacks, additional borehole locations, and addressing questions for subsequent site-specific geotechnical reports.

Surface Water

Based on the subsurface conditions and slope stability assessment, potential impacts will be assessed in relation to the proposed land use plan. Potential mitigation measures for any impacts will be discussed. The potential impacts or areas of concern noted in the Phase 2 reporting will lead into the details on future studies required for site development as part of the Phase 3 reporting.

Climate Change

Phase 2 will incorporate climate change considerations and decision making to assist in creating a built form and system of infrastructure that mitigates the Town's contribution to climate change and enhances resiliency to its impacts. Implementing measures that mitigate climate risk and enhance resiliency to changing climate conditions and extreme weather events bolsters the safety and preparedness of communities, infrastructure and natural environment.

5.2 Non-Participating Properties

For all non-participating properties, it is expected that a similar level of field investigation would be required for any land use changes proposed to identify existing characteristics and conditions present. Through this Phase 1 local SWS report, desktop information was used to characterize the non-participating properties to allow for a comprehensive review of the natural heritage and water resource system for the local subwatershed study area; however, no targeted field investigations were completed.

Natural Heritage

A fulsome terrestrial and aquatic field program would be required to understand ecological features and functions within these properties to match the detailed investigations that were completed as part of the Phase 1 SWS.

Field investigations to be completed would include:

<u>Terrestrial Field Investigations</u>

- Ecological Land Classification and three-season botanical inventories (spring, summer and fall);
- Amphibian call count surveys (three rounds);
- Turtle basking surveys (three rounds) and turtle nesting suitability survey (one round);
- Snake surveys (four rounds);
- Structure Screening Surveys (including visual assessment of potential to provide bat habitat, Barn Swallow nesting sites and snake hibernacula habitat suitability);
- Breeding bird surveys (two rounds minimum with potential third round if suitable grassland habitat is present);
- Bat habitat and acoustic surveys; and
- Feature pre-staking (top of bank with geotechnical engineer, wetland and woodland dripline).

<u>Aquatic Field Investigations</u>

- Headwater Drainage Feature Assessments (HDFA; three rounds);
- Aquatic habitat assessment (one survey); and
- Fish community sampling within all drainage features and ponds.

Additional review of the existing NHS linework (as presented within **Figure 4-1**) should be refined based on site-specific information collected.

Fluvial Geomorphology

Additional erosion constraints must be established for all non-participating properties. These analyses would involve additional field investigations to document active geomorphic processes and stream health. The assessments will also include measurements of channel dimensions (i.e., bankfull and wetted widths and depths), as well as the characterization of bed and bank substrate. Additional desktop analyses shall also be performed, and will include a review of historic and recent aerial imagery to document current and past channel location, to provide insight into channel adjustments, and to identify future trends. This would aid in establishing meander belt limits on a reach basis following standard geomorphic techniques.

All watercourses (low, medium and high) should be evaluated to confirm that the correct constraint ranking has been assigned to the feature. Constraint rankings must be completed in accordance with the criteria identified within the SABE (and within the Town's OP). For low constraint watercourses, these drainage features should be reviewed to confirm that they meet the watercourse definition under the Conservation Authorities Act. If they do not meet the watercourse definition, then they should be assessed as HDFs using the HDFA Guideline.

Hydrology and Hydraulics

The hydrology modelling updates cover non-participating properties within the Study Area. The drainage area and assumed soil parameters of non-participating properties will be confirmed through their respective studies to ensure they do not differ significantly from those presented in this report. If a change to the model parameters is warranted, the hydrology model will be updated to re-calculate the peak flows in the affected tributaries. The hydraulics model channel geometry has not been updated through non-participating properties. Future studies will update the hydraulics model based on detailed topographic survey where warranted. If an update to the hydrology model was conducted then the re-calculated peak flow will be applied to the affected tributaries and the floodline elevations will be recalculated.

Hydrogeology

Additional site-level subsurface investigations would be required to evaluate existing conditions and provide preliminary assessments of connections to local features, such as local wetlands or streams. The required scope of work would be similar to what has been completed to-date on the initial group of participating properties and can be scaled to be applied to individual properties that may join at a later date, but monitoring timelines for hydrogeological studies may require extended time periods (minimum of one year of groundwater level monitoring).

Geotechnical

A subsurface investigation will be required to determine soil and groundwater conditions, characterize site geology, and results used to support the hydrogeological study. Additionally, an erosion hazard assessment and slope stability study will need to be conducted to establish the

LTSTOS for confined valley systems on site. The study will follow TRCA guidelines from "The Living City Policies" and provincial guidelines from the "Technical Guide – River and Stream Systems: Erosion Hazard Limit." More details are provided in the “Geotechnical Assessment” section within the **Terms of Reference** (**Appendix A**).

Surface Water

If the non-participating properties are located within areas that were identified as being of interest from studies completed on nearby or adjoining properties, additional surface water flow monitoring, long-term monitoring stations and/or surface water sampling programs may be required. These additional studies may also be required if the property falls within an area with an identified data gap (such as where a group of non-participating properties are situated together). The presence of wetlands on the property may warrant additional localized investigation to characterize and potentially generate a feature-based water balance.

If there is sufficient coverage in terms of monitoring data and/or monitoring stations, no additional investigation may be required.

6. Conclusions

If you have any comments or concerns regarding the Phase 1 SWS Report, please contact one of the undersigned.

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APPENDIX A – Terms of Reference

Terms of Reference

Local Subwatershed Study Terms of Reference

Mayfield Tullamore Secondary Plan

Town of Caledon, Peel Region, Ontario

Submitted to:

Mayfield Tullamore Landowner Group Inc.
c/o Development Collective
Attn: Kim Beckman, MTLOG Group Manager

Submitted by:

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August 2024
Project 2400278

Issues and Revisions Registry

Identification	Date	Description of Issued and/or Revision
First Submission	May 2024	
Second Submission	August 2024	Addresses agencies comments from the Town of Caledon, Region of Peel and Toronto and Region Conservation Authority.

Statement of Conditions

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

Table of Contents

1. Introduction

GEI Consultants Ltd. (GEI) and SCS Consulting Group Ltd. (SCS), are working on behalf of the Mayfield Tullamore Landowner Group Inc. (MTLOG) in support of an official plan amendment to the Town of Caledon's Official Plan. The MTLOG lands are approximately 423 ha in size and generally located north of Mayfield Road, west of Torbram Road, south of Old School Road, and east of Dixie Road in the Town of Caledon, Ontario (**Figure 1, Appendix A**). As identified in the Mayfield Tullamore Secondary Plan Terms of Reference, Town of Caledon Official Plan (2024) and the Peel Region Settlement Area Boundary Expansion (SABE) Study, development of these lands requires a Local Subwatershed Study (SWS). The following document outlines the Terms of Reference (TOR) for the Local SWS, based on the Region of Peel TOR provided as Appendix F to the Scoped Subwatershed Study (Wood et al., 2022) and the Town of Caledon's SWS TOR(May 2024).

A first draft of this Terms of Reference was submitted to the Town of Caledon, Region of Peel and Toronto and Region Conservation Authority in May 2024. Comments from these agencies were received July, 2024.

1.1 Purpose

The Mayfield Tullamore Secondary Plan Area is located within Peel Region, in the Town of Caledon and is within the Peel Region's Settlement Area Boundary Expansion (SABE) Study Area, which outlines areas for future settlement and urban development. As outlined in the SABE Scoped Subwatershed Study (SABE SWS (Wood et. al., December 2021)), the purpose of a Local Subwatershed Study (SWS) is to assist in developing a sustainable development plan for the subject growth area in Caledon by ensuring protection and benefits to the natural and human environments through the further implementation of the direction, targets, criteria and guidance of the SABE SWS (Wood et. al., December 2021). As per the SABE SWS: "The Local Subwatershed Study will confirm, refine and implement a Natural Heritage System (NHS) and the water resource management approach that will protect, rehabilitate, and enhance the natural and water-based environments within the Secondary Plan Area, and the surrounding lands in the subwatershed."

The Future Caledon Draft OP (2024) outlines requirements for a Local SWS for the new community areas (Section 13.9.1) as part of the integrated planning process for Secondary Plan areas.

As such, a local Subwatershed Study (SWS) is required to support the future development of land owned by the MTLOG within the Humber River Watershed in alignment with Official Plan policies. The scope of the SWS will generally focus on characterization of the area, subwatershed impact analysis and mitigation strategies for future land use scenarios.

The SWS for the MTLOG lands will include field work programs and desktop assessments spanning the following main disciplines:

- Natural Heritage – Aquatic and Terrestrial Systems;
- Stream Morphology;

- Hydraulics and Hydrology;
- Hydrogeology;
- Geotechnical Assessment;
- Surface Water Quality; and
- Climate Change.

The SWS will also:

- Address the relevant natural features and functions identified in the Provincial Policy Statement (PPS; MMAH 2020), Region of Peel Official Plan, and Town of Caledon Official Plan;
- Provide the foundation for the layout of the Secondary Plan by defining and delineating elements such as the NHS, and the location of stormwater management facilities;
- Follow the direction and guidance of the Scoped Subwatershed Study (Wood et al., 2022) confirming targets and criteria based on site specific data obtained through the Secondary Plan level study;
- Define measures to protect and/or enhance the NHS;
- Address Climate Change to ensure the SWS adheres to various municipal climate change policies and targets; and
- Inform future work required as part of future planning stages

The Subwatershed Study will be separated into three phases, each with an associated report, these include:

- **Phase 1** Subwatershed Characterization and Integration;
- **Phase 2** Impact Assessment; and
- **Phase 3** Implementation and Management Strategies.

The SWS report will be submitted by phase, with the subsequent phase being prepared while the agencies are reviewing and preparing comments on the previous phase. This will allow adequate review time and opportunity to provide comment, while allowing the Study Team to proceed with the next phase ensuring that the overall Secondary Plan process timelines can be achieved.

1.2 Study Area – Caledon New Urban Area

The Mayfield Tullamore Secondary Plan encompasses approximately 423 hectares (1,045) acres in the Town of Caledon. These lands (herein referred to as the Study Area) are east of the Mayfield West Secondary Plan Area. They are generally bounded by Dixie Road to the west, Old School Road to the north, Torbram Road to the east, and Mayfield Road to the south. The majority of the lands are east of Bramalea Road; however, three participating parcels are located abutting the west side of Bramalea Road. The overall local Subwatershed Study Area includes the Secondary Plan Area boundaries; There are several secondary study components that have study areas that extend beyond the local Subwatershed Study Area; these include the following, shown on **Figure 1** (**Appendix A**):

1.2.1 Natural Heritage Study Area

The Natural Heritage Study Area (NHSA) will consist of the Secondary Plan area plus the 120 m adjacent lands, as shown on **Figure 1** (**Appendix A**). The 120 m adjacent lands allow for the assessment of potential negative impacts on significant features.

1.2.2 Stream Morphology Study Area

The geomorphic assessment will be undertaken for watercourses within the Secondary Plan area, as well as receiving watercourses for a distance of approximately 250 m downstream of the Study Area as shown on **Figure 1** (**Appendix A**). The assessment for the downstream reaches will be used to assess the impacts of the proposed development to these reaches, from a geomorphic perspective. Recognizing that these reaches flow on lands that are not participating in the current study, where appropriate, these geomorphic assessments will be completed within the road right--of--way, or through desktop-based methods.

1.2.3 Hydraulics and Hydrology Study Area

The Hydrologic Study Area (HSA) will encompass the Secondary Plan area, in addition to external drainage from lands upstream that flow through the Secondary Plan area. Existing peak flows at key flow nodes downstream of the MTLOG lands to Lake Ontario will be calculated and utilized to compare post development flows to pre-development flows for impact and mitigation assessment within the Secondary Plan (**Figure 2, Appendix A**).

1.2.4 Existing Land Use and Ownership

The Secondary Plan area is predominantly agricultural, with some residential dwellings, and a variety of candidate natural heritage features across the Study Area including woodlands and wetland in the central and southwestern portions of the Subject Lands; most of these associated with the Tributaries of the West Humber River that run in various directions across the Subject Lands. Many of these features are located within the Greenbelt Plan Area.

The participating landowners make up approximately 74% of the total Secondary Plan Area; participating properties are shown on **Figure 3** (**Appendix A**). The SWS will also include discussion related to non-participating lands. It is acknowledged that access to non-participating lands may be restricted, and site-specific information may not be made available for these lands. As such, items such as feature limit staking may not be able to occur at the SWS stage for these lands. The local SWS will provide high-level characterization for these non-participating lands based on aerial interpretation and secondary data sources. The SWS will also identify an outline of additional works/studies that may be necessary if/when these lands proceed to development. Efforts will be made to engage with non-participating landowners to obtain more detailed site conditions to support this local SWS.

In addition to addressing phasing in relation to Official Plan and Secondary Plan considerations, the SWS will also include discussion related to non-participating lands. It is acknowledged that access to non-participating lands may be restricted, and site-specific information may not be made available for these lands. As such, items such as feature limit stakings may not be able to occur at the SWS stage for these lands. The SWS will identify the non-participating landowners and provide an outline of additional works/studies that may be necessary if/when these lands proceed to development.

1.3 Policy Context

The SWS will support the overarching Secondary Plan for the Study Area. As such, it must conform with or be consistent with all applicable local and provincial land use planning policies. The SWS is not meant to replace or supersede existing policies, development standards, submission requirements, etc., as these are already covered by, but not limited to the following:

- Region of Peel Official Plan (2022 Consolidation);
- Region of Peel Settlement Area Boundary Expansion Technical Reports;
- Environmental Screening Report (2020);
- Scoped Subwatershed Study Part A, Part B and Part C (2022);
- Future Caledon Official Plan (2024);
- Town of Caledon Official Plan (consolidated 2024);
- Conservation Authorities Act, R.S.O 1990, c. C.27 (July 2023 Consolidation) and associated Ontario Regulation 41/24;
- Provincial Policy Statement (2022);
- Greenbelt Plan (2017);
- Growth Plan for the Greater Golden Horseshoe (2020);
- Nutrient Management Act. 2002, S.O. 2002, c. 4 (June 2021 Consolidation);
- Environmental Protection Act, R.S.O. 1990, C. E.19 (February 2024 Consolidation);
- Ontario Water Resources Act, R.S.O. 1990, C. O.40 (June 2021 Consolidation);
- Clean Water Act, S.O. 2006, C. 22 (February 2024 Consolidations);
- Endangered Species Act, 2007, S.O. 2007, c. 6 (February 2024 Consolidation);
- Fisheries Act, R.S.C., 1985, c. F-14 (amended March 2024); and
- Migratory Birds Act, S.C. 1994, c. 22 (amended December 2017).

For further clarity, the SWS will not be recommending new policies or development standards to address future development within the Study Area. The SWS will be measuring the potential future development against existing policies and standards and then identifying possible means to address the same. All future development within the Study Area will still remain subject to the *Planning Act* process, including but not limited to master planning, block planning, plans of subdivision and site plan application, etc.

1.4 Previous Studies, and Guidelines

Where relevant, other studies and guidelines will be used to provide input and guidance to the preparation of the SWS. One of the foundational references will be the Region of Peel Scoped Subwatershed Study (Wood et al., 2022). In addition, the following list includes some additional studies that will be referenced, but is not meant to be an exhaustive list:

- Ministry of Natural Resources: Natural Heritage Reference Manual: Second Edition (OMNR 2010);
- Humber River Watershed Plan (TRCA, 2008);
- Humber River Watershed Plan Implementation Guide (TRCA, 2008);

- Humber River State of the Watershed Reports (TRCA, 2008);
- Final Report Humber River Hydrology Update (TRCA, 2018);
- Humber River Watershed Characterization Report (TRCA, 2023);
- Listen to Your River: A Report Card on the Health of the Humber River Watershed (TRCA, 2007);
- Humber River Fisheries Management Plan (MNR and TRCA, 2005);
- TRCA Master Environmental and Servicing Plan Guideline (TRCA, 2015);
- Evaluation, Classification, and Management of Headwater Drainage Features Guidelines (CVC & TRCA, 2014);
- TRCA Guidelines for Review of SWM Pond Location with Respect to Groundwater Conditions;
- TRCA Stormwater Management Criteria Document (TRCA, 2012);
- Erosion and Sediment Control Guide for Urban Construction (TRCA, 2019);
- Crossings Guideline for Valley and Stream Corridors (TRCA, 2015);
- Channel Modification Design and Submission Requirements (TRCA, 2007);
- Technical Guidelines for Flood Hazard Mapping (TRCA and other Conservation Authorities, 2017);
- TRCA/CVC Low Impact Development Stormwater Management Planning and Design Guide (February 2024) https://wiki.sustainabletechnologies.ca/index.php?title=Main_Page&oldid=15953;
- Geotechnical Engineering Design and Submission Requirements (TRCA November 2017);
- Hydrogeological Assessment Submissions- Conservation Authority Guidelines to Support Development Applications (Conservation Ontario 2013);
- Wetland Water Balance Risk Evaluation (TRCA, 2017);
- Wetland Water Balance Monitoring Protocol (TRCA, 2016);
- Wetland Water Balance Modelling Guidance Document (TRCA, 2020);
- Technical Guide for River & Stream Systems: Erosion Hazard Limit (MNRF, 2002);
- Ministry of the Environment Water Well Records;
- Approved CTC Source Protection Plan (CTC Source Protection Committee, 2022); and
- Approved Assessment Report: Toronto and Region Source Protection Area (CTC Source Protection Committee, 2022).

Additional studies and resources will be reviewed and referenced as appropriate to support the SWS.

1.5 Technical Advisory Committee

To facilitate consultation, a Technical Advisory Committee (TAC) will be formed comprising of staff from the Region of Peel and the Town of Caledon. It may also include representation from the local Conservation Authority, various applicable Provincial representatives, landowner technical representatives, and the consulting team(s).

Monthly meetings with the TAC will be held to discuss technical matters, as needed.

Site visits will be organized to define and stake the limits of features where this exercise has not yet been completed or where limits need to be reconfirmed given the time that has passed since the completion of the prior staking.

For specific and specialized matters, “sub TACs”, involving the discipline-specific professionals, will be established where required. The TAC will advise and assist in directing the development of the Secondary Plan and its component studies throughout the study process. The TAC will assist in ensuring that the Secondary Plan evolves from the foundational basis of the Local Subwatershed Study to a Community Development Plan in a collaborative manner through the integration of the concurrent consultant studies.

1.6 General and Public Consultation

The SWS will include appropriate consultation within the context of the Planning Process including but not limited to public notification, agency notification, stakeholder consultation and Indigenous Engagement.

2. Phase 1 – Subwatershed Characterization and Integration

This analysis will inventory, characterize and assess natural hazards and natural heritage features and functions within the Study Area. The analysis will provide recommendations for the protection, conservation and management of natural hazards and natural heritage features within the Secondary Plan Area. Phase 1 should characterize the resources associated with each discipline and across disciplines to accomplish the following, as per the Town of Caledon's SWS TOR – Redline to the Peel Region Local Subwatershed Plan Terms of Reference (March, 2024):

- "establish the form, function and linkages of the environmental resources;
- confirm, refine and identify environmental constraints and opportunities related to terrestrial and aquatic habitat, features, and systems;
- establish surface water and groundwater constraints and opportunities associated with flooding, erosion, water quality, water budgets, including recharge and discharge areas through new numerical tools (models) suitably calibrated to local conditions; and
- Refine and implement criteria and constraints for management opportunities associated with the environmental features and systems".

The following items will be considered within **Phase 1**:

- Background Information Review: the goal of this exercise is to characterize and map preliminary constraints and opportunities for development across the Study Area based on desktop investigations and site reconnaissance, to be followed up by detailed fieldwork;
- Gap Analysis: the goal of this exercise is to use the background data from the background information review to identify background data gaps and propose methods to address these gaps; this should include suggestions for continued monitoring. A summary for each source used in the background review will be required; and
- Workplan Confirmation: Due to accelerated timelines, a large portion of the background review has been completed and subsequently has already influenced the local SWS work plan. The Phase 1 local SWS is anticipated to be delivered in tandem with a final TOR. As such, the workplan includes the scope of work that has been completed to date, as well as additional work that will be completed through subsequent phases of the local SWS that has been carried out is appended to this TOR. It is anticipated that a TAC meeting will be scheduled shortly after submission to allow for a technical review of the work plan.

The field work program is tailored specifically to address data gaps or otherwise outdated data as previously determined. The field program is inclusive of pre-development monitoring that not only characterizes the existing systems and features within the Study Area but will also contribute to establishing baseline conditions with the local Subwatershed Study Area for future post-development comparisons.

It is recognized that the municipal planning process and development of the Study Area occur over a protracted timeline, and therefore accommodations for the updating of existing conditions must be included in the SWS. For example, if a development parcel moves forward to Draft Plan in 2033, it may be necessary to re-evaluate changes in existing conditions such as natural hazards associated with valley lands or limits of vegetation and habitat boundaries. The SWS shall include a comprehensive discussion on the lifespan and relevance of baseline data in relation to impact assessment, specific to each discipline. The SWS shall propose a decision-making framework that helps to define when and why certain baseline conditions may need updating as part of future *Planning Act* applications.

The final deliverable for Phase 1 will be a Subwatershed Characterization and Integration Report. This report will include the following:

- Description of general characteristics of the local subwatershed and the Secondary Plan Area from each discipline's perspective and will include the following:
    - Climate, landform, geology, and soils;
    - Hydrogeology/groundwater quantity and quality;
    - Surface water quantity and quality;
    - Stream geomorphology;
    - Aquatic and Terrestrial ecosystems; and
    - Natural Environment Systems.
- Descriptions of the features, functions, constraints and opportunities within the Study Area; these will be mapped, and the preliminary Natural Heritage System from the SABE SWS (Wood et. al., December 2021) will be refined. This will include delineation of all key natural heritage and key hydrologic features, their status and significance with regards to policy requirements based on targeted field assessments.

The following are key activities that will be completed, by discipline:

2.1 Natural Heritage (Aquatic and Terrestrial Systems)

- A background review and gap analysis will be conducted to assess landscape conditions, as well as the aquatic and terrestrial environment; this will include species at risk screening using available databases;
- Update and/or confirm the fisheries and watercourse classifications in collaboration with the Stream Morphology Team;
- Identify general opportunities and constraints to development at a subwatershed scale level, through a summary of natural heritage characterizations completed (background review, gap analysis, field surveys);
- Refine the natural heritage and natural hazards limits reflecting the NHS objectives and other intentions of the Official Plan or Master Plans, in collaboration with the other disciplines, including:
    - Final staking of significant Natural Heritage System features in consultation with the Town and TRCA;
    - Coordinate with geotechnical investigation to determine long-term stable top of valley as required;
    - Identification of appropriate minimum Vegetative Protection Zones to be established based on feature sensitivity;

- Refinement of meander belt width delineation within proposed watercourse corridor (in areas where meander belt may impact limit of development;
- Update assessments of significance of natural heritage features (such as significant woodlands, significant wildlife habitat, etc.) in accordance with the Natural Heritage Reference Manual (MNR, 2010), the Official Plans of the Town and the Region, and other guidance documents as appropriate;
- Review and refine the SABE Scoped SWS's NHS enhancement and linkage opportunities based on the targets and goals in the Scoped SWS; and
- Update Species at Risk (SAR) assessment on a broad scale and for participating lands in consultation with MECP, as required.

To support the work above, the following detailed ecological field investigations will be undertaken in 2024 – these will provide baseline data and support characterization of the Study Area:

Terrestrial Field Investigations

- Winter Raptor Survey following Raptor Survey protocol adapted from the "British Columbia Ministry of Sustainable Resource Management Inventory Methods for Raptors" (2001);
- Bat Habitat Assessments and follow-up acoustic monitoring within wooded vegetation communities, following survey guidelines in "Bats and Bat Habitats: Guidelines for Wind Power Projects" (MNRF, 2011);
- Ecological Land Classification and three-season botanical inventories (spring, summer and fall) following ELC sampling protocol for Southern Ontario (Lee et al. 1998);
- Amphibian call count surveys (three rounds) using survey protocol based on the 'Marsh Monitoring Program' (Bird Studies Canada, 2014);
- Turtle basking surveys (three rounds) and turtle nesting suitability survey (one round) based on protocols established by "Survey Protocol for Blanding's Turtle (*Emydoidea blandingii*) in Ontario" (MNRF, 2015);
- Snake surveys (three rounds) based on the "Survey Protocol for Ontario's Species at Risk Snakes" (MNRF, 2016);
- Structure Screening Surveys (including visual assessment of potential to provide bat habitat, Barn Swallow nesting sites and snake hibernacula habitat suitability);
- Breeding bird surveys (two rounds) and grassland bird habitat assessment based on protocols from the Ontario Breeding Bird Atlas (2007); and
- Feature pre-staking (top of bank with geotechnical engineer, wetland and woodland dripline).

Third round breeding bird surveys have been identified as a provisional item if candidate habitat is identified and follow-up studies are deemed necessary.

Aquatic Field Investigations

- Headwater Drainage Feature Assessments (HDFA; three rounds) using protocol established in the "Evaluation, Classification and Management of Headwater Drainage Features Guidelines" (CVC & TRCA, 2014);

- Aquatic habitat assessment (one survey) following OSAP methodologies (2013); and
- Fish community sampling within all drainage features and ponds following OSAP methodologies (2013).

All incidental wildlife observations will be recorded during site investigations.

This scope of work will seek to characterize feature significance and sensitivity for all participating properties and identify the limits of Greenbelt KNHFs. It is assumed that there will be no alteration within 30 m of any of the Greenbelt's Key Natural Heritage or Key Hydrologic Features. Any proposed alterations within these features will require additional detailed investigations to be completed during the site-specific investigations (and to be addressed as part of subsequent Environmental Impact Studies).

2.2 Stream Morphology

- The fluvial geomorphological assessments in support of Local Subwatershed Studies will be aligned to meet or exceed the criteria outlined in Appendix B – Erosion and Geomorphology - of the TRCA Stormwater Management Criteria (2012). This work will be closely tied to the aquatic systems review;
- Stream morphology work will seek to identify and fill data gaps in context of geomorphic assessments for all watercourses and associated wetland features within the study area, including identification of headwater drainage features (HDFs) through to higher order streams/rivers;
- The following items will be completed to support the Background Review, Gap Analysis, and Existing Conditions Analysis:
    - Review of historic and recent aerial imagery, particularly with respect to deriving stream corridor dynamics such as meander belt, 100-year erosion risk, etc.;
    - Existing geomorphic mapping and analyses;
    - Conduct reach delineations where not previously completed;
    - Conduct rapid assessments where not previously completed;
    - Detailed geomorphic field assessments;
    - Meander belt width assessments for higher order streams within the study area; and
    - Results of the above reviews will support the Phase 1 delineation of a refined Natural Heritage System.

2.3 Hydraulics and Hydrology

- Existing storm drainage patterns and external drainage impacting the MTLOG lands will be identified to characterize the existing hydrologic setting;
- A summary of applicable stormwater management criteria for quantity, quality and erosion control will be provided including the Humber River unit rates for quantity control of 2 through 100 year storm events;
- The TRCA Humber River Watershed existing conditions hydrology model will be reviewed and verified based on existing land use and topography;

- The Regional storm event TRCA Humber River Watershed existing conditions hydrology model will be discretized for the purposes of establishing pre-development targets for stormwater management for the MTLOG lands. Regional storm event peak flows at key flow nodes downstream of the MTLOG lands will be confirmed at key locations down to Lake Ontario;
- Additional field investigations via survey and field inspection of existing culverts will be conducted to verify existing drainage patterns and the TRCA hydraulic models;
- The TRCA hydraulic models will be reviewed and verified for the tributaries of the Humber River located within the MTLOG lands. The floodlines for watercourses (defined bed and bank) will be delineated, as required. Any required modifications to the TRCA hydraulic model flows will be determined in accordance with the findings of the hydrologic assessment; and
- Existing Flood Vulnerable Areas (FVAs) downstream of the MTLOG lands that will potentially be impacted from future development in the MTLOG area will be identified.

2.4 Hydrogeology

- The hydrogeological background review will include available published data such as water well records in the area, as well as any available consulting or research reports, available geological or hydrostratigraphical conceptual models (available through or produced by source water protection studies or the Oak Ridges Moraine Groundwater Program) and mapping products (produced by the Geological Survey of Canada, Ontario Geological Survey, Ministry of the Environment, Conservation and Parks and/or Ministry of Natural Resources and Forestry, etc.);
- Additional field investigation will provide additional spatial and temporal insight on the groundwater system;
- The field program will include a combination, that will include, but is not limited to the collection of the following datasets to provide data on a more regional context and provide insight in establishing appropriate field investigations for more site-specific studies for site plan approval submissions:
    - Monitoring well installations with borehole logs (including monitoring well nests in select locations);
    - Drivepoint piezometers (including nested piezometers in select locations);
    - Long-term manual groundwater and surface level measurements (including hydraulic gradient calculations);
    - Groundwater and surface water chemistry;
    - Identification of the presence of seeps in and around watercourses and surface water features;
    - Hydraulic conductivity measurements; and
    - Spot baseflow measurements.
- This data will be used to help determine predevelopment infiltration, depth to groundwater throughout the year, groundwater flow direction/gradient, and the interaction with surface water features;
- Baseline data collection will support site and feature-based water balance analyses and support the assessment of LID feasibility;

- Depending on the outcome of the field investigation and the hydrogeological assessment, refinement of available hydrogeological understanding included in published studies may be possible and may include any or all the following:
    - Refine geologic interpretation and hydrostratigraphy including surficial geology and hydrogeologic parameters;
    - Refined understanding of the observed shallow groundwater conditions as they relate to response to seasonal changes in levels, flows and gradients, and responses to storm events (where possible);
    - Refine mapping and interpretations of groundwater discharge areas; and
    - Refinements to groundwater flow contributions to and from surface water features and wetlands.

2.5 Geotechnical

- Subsurface investigations will be conducted to determine the underlying soil and groundwater conditions, characterize the site geology, and to support the hydrogeological study;
- The scope also includes an erosion hazard assessment and slope stability study to determine the long-term stable top of slope (LTSTOS) position for confined valley systems on site. The site is within TCRA jurisdiction; therefore the slope stability study will follow TRCA guidelines within “The Living City Policies,” dated November 28, 2014. The study will also follow provincial guidelines within “Technical Guide – River and Stream Systems: Erosion Hazard Limit,” dated 2002, by Ministry of Natural Resources;
- Field investigations will include the following:
    - Obtain public and private utility locates;
    - Advance boreholes across the site on participating properties and collect soil samples using the Standard Penetration Test. Borehole depths are established to support typical development, with deeper boreholes in locations along the valley systems to support detailed slope stability analysis;
    - Monitoring wells and nested wells will be installed in strategic locations;
    - The boreholes with monitoring wells/nested wells will be instrumented with a 50 mm diameter PVC casing. All installations will be conducted in accordance with Ontario Regulation 903 for subsequent monitoring and testing purposes; and
    - Conduct geotechnical laboratory testing on selected soil samples to determine soil index properties.
- To support preliminary constraints and opportunities mapping, slope stability assessments will include:
    - A visual slope inspection of the valleylands on the participating properties. The MNR Slope Rating and Slope Inspection Forms will be filled out;
    - Cutting cross-sections through the slopes, watercourses and valleylands using the topographic plan or LiDAR DEM available for the site;
    - Conservative estimates for the toe erosion allowance and stable slope allowance will be used at this time to estimate the LTSTOS;
    - Assessment of the erosion access allowance and total development setbacks related to slope and erosion hazards;

- Review of any proposed grading strategy related to site servicing and stormwater management ponds; and
- Plan and profile views of the preliminary setback distances to assist with development constraint mapping.

2.6 Surface Water Quality

- Review of currently available background information to provide a preliminary understanding of the baseline water quality in the subwatershed;
- Existing datasets will be reviewed to understand the existing water quality status in the study area and to provide the baseline reference and identify any water quality concerns and constraints in the study area;
- Other published documents including, but not limited to, Conservation Authority's Source Water Protection documents will be reviewed for additional background information;
- The study will locate existing SWM facilities and the respective catchment areas, as the baseline reference for stormwater management in terms of water quantity and control;
- A surface water quality sampling program within the Study Area will be completed in order to characterize the surface water quality based on the contributing land use, soils, and stormwater quality management practices during both wet (storm) and dry (baseflow) periods;
- Surface water quality monitoring and stream gauging will be completed at the same locations in order to correlate the surface water quality with the study area hydrology;
- Six (6) surface water quality monitoring events will be completed between April and December 2024;
- Surface water quality samples will be collected at each station for one (1) wet and one (1) dry event for each season;
- Two (2) grab samples will be collected for each wet weather event; one grab sample will be collected during the onset of the storm and one grab sample will be collected during the recession of the storm. A "dry" weather event is considered to be an event completed where precipitation has not occurred within the previous 72 hours. A "wet" weather event is considered to be any precipitation event of 5 mm or more in a 24-hour time period;
- The grab samples for each wet weather and dry weather event will be analyzed for the following contaminants:
  - Oil and Grease;
  - Total Phosphorus;
  - Anions (Nitrate, Nitrite, Phosphate, Chloride);
  - Ammonia;
  - Total Kjeldahl Nitrogen (TKN);
  - Conductivity;
  - Total Solids (TS);
  - Total Suspended Solids (TSS);
  - Biochemical Oxygen Demand (BOD_5);
  - PH/alkalinity;

- Total Coliforms/Fecal Coliforms/E.Coli;
- PAH;
- Metals (Al, Sb, As, Ba, Be, B, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Mo, Ni, P, K, Se, Si, Ag, Na, Sr, Tl, Sn, Ti, W, U, V, Zn, Zr);
- Hardness as $CaCO_3$; and
- Turbidity.

- Field measurements of the following contaminants will be measured using a water quality probe during the sampling event:
  - Dissolved Oxygen;
  - PH;
  - Salinity; and
  - Temperature.

2.7 Climate Change

A Climate Scenario Analysis will be prepared that will assess relevant historic climate data versus future climate trend scenarios. Two climate scenarios will be used going forward, including the most recent climate change scenarios produced by the Intergovernmental Panel on Climate Change (IPCC) in their Sixth Assessment Report (AR6 2021), known as Shared Socioeconomic Pathways (SSPs). This data will support a more integrated assessment of climate risks associated with the SWS Study Area and will support **Phase 2** impact assessment and **Phase 3** monitoring, management, and implementation reports.

3. Phase 2 – Detailed Update to Existing Conditions and Impact Assessment

The objective of **Phase 2** is to provide a detailed characterization of the existing conditions, building off the outputs from **Phase 1**. The output from **Phase 2** will be an integrated and iterative impact assessment of all disciplines.

The **Phase 2** report will introduce the land use plan and will include a fulsome assessment of potential impacts on natural heritage and water resource features and functions as a result of proposed development. This report will also include an exploration of mitigation and management strategies for the proposed impacts.

Where appropriate, analytical tools will be used to predict changes to existing conditions and assess potential land use scenarios in relation to subwatershed-based targets based on background data or baseline monitoring data collected during Phase 1. These impact analyses will aim to identify preferred land use scenarios that meet the goals and targets identified within the SABE Scoped SWS and the Phase 1 Report.

Key objectives for the impact assessment phase are provided below.

3.1 Natural Heritage

- The report will include an integrated impact assessment of the proposed land use plan on the terrestrial and aquatic system within the Study Area and appropriate mitigation strategies to protect natural heritage features and functions;
- This includes, but is not limited to the following:
    - Review natural heritage features and sensitive areas for potential negative impacts as a result of the proposed land use plan;
    - Refinement of best management approaches for design, implementation and management of corridors, buffers, and restoration areas to avoid or mitigate impacts, including assessment of NHS/urban interface (i.e., fencing, directional lighting, interpretive signage, etc.);
    - Determine principles for buffer and natural infrastructure integration (e.g., low impact development);
    - Review potential linkage and enhancement opportunities as identified in the SABE Scoped SWS Preliminary NHS and refine these according to the targets, criteria, and goals of the SABE Scoped SWS;
    - Assess the potential impacts of direct aquatic habitat modifications (e.g., watercourse realignments, watercourses crossings) and impacts from changes to the hydrologic and hydrogeologic regimes;
    - Validation of fisheries mitigation and compensation for watercourses that are to be eliminated or realigned, in consultation with appropriate agencies;
    - Assess opportunities for enhancement of aquatic and riparian habitats;

- Assess impacts of the proposed land use plan on the overall Natural Heritage System as it related to thermal regime, species diversity, water quality and quantity and long-term protection;
- Provide preliminary mitigation and management recommendations to protect terrestrial and aquatic features and functions;
- Screening of retained features for Feature Based Water Balance Risk Assessment in consultation with other disciplines and explore candidate mitigation considerations (e.g. rooftop drainage, LIDs, etc.); and
- In consultation with other disciplines, demonstrate that proposed locations for wetland compensation will be supported by required hydrology.

3.2 Stream Morphology

- To support the impact assessment phase, erosion hazards and watercourse encroachments will be assessed in relation to the proposed land use plan;
- Conceptual strategies will be assessed from physically sustainable, fluvial/riparian, and a natural heritage/habitat perspective and will include:
  - Comprehensive list of current geomorphic regime status for all watercourses within the study area at the reach scale (i.e., 'in-regime', transitional, or adjusting, etc.);
  - Comprehensive list of current natural heritage values inherent to existing watercourses within study area at the reach scale using the Rapid Stream Assessment Technique (RSAT);
  - Opportunities and conceptual methods for bringing each reach identified as transitional or adjusting back to an 'in-regime' status;
  - Mitigation measures and opportunities for any potential impacts to thermal regime to ensure protection of habitat for Redside Dace;
  - Erosion threshold determination for watercourses identified to be sensitive to erosion;
  - Evaluate opportunities to bring each reach in line with the objectives for ecological sustainability;
  - Natural Channel Design identification and design objectives for future detailed design; and
  - Correlate above noted workplan elements with a climate change understanding and strategy that will depend upon the scenarios of interest. Both the physically sustainable fluvial/riparian perspective and the natural heritage/habitat perspective should be assessed from the 'no-regrets' scenario to the year 2100 scenario.

3.3 Hydraulics and Hydrology

- Discretize the TRCA Humber River Watershed future conditions hydrology model for the purposes of establishing post-development uncontrolled flows for the MTLOG lands;
- Update the TRCA future conditions hydrologic model for the 2 through 100 year and Regional storm events, to reflect proposed future land uses within the MTLOG lands in accordance with the land use;

- Report post development uncontrolled peak flows and compare to pre-development peak flows for the 2 through 100 year and Regional storm events at key nodes downstream of the MTLOG lands to Lake Ontario;
- Assess the implications of uncontrolled future flows in existing downstream flood vulnerable areas; and
- Confirm the need for the management of Regional storm event flows (in case the increase of flow causes unacceptable impacts to downstream culverts and flood vulnerable areas).

3.4 Hydrogeology

- The goal of the hydrogeological assessment is to establish a geological and hydrostratigraphical conceptual model for the study area and assess what would be impacted by development activities;
- The hydrogeological assessment data and conceptual model will be reviewed in the context of other disciplines and policy frameworks (such as the Source Water Protection Plan) to provide an impact assessment of areas that may be more sensitive to development, may be less developable due to significant constraints or may require additional mitigation to be feasible for the planned land uses. The impact assessment will address:
    - Seepage and discharge observations;
    - Fish habitat;
    - Phreatophytic observations;
    - Streambed composition;
    - Low flow analysis and water quality;
    - The impact assessment will also address the overall groundwater budget model along with the surface water components for both existing and future scenarios; the water budget for the study area will estimate precipitation, evapotranspiration, runoff and infiltration, and groundwater recharge and discharge;
    - Groundwater supported features; and
    - The baseline water balance assessment will be updated to reflect the proposed land use scenarios, and potential impacts to groundwater recharge will be assessed.

3.5 Geotechnical

- Based on the subsurface conditions and slope stability assessment, potential impacts will be assessed in relation to the proposed land use plan. Mitigation measures will be prepared to support future earthworks for the proposed development.

3.6 Surface Water Quality

- Based on the results of the quality analyses from **Phase 1**, an assessment of potential land use impacts on surface water quality, water quality improvement strategies, with particular attention to Redside Dace water quality requirements (DO, TSS, T) and mitigation strategies and BMPs for urban stormwater management will be addressed.

3.7 Climate Change

- Based on the Phase 1 review of the moderate emissions scenario (SSP2-4.5) and a very high emissions scenario (SSP5-8.5), Phase 2 of the local SWS will assess how climate change considerations and decision making can be incorporated to assist in creating a built form and system of infrastructure that mitigates the Town's contribution to climate change and enhances resiliency to its impacts; and
- Address measures that mitigate climate risk and enhance resiliency to changing climate conditions and extreme weather events, and bolster the safety and preparedness of communities, infrastructure and natural environment.

3.8 Servicing and Grading

To support the Phase 2 report, a Preliminary Grading and Servicing Memo will be prepared to demonstrate that the land use concept can be graded and serviced in accordance with the Town of Caledon, the Toronto and Region Conservation Authority (TRCA), Region of Peel, and the Ministry of Environment, Conservation and Parks (MECP) development criteria. The memo will include the following:

- Grading;
- Prepare a Preliminary Grading Plan showing centreline road grades based on the conceptual road alignments;
- Provide direction to more detailed grading analyses to be completed at the Draft Plan of Subdivision stage of the development process;
- Identify any areas where grading is required within the NHS for the implementation of infrastructure, trails or roads and assess potential impacts from grading on natural features and functions of the NHS;
- Storm Sewer Servicing;
- Prepare preliminary design and layout of internal trunk storm servicing system within the MTLOG Lands;
- Sanitary Sewer Servicing;
- Complete conceptual sanitary flow generation calculations based on the land use plan;
- Prepare preliminary design and layout of internal trunk sanitary servicing system within the MTLOG area;
- Provide confirmation of conformance of the plan to the Region's latest Water & Wastewater Master Plan;
- Confirm capacity of existing downstream sanitary infrastructure to facilitate any proposed interim and ultimate servicing strategies through consultation with Region staff;
- Identify potential impacts to the NHS from the proposed sanitary sewer servicing strategy;
- Water Supply and Distribution;
- Develop a conceptual fire and peak daily water demand associated with the land use plan;

- Identify the preliminary alignment and design of the internal trunk water supply system, and associated connection points to the external system;
- Provide confirmation of conformance of the plan to the Region's latest Water & Wastewater Master Plan;
- Identify potential impacts to the NHS from the proposed water supply and distribution strategy; and
- Hydrant testing/pressure monitoring to be conducted as required to support findings of the study.

4. Phase 3 – Implementation & Management Strategies

Based on the output from **Phase 2**, complimentary technical studies and stakeholder consultation, the objective of **Phase 3** is to:

- Provide input to the Secondary Plan and Preferred Land Use Scenario;
- Identify future study requirements as related to the development process and *Planning Act;*
- Discuss phasing considerations related to the *Planning Act* with respect to:
    - overall constraints and opportunities for implementation for stormwater management and hydrogeological (water balance) considerations;
    - grading and earth moving considerations by phase;
    - potential interim stormwater and servicing measures required (in tandem with MESP);
    - impacts of phasing on future study requirements;
    - Discuss construction best management practices;
    - Confirm rehabilitation, restoration, and enhancement projects to be incorporated into Draft Plans;
    - Provide guidance on the implementation and management of natural heritage system buffers, linkages, wildlife corridors and trails;
    - Guidance for decommissioning of Municipal Drains if required;
    - Provide guidance on a monitoring program that will allow for the tracking of impacts of the land use changes on the natural environment;
    - Provide guidance for the preparation of an Adaptive Management Plan to respond to results of the monitoring program; and
    - Provide guidance for any additional study requirements.

Where relevant, more specific objectives for this phase are below.

4.1 Natural Heritage

- Develop strategies and recommendations for restoration and enhancement of the NHS to improve ecological integrity, optimize biodiversity, and restore natural features;
- Provide guidance on the implementation and management of natural heritage system buffers, linkages, wildlife corridors and trails;
- Confirm rehabilitation, restoration, and enhancement projects to be incorporated into Draft Plans; develop preliminary ecological targets to guide subsequent planning phases for site-specific restoration and enhancement;
- Provide high-level recommendations for mitigation measures (LIDs, etc.), for retained and compensation wetlands, based on the feasibility assessment completed in Phase 2;
- Identify future development application requirements for detailed feature-based water balance assessments in consultation with other disciplines;

- Outline requirements, ecological, regulator, and policy-based, for any potential feature removal and compensation initiatives – feature removal and compensation will be assessed with support from the recommendations provided in the SABE Scoped SWS Part C report;
- Develop a preliminary implementation and management strategy to support the timing of restoration and enhancements through subsequent planning phases;
- Establish recommended monitoring program for aquatic and terrestrial environments; and
- Outline future study requirements for subsequent planning phases related to natural heritage.

4.2 Stream Morphology

- Coordinate amongst disciplines to identify strategies to meet natural heritage and fluvial sustainability goals;
- Provide restoration and optimization opportunities for headwater drainage features and streams/rivers including potential LID and Green Infrastructure opportunities to manage stormwater, protect water balance, maintain thermal regime, and support habitat creation; and
- Identify detailed design projects that would support the goals of the SWS and identify future studies and priorities for subsequent planning phases that will support stormwater management, natural heritage management, and climate change goals.

4.3 Hydraulics and Hydrology

- Develop a Stormwater Management (SWM) strategy, including LID measures and end of pipe SWM facilities that achieves the SWM criteria for quantity, quality, and erosion control, in addition to mitigating impacts to water balance. Natural heritage, groundwater and surface water impact assessments shall be considered when developing the SWM strategy;
- If warranted based on the hydrologic assessment, provide a recommended approach to the management of Regional storm flows;
- Verify the SWM strategy conformance with the criteria developed as part of the Phase 1 Study;
- Identify additional systems such as Clean Water Collector (CWC) systems, required to support LID measures as part of the overall water balance mitigation strategy and/or any feature specific water balance mitigation strategy, where required;
- Provide general design criteria for end-of-pipe SWM facilities that will work toward mitigating the impacts from the land use plan. The criteria will provide guidance at the next stage in the development process in support of Draft Plan of Subdivisions for sizing and grading of SWM facilities; and
- Provide an overview of timing, phasing and cost sharing requirements for end-of-pipe SWM facilities.

4.4 Hydrogeology

- Provide preliminary recommendations and measures to be considered during construction to mitigate impacts to local groundwater resources such as dewatering or to the water balance caused by decreases in infiltration and increases in runoff;
- Identify potential surface water infiltration opportunities based on soils information, depth to the water table, and aquifer vulnerability;
- Identify future development application requirements for feature based water balances in consultation with other disciplines;
- Establish a recommended monitoring program to support hydrogeological understanding of changes due to the preferred land use plan; and
- Provide details on future studies and considerations required for subsequent planning phases;

4.5 Geotechnical

- Provide details on future studies and monitoring considerations required for subsequent planning phases including boreholes and monitoring wells to support detailed design.

4.6 Surface Water Quality

- Provide details on future study requirements and additional field investigations to address detailed design items such as stormwater management.

4.7 Climate Change

- Provide guidance to address climate change considerations and demonstrate compliance with the Town of Caledon's Community Climate Change Action Plan and the Peel Region's Climate Change Master Plan.

4.8 Adaptive Management and Monitoring Plan

As per the Town of Caledon SWS TOR (May, 2024) an Adaptive Management and Monitoring Plan to assess and adapt to the subwatershed's response to the preferred land use changes.

This Plan will include a detailed monitoring plan, integrated amongst the disciplines, and adaptive responses to monitoring data results. As the MECP is advancing industry guidance for broad-based community monitoring plans to support the Consolidated Linear Infrastructure ECA process, this Adaptive Management and Monitoring Plan will look to align with this guidance when available.

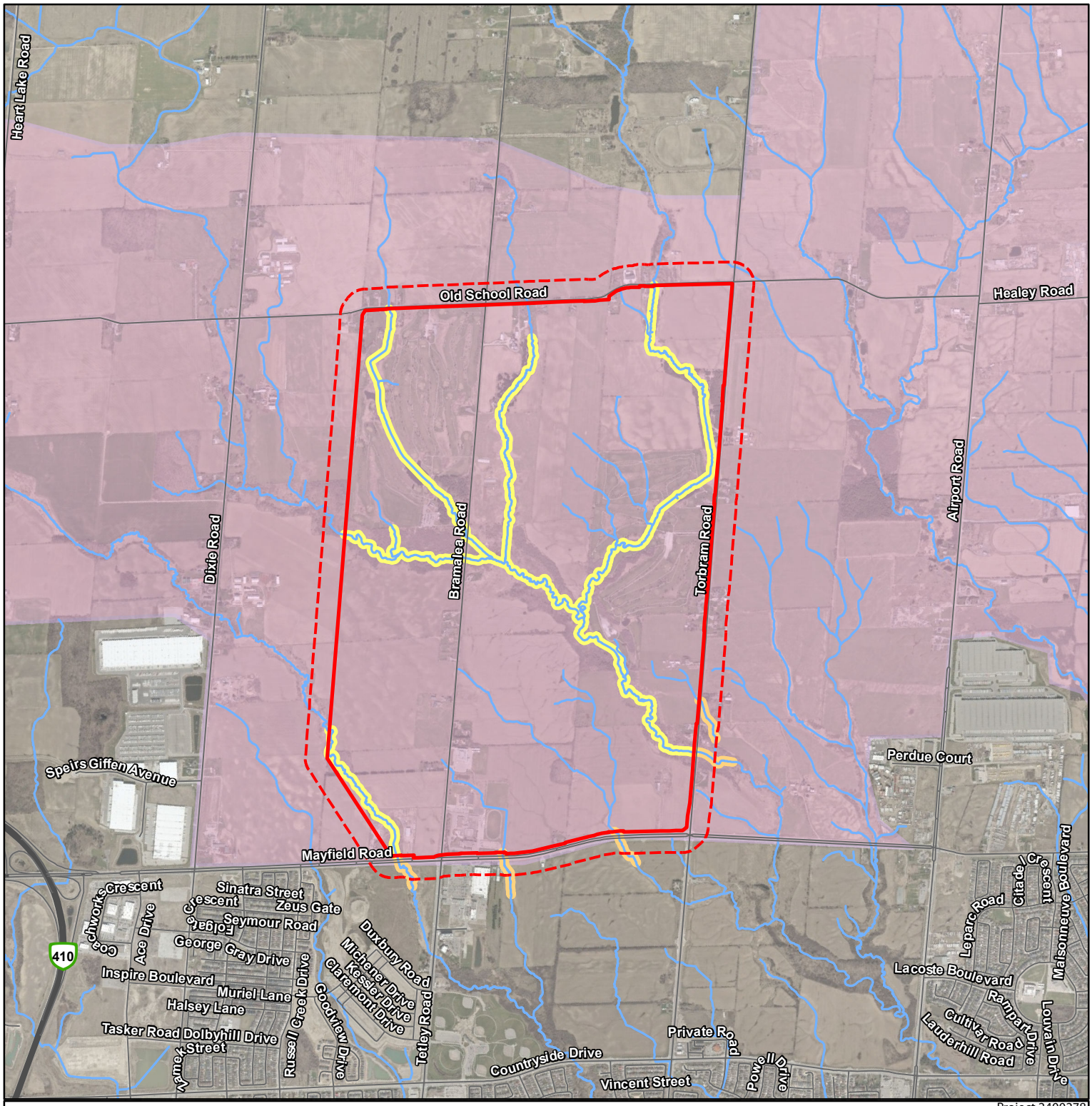
To better capture the goals and objectives for each discipline contributing to the SWS, further details have been included as appendices. The objectives and workplan requirements within these appendices are meant to be performed and addressed throughout the duration of the SWS and are not distinctly tied to a specific phase. The key workplan requirements are in support of Secondary Planning. Future Study Requirements are identified in support of either Draft Plan of Subdivision or Detailed Design.

Appendix A

Figure 1 – Mayfield Tullamore Local Subwatershed Study Area

Figure 2 – Hydraulic Study Area

Figure 3 – Participating Landowners



NOTES:
1. Coordinate System: NAD 1983 UTM Zone 17N.
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3. Orthoimagery © First Base Solutions, 2024. Imagery taken in 2022.

Legend
- Study Area
- Study Area + 120m
- Fluvial Geomorphology Study Area
- Additional Downstream Reaches to be Assessed
- Watercourse (TRCA, 2022)
- Approximate Settlement Area Boundary Expansion Focus Study Area (Peel, 2022)

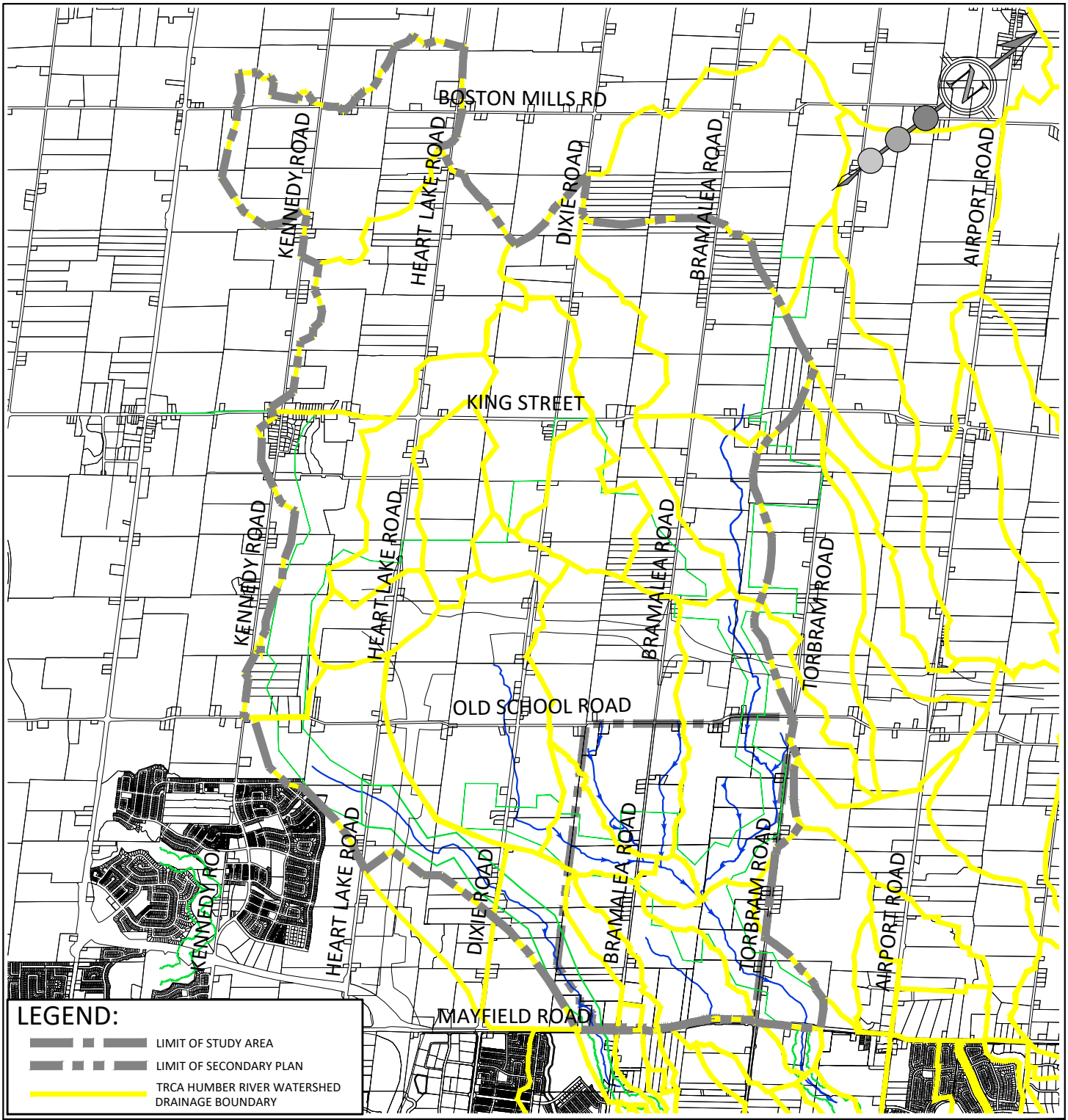
Project 2400278

Mayfield Tullamore Landowner Group
Terms of Reference

Figure 1
Subwatershed Study Area - Natural Heritage and Fluvial Geomorphology

0 400 m
1:30,000

GEI Consultants



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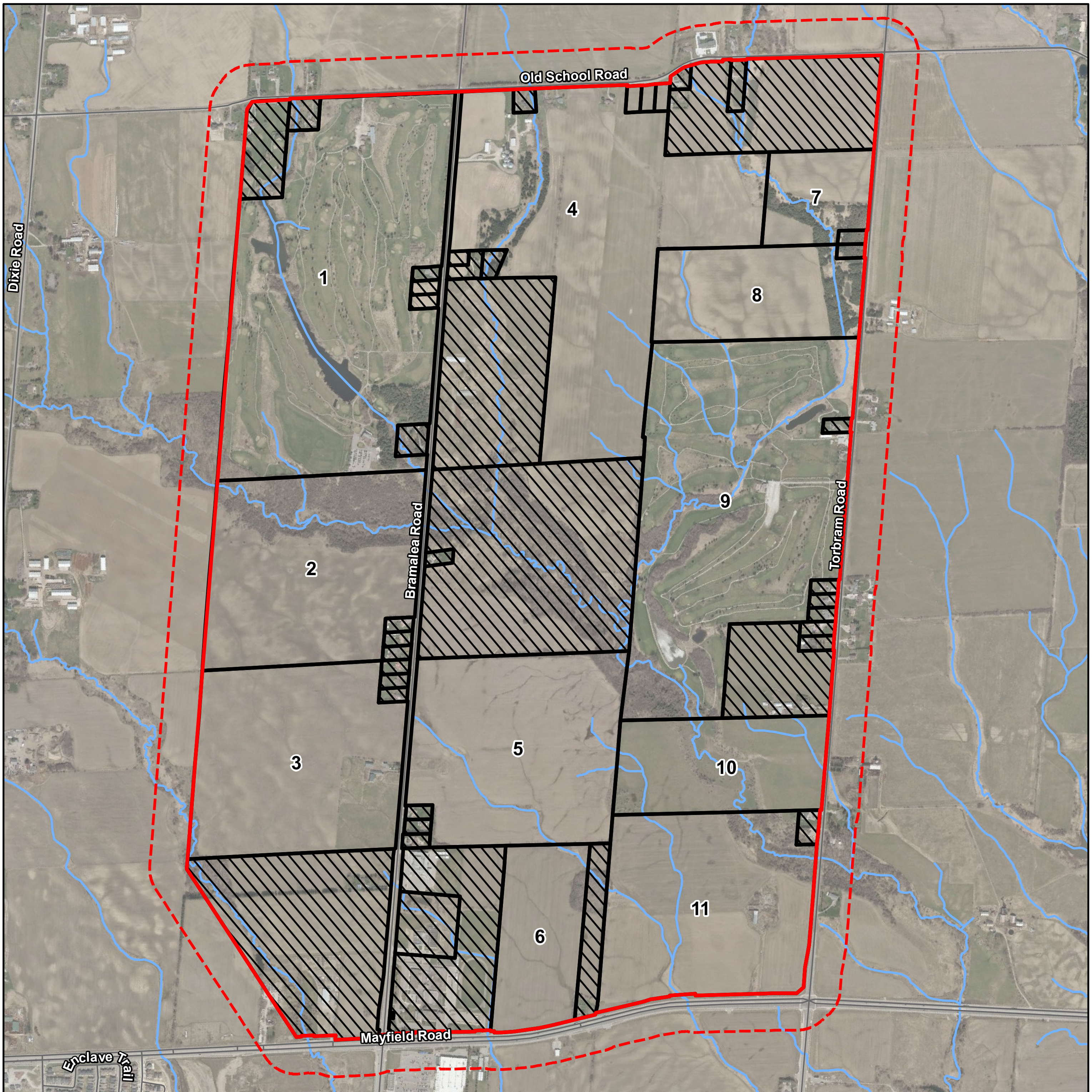
MAYFIELD TULLAMORE LOCAL SUBWATER STUDY

HYDRAULIC AND HYDROLOGIC STUDY AREA

DESIGNED BY: C.M.D.	CHECKED BY: N.D.M.	PROJECT No: 2699	FIGURE No: 2
SCALE: 1:50000	DATE: AUGUST 2024		

File: P:\2699 Mayfield Tullamore Landowner Group\Drawings\MESP\Fig\Report Figures\2699P-LOCT-X.2.dwg – Revised by <DDILAY> : Wed, Aug 28 2024 – 12:04pm



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Legend
- Study Area
- Study Area + 120m
- Watercourse (TRCA, 2022)
- Non-Participating Property
- Participating Property

Map #	Property Identifier	Ownership Entity
1	Banty's Roost Golf Course	ANATOLIA INVESTMENTS CORP.
2	Broccolini North	12442 BRAMALEA LIMITED PARTNERSHIP represented by its general partner 12442 BRAMALEA LIMITED PARTNERSHIP
3	Broccolini South	BRAMALEA ROAD LIMITED PARTNERSHIP represented by its general partner BRAMALEA ROAD ROAD BP INC. and BRAMALEA ROAD CONINVEST LIMITED PARTNERSHIP represented by its general partner BRAMALEA ROAD COINVEST GP INC.
4	TACC	TACC DEVELOPMENTS (ARMSTRONG) LTD.
5	DG-1	DG (CALEDON 1) INC.
6	Torchia	2052743 ONTARIO INC.
7	DG-2	SENTINEL (TORBRAM) HOLDINGS INC.
8	DG-3	SENTINEL (TORBRAM) HOLDINGS INC.
9	Mayfield Golf Course	MAYFIELD GOLF COURSE INC.
10	Rice	TULLAMORE INDUSTRIAL GP LIMITED
11	DG-4	MAYFIELD LANDING DEVELOPMENTS INC.

Project 2400278

Mayfield Tullamore Landowner Group
Terms of Reference

Figure 3
Participating Properties in Study Area

0 400 m
1:17,500

N

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Appendix B

Discipline Specific Workplans

Appendix B

Discipline Specific Workplans

All work is to be completed in general conformance with the Town of Caledon SWS TOR – (May 2024), appended to this workplan (**Appendix A**).

Natural Heritage: Terrestrial and Aquatic Systems

Section 5.6.20.14.16 of the Peel Region OP requires that Secondary Plans:

"*make appropriate considerations for watershed boundaries and the protection, restoration and enhancement of a natural heritage system; and ensure protection of a natural heritage system and water resource system informed by subwatershed study recommendations and that integrates water and stormwater management objectives and requirements*"

The TOR acknowledges that a natural heritage system has generally been defined through previous studies and natural heritage system policies in support of the Region of Peel's Official Plan approval; inclusive of the SABE SWS (Wood et. al., December 2021).

The purpose of this assessment is to support the Official Plan policies above, review the preliminary natural heritage system proposed within the SABE Scoped SWS (Wood et. al. 2022) and confirm the opportunities and constraints, including natural feature and hazard limits, buffers, and setbacks associated within the Study Area. A Preliminary natural heritage system will be prepared, with some conservative assumptions on non-participating lands where candidate natural heritage features may be present. These assumptions will be based on aerial interpretation and will be required to be confirmed and refined if these non-participating parcels come forward.

For participating lands, the natural heritage refinements will be based on the background review and detailed field investigations undertaken during **Phase 1**; inclusive of aquatic and terrestrial systems. In addition, landscape-scale screening will be considered to provide recommended linkage opportunities to enhance ecological integrity, and promote habitat connectivity and wildlife movement.

Key Objectives

Objective 1: Determine the final limit of development adjacent to natural heritage system through: Confirmation of natural heritage and natural hazards limits, including field staking and survey in consultation with TRCA and the Town, and inclusion of buffer widths as appropriate.

Objective 2: Establish principles for works within buffers, including restoration and enhancement opportunities, in consultation with TRCA and the Town.

Objective 3: Integrate findings with hydrogeological and stormwater management assessments as input to the selection of appropriate LID measures for stormwater management and water balance mitigation.

Workplan Requirements

The following is a list of key activities to be completed:

- Identify the general opportunities and constraints to development at a subwatershed scale level, through a summary of natural heritage characterizations completed in support of secondary planning approval;
- Update and/or confirm the fisheries and watercourse classifications;
- Refine the natural heritage and natural hazards limits reflecting the NHS objectives and other intentions of the Master Plan, including:
    - Final staking of significant Natural Heritage System features in consultation with the Town and TRCA. Modifications to NHS boundaries to be minor to reflect differences in scale and level of detail from Secondary Plan in accordance with Official Plan or Official Plan Amendments (OPAs);
    - Conduct geotechnical investigation to determine long-term stable top of valley slope as required;
    - Review and recommend appropriate minimum feature buffers for natural heritage and hazard features;
    - Refinement of meander belt width delineation within proposed watercourse corridor (in areas where meander belt may impact limit of development;
    - Update assessments of significance of natural heritage features (such as significant woodlands, significant wildlife habitat, etc.) in accordance with the Natural Heritage Reference Manual (MNR, 2010), the Official Plans of the Town and the Region, and other guidance documents as appropriate; and
    - Update Species at Risk (SAR) assessment on a broad scale and for participating lands in consultation with MECP, as required.

To support the work above, the following ecological field investigations will be undertaken in 2024:

Terrestrial Field Investigations (**Figure 1, Appendix B**)

- Winter Raptor Survey following Raptor Survey protocol adapted from the "British Columbia Ministry of Sustainable Resource Management Inventory Methods for Raptors" (2001);
- Bat Habitat Assessments and follow-up acoustic monitoring within wooded vegetation communities, following survey guidelines in "Bats and Bat Habitats: Guidelines for Wind Power Projects" (MNRF, 2011), Species at Risk Bats Survey Note (MECP, 2022), and Maternity Roost Surveys (Forests/Woodlands) (MECP, 2022);
- Ecological Land Classification and three-season botanical inventories (spring (May, 2024), summer (July 2024) and fall (September 2024)) following ELC sampling protocol for Southern Ontario (Lee et al. 1998);
- Amphibian call count surveys (three rounds) using survey protocol based on the 'Marsh Monitoring Program' (Bird Studies Canada, 2014);
- Turtle basking surveys (three rounds) and turtle nesting suitability survey (one round) based on protocols established by "Survey Protocol for Blanding's Turtle (*Emydoidea blandingii*) in Ontario" (MNRF, 2015);
- Snake surveys (three rounds) based on the "Survey Protocol for Ontario's Species at Risk Snakes" (MNRF, 2016);

- Structure Screening Surveys (including visual assessment of potential to provide bat habitat, Barn Swallow nesting sites and snake hibernacula habitat suitability);
- Breeding bird surveys (two rounds) and grassland bird habitat assessment based on protocols from the Ontario Breeding Bird Atlas (2007); and
- Feature pre-staking (top of bank with geotechnical engineer, wetland and woodland dripline).

Third round breeding-bird surveys have been identified as a provisional item if candidate habitat is identified and follow-up studies are deemed necessary.

Detailed terrestrial station mapping is located in **Figure 1** (**Appendix B**).

Aquatic Field Investigations

- Headwater Drainage Feature Assessments (HDFA; three rounds) using protocol established in the "Evaluation, Classification and Management of Headwater Drainage Features Guidelines" (CVC & TRCA, 2014);
- Aquatic habitat assessment (one survey) following OSAP methodologies (2013); and
- Fish community sampling within all drainage features and ponds following OSAP methodologies; spring and summer sampling (2013).

Detailed aquatic station mapping is located in **Figure 2** (**Appendix B**).

Field Studies that have been completed to date have been compiled to confirm appropriate seasonal windows and timings were followed (**Table 1, Appendix C**). The following surveys are either underway or are to be completed summer/fall 2024:

- Spring and Fall Botany and ELC;
- Summer HDFA (round 3);
- Aquatic Habitat Assessment; and
- Summer fish community sampling.

One goal of this scope of work is to confirm the limits of the Greenbelt's Key Natural Heritage and Key Hydrologic Features; it is then assumed that there will be no alteration within 30 m of any of these features. Any potential alterations within these features will require additional detailed investigations to be completed during the site-specific investigations (and to be addressed as part of subsequent Environmental Impact Studies).

This scope of work will also include the following, in alignment with the SABE Scoped SWS goals and targets:

- Validation of fisheries mitigation and compensation for watercourses that are to be eliminated or realigned, in consultation with appropriate agencies;
- Refinement of best management approaches for design, implementation and management of corridors, buffers, and restoration areas to avoid or mitigate impacts, including assessment of NHS/urban interface (i.e. fencing, directional lighting, interpretive signage, etc.). Determine principles for buffer and infrastructure integration (i.e. low impact development);

- Identification of opportunities and constraints to meet Natural Heritage System objectives as they relate to non-participating lands (i.e. are there any non-participating lands that could provide strategic linkages in the Natural Heritage System or optimal location for mitigation or enhancement measures?);
- Evaluation of impacts, opportunities, constraints, and mitigation measures related to the Natural Heritage System from a climate change perspective; and
- Management and monitoring recommendations to ensure long-term sustainability of the NHS and other ecological features with the Study Area.

Ultimately, the SWS will include complete mapping of the Natural Heritage System boundary, including opportunities and constraints, consisting of but not limited to the following:

1. Physical top of bank (as staked with TRCA and the Town);
2. Long term slope stability limits, where applicable;
3. Erosion and flood hazard lands;
4. Locations of significant groundwater recharge areas and ecologically significant groundwater recharge areas;
5. Headwater drainage features requiring protection or conservation;
6. Watercourses;
7. Fish habitat;
8. Valleylands;
9. Woodlands (as staked by the Town);
10. Wetlands (as staked by the Town and TRCA);
11. Stream restoration and/or erosion site rehabilitation reaches;
12. Habitat of Endangered and Threatened Species;
13. Significant Wildlife Habitat;
14. Regional Greenlands System boundaries;
15. Greenbelt boundaries and its components including:
    a. Key natural heritage features;
    b. Key hydrologic features; and
    c. Key hydrologic areas.
16. Vegetation protection zones;
17. Natural heritage enhancement and compensation lands;
18. Stormwater management facilities; and
19. Linkage and Enhancements.

It should be noted that all of the features identified above through the SWS may not be incorporated into the Natural Heritage System. For example, nesting locations of Barn Swallow, a Special Concern species that commonly nests in manmade structures such as barns, are unlikely to be included within the NHS unless associated with other features identified above.

Future Study Requirements

The SWS will include a summary of future study requirements related to natural heritage assessments, which may include:

- Species at Risk Screening, if applicable, to evaluate/address changes related to Species at Risk (i.e. assess newly listed species, or confirm any new occurrences of Species at Risk, since SWS completion).
  Timing: Draft Plan of Subdivision

- Buffer Management Plan: address detailed design of storm outfalls, road crossings, linkages, detailed NHS restoration and enhancement opportunities.
  Timing: Detailed Design

- Climate change assessment: in relation to buffer management, which items are sensitive to the impacts of climate change? (i.e. road crossings, slope stability, extent of floodplain).
  Timing: Draft Plan/Detailed Design

- Monitoring program development:

  - Existing conditions baseline.
    Timing: Concurrent with SWS

  - Performance evaluation of the stormwater and environmental management system.
    Timing: Detailed Design

- Permitting requirements for lands within regulated areas (i.e. "Development, Interference with Wetlands and Alterations to Shorelines and Watercourses", Tree Conservation By-laws/permits, DFO reviews/authorizations, MECP permits/authorizations under the Endangered Species Act, etc.).

  Timing: Draft Plan / Detailed Design

- SWS Addendum Report (for non-participating lands): Address SWS Terms of Reference for items not able to be completed during SWS preparation due to non-participating status of lands.

  Timing: Draft Plan

- Adaptive Management Plan (AMP)

Stream Morphology

The improvement of natural or human-made/-impacted watercourses has been dominated historically by the need to drain upland areas of watersheds quickly and efficiently, primarily in the context of water volume and discharge management. Recent advances in the understanding of watercourses as more interconnected and holistic topographic features within a natural landscape context have seen a change in the approach of watercourse management that includes values beyond physical volumetric parameters as driving mechanisms for management decisions. These values now include the re-instatement of the natural form and function for watercourses, driven by parameters such as watershed water balance restoration, and the enhancement/preservation/restoration of human impacted water features to embrace a wider array of ecological values such as sustainable channel corridors and the provision of higher quality habitat for riparian and aquatic species alike.

The remediation and restoration of human-impacted watercourses and associated wetland features within a subwatershed to derive more ecosystem focused positive outcomes and sustainability depends upon Natural Channel Design (NCD) elements that are expected from a thorough understanding of geomorphic criteria.

This component will be closely tied to the aquatic systems review.

Key Objectives

Objective 1: Confirm findings (in the context of the participating study lands) from the SWS Plan.

Objective 2: Identify and seek to fill data gaps in context of geomorphic assessments (as noted in Objective 1, above) for all watercourses and associated wetland features within the study area, including identification of headwater drainage features (HDFs) through to higher order streams/rivers.

Objective 3: Derive conceptual strategies to meet the overarching goals from a physically sustainable fluvial/riparian perspective. The strategies to meet the goals from this physical perspective will support hydrologic, hydraulic, and thermal regime sustainability (for cold water systems where required). Particular attention will be given to the role that sediment balance (net zero degradation/aggradation) and associated phosphorous mobilization is playing in the larger subwatershed contexts.

Objective 4: Derive conceptual strategies to meet overarching goals from a natural heritage/habitat perspective. The strategies to meet the goals from this ecological perspective will support the restoration and optimization of robust natural heritage values. Particular attention will be given to the interfacing of LID Strategies and Green Infrastructure (GI) in managing stormwater and protecting naturalized water balances as well as cold-water thermal regimes. Robust habitat creation strategies will also be explored, again focusing upon the creation or protection of cold-water riparian ecosystems.

Objective 5: Derive a comprehensive list of detailed design projects to meet the conceptual objectives noted above. The listing will seek to prioritize projects based upon ease of completion, cost and overall value for the realization of the conceptual objectives.

Objective 6: Correlate conceptual strategies and the resultant listing of detailed project priorities with all other SWS assessments, particularly stormwater management, natural heritage evaluation and climate change.

Workplan Requirements

- Data gap and existing conditions analysis:
    - Review of historic and recent aerial imagery, particularly with respect to deriving stream corridor dynamics such as meander belt, 100-year erosion risk, etc.;
    - Existing geomorphic mapping and analyses;
    - Conduct reach delineations where not previously completed;
    - Conduct rapid assessments where not previously completed;
    - Detailed geomorphic field assessments;
    - Meander belt width assessments for higher order streams within the study area; and
    - Erosion threshold determination.

- Conceptual strategies from physically sustainable, fluvial/riparian, and a natural heritage/habitat perspective:
    - Develop comprehensive list of current geomorphic regime status for all watercourses within the study area at the reach scale (i.e., 'in-regime', transitional, or adjusting, etc.);
    - Develop comprehensive list of current natural heritage values inherent to existing watercourses within study area at the reach scale using the Rapid Stream Assessment Technique (RSAT);
    - Opportunities and conceptual methods for bringing each reach identified as transitional or adjusting back to an 'in-regime' status;
    - Evaluate opportunities to bring each reach in line with the objectives for ecological sustainability; and
    - High-level cost estimates for the same.
- NCD identification and design objectives for future detailed design;
- Consideration of thermal regime for occupied and contributing redside dace habitat; and
- Correlate above noted workplan elements with a climate change understanding and strategy that will depend upon the scenarios of interest. Both the physically sustainable fluvial/riparian perspective and the natural heritage/habitat perspective should be assessed from the 'no-regrets' scenario to the year 2100 scenario.

Future Study Requirements

The SWS will include a summary of future study requirements related to fluvial geomorphic assessments, which may include:

- Detailed geomorphic field assessments/recommendations including:
    - Rapid and detailed Geomorphic Assessments for those reaches requiring such field investigations still (for permanently flowing channels);
    - Site specific reach refinements (RSAT);
    - Meander belt and 100-year erosion risk assessments;
    - Conceptual design of LIDS measures to confirm location and sizing; and
    - Refinement of SWMF outlet works and NCD correlation.

Timing: Draft Plan

- Natural Channel Design:
    - Refine NCD elements to maximize probability to meet objectives and to meet specific requirements related to cold-water system stability and the creation of rich and robust natural heritage features;
    - Dove-tailing detailed storm water management (SWM) studies with the geomorphic analyses and natural channel design aspects will be critical;
    - SWM analyses and designs should seek to assess the 1:100-year or Regional flood recurrence event ***and*** the bank forming (aka bankfull) flood event, best approximated by the 1:2-year recurrence flood event; and
    - Hydraulic parameters must include the width, depth, and mean velocity for these recurring flood flows.

Timing: Detailed Design

Hydrology and Hydraulics

The purpose of the hydrologic and hydraulics work is to establish the existing and proposed storm drainage patterns internal and external to the Secondary Plan area lands and characterize the hydrologic setting. The focus of the work will be on understanding the existing and proposed flows to significant features within the Secondary Plan area, identifying and confirming stormwater management design criteria, and determining the extents of floodplain development constraints on the developable area. The work will also identify any potential impacts on flood vulnerable areas downstream due to the future development.

Key Objectives

Objective 1: Establish existing and proposed storm drainage boundaries.
Objective 2: Refine available hydrology and hydraulics models.
Objective 3: Confirm stormwater management criteria via background information review and results of hydrologic study.
Objective 4: Identify a stormwater management strategy including LID measures and end of pipe SWM facilities that achieves the SWM criteria.

Workplan Requirements

The hydrology analysis will include examining or assessing the following:

- Identifying existing storm drainage patterns and external drainage impacting the Secondary Plan to characterize the existing hydrologic setting;
- Identifying and preparing a summary of applicable stormwater management criteria for quantity, quality and erosion control including the Humber River unit rates for quantity control of 2 through 100 year storm events;
- Reviewing and verifying the TRCA Humber River Watershed existing conditions hydrology model based on existing land use and topography;
- The Regional storm event TRCA Humber River Watershed existing conditions hydrology model will be discretized for the purposes of establishing pre-development targets for stormwater management for the Secondary Plan area. Regional storm event peak flows at key flow nodes downstream of the study area will be confirmed at key locations down to Lake Ontario;
- Discretize the TRCA Humber River Watershed future conditions hydrology model for the purposes of establishing post-development uncontrolled flows for the MTLOG lands;
- Update the TRCA future conditions hydrologic model for the 2 through 100 year and Regional storm events, to reflect proposed future land uses within the MTLOG land in accordance with the land use;
- Report post development uncontrolled peak flows and compare to pre-development peak flows for the 2 through 100 year and Regional storm events at key nodes downstream of the MTLOG lands to Lake Ontario;
- Assess the implications of uncontrolled future flows in existing downstream flood vulnerable areas;
- Confirm the need for the management of Regional storm event flows (in case the increase of flow causes unacceptable impacts to downstream culverts and flood vulnerable areas);

- Develop a Stormwater Management strategy, including LID measures and end of pipe SWM facilities that achieves the SWM criteria for quantity, quality, and erosion control, in addition to mitigating impacts to water balance. Natural heritage, groundwater and surface water impact assessments shall be considered when developing the SWM strategy;
- If warranted based on the hydrologic assessment, provide a recommended approach to the management of regional storm flows;
- Verify the SWM strategy conformance with the criteria developed as part of the Phase 1 Study;
- Identify additional systems such as Clean Water Collector (CWC) systems, required to support LID measures as part of the overall water balance mitigation strategy and/or any feature specific water balance mitigation strategy, where required;
- Provide general design criteria for end-of-pipe SWM facilities that will work toward mitigating the impacts from the land use plan. The criteria will provide guidance at the next stage in the development process in support of Draft Plan of Subdivisions for sizing and grading of SWM facilities; and
- Provide an overview of timing, phasing and cost sharing requirements for end-of-pipe SWM facilities.

The hydraulic analysis will include examining or assessing the following:

- Additional field investigations via survey and field inspection of existing culverts to verify existing drainage patterns and the TRCA hydraulic models;
- The TRCA hydraulic models will be reviewed and verified for the tributaries of the Humber River located within the Secondary Plan. The floodlines for watercourses (defined bed and bank) will be delineated, as required. Any required modifications to the TRCA hydraulic model flows will be determined in accordance with the findings of the hydrologic assessment; and
- Existing Flood Vulnerable Areas (FVAs) downstream of the study area that will potentially be impacted from future development of the Secondary Plan will be identified.

Future Study Requirements

The SWS will include a summary of future study requirements related to hydrologic and hydraulic assessments. As the development approvals proceed through the Tertiary Plan and Draft Plan of Subdivision processes, the proposed servicing and stormwater management design will be refined including preliminary design and recommendations of stormwater management facilities and infiltration measures. Updates to the hydrologic modelling are anticipated based on refined local road networks, grading, servicing, and land use characteristics. Updates to the hydraulic models may be required if grading is proposed within the existing floodplain.

Hydrogeological Assessment

The purpose of the hydrogeological assessment is to review the regional hydrogeological setting of the Secondary Plan area lands, and characterize the local soil, groundwater and surface water flow conditions. The focus of the work will be on understanding the key hydrogeological functions and groundwater interactions with natural features to provide input to the design and engineering of proposed development areas such that important aquifers and natural features will be supported.

Key Objectives

The goal of the hydrogeological assessment is to establish a geological and hydrostratigraphical conceptual model for the study area. This investigation is more focused on the shallower environment, which is what would be impacted by development activities and what is typically interacting with the surrounding ecosystems. The deeper aquifer system is not intended to be studied in depth as part of this investigation as it is intended to be largely unaltered by development activities, specifically construction and dewatering activities.

This will include examining or assessing the following:

- Establish the study area stratigraphy and identify the aquifer(s) that may be present and their extents (hydrostratigraphy);
- Evaluate key characteristics of these bedrock and overburden systems, including hydraulic conductivity, hydraulic gradients (upward or downward), and groundwater chemistry;
- Evaluate the interactions between the groundwater and surface water systems and how these interactions impact the surrounding ecological environment;
- Identify areas where further investigation may be required to quantify or evaluate the hydraulic characteristics and/or confirm/establish conditions in complex environments or connections between the groundwater system and the surrounding environment;
- Identify areas within the study area where dewatering and/or depressurization may be required to facilitate development and construction or where a high groundwater table may be present; and
- Identify areas where future development may not be possible or where future development may have significant impacts to the groundwater regime or impacts its connection to the surface water, ecological, or other systems.

Workplan Requirements

The scope of work required to complete the hydrogeological assessment includes reviewing available published data and conducting a field investigation to confirm or establish in-situ conditions via in-situ testing and assessment.

Available data includes the review of water well records in the area, as well as any available consulting or research reports, available geological or hydrostratigraphical conceptual models (available through or produced by source water protection studies or the Oak Ridges Moraine Groundwater Program) and mapping products (produced by the Geological Survey of Canada, Ontario Geological Survey, Ministry of the Environment, Conservation and Parks and/or Ministry of Natural Resources and Forestry, etc.).

Additional field investigation will provide additional spatial and temporal insight on the groundwater system. In order to accomplish this, the field program will include a combination, that will include, but is not limited to the collection of the following datasets to provide data on a more regional context and provide insight in establishing appropriate field investigations for more site-specific studies for site plan approval submissions:

- Monitoring well installations with borehole logs (including monitoring well nests in select locations);
- Drivepoint piezometers (including nested piezometers in select locations);

- Long-term manual groundwater and surface level measurements (including hydraulic gradient calculations);
- Groundwater and surface water chemistry;
- Identification of the presence of seeps in and around watercourses and surface water features;
- Hydraulic conductivity measurements; and
- Spot baseflow measurements.

Monitoring locations are shown in **Figure 3** (**Appendix B**).

Depending on the outcome of the field investigation and the hydrogeological assessment, refinement of available hydrogeological understanding included in published studies may be possible and may include any or all the following:

- Refinegeologicinterpretation and hydrostratigraphy including surficial geology and hydrogeologic parameters;
- Refined understanding of the observed shallow groundwater conditions as they relate to response to seasonal changes in levels, flows and gradients, and responses to storm events (where possible);
- Refine mapping and interpretations of groundwater discharge areas;
- Refinements to groundwater flow contributions to and from surface water features and wetlands; and
- Feature-based water balance risk assessments.

The hydrogeological assessment data will be reviewed in the context of the following to provide a more comprehensive assessment of areas that may be more sensitive to potential impacts from development as well as areas that may not be ideal for development due to significant constraints or may require addition mitigation to be feasible and acceptable for the planned land uses.

These additional observations and technical assessments would be obtained from the hydrologic, terrestrial, aquatic and fluvial geomorphologic characterizations and would include, for example:

- Observations of seepage and discharge;
- Fish habitat;
- Phreatophytic observations;
- Streambed composition; and
- Low flow analysis and water quality.

In turn the groundwater characterization may also be used to provide technical input to aid in the characterization and data gap analysis for these same related and connected component disciplines.

Field observations for groundwater discharge will be coordinated at the field program's outset and all disciplines will be directed to collect appropriate observations during the completion of their other field tasks, as appropriate.

Future Study Requirements

The SWS will include a summary of future study requirements related to hydrogeological assessments. Additional investigations may be recommended for many reasons, including inconsistent data or unexpected results that may require confirmation or further delineation, or the results indicate a more complex environment than anticipated.

Some additional investigation recommendations may be included that can be completed in future work when more detailed site studies are being completed for site plan or zoning approvals. Additional tasks that may be required for immediate assessment or as recommendations to be included in future detailed site plan studies, may include any or all of the following:

- Additional drilling investigations, including additional monitoring points;
- Extended groundwater and surface level monitoring;
- Feature Based Water Balance Risk Assessments;
- Additional monitoring wells (maybe additional monitoring nests);
- Additional drivepoints and/or staff gauges (maybe additional monitoring nests);
- Seepage meter installation and monitoring;
- Additional streamflow or baseflow assessments; and
- Additional groundwater and/or surface water sampling.

Surface Water Quality

The purpose of the surface water quality work is to review the available existing surface water quality data of the Secondary Plan lands and characterize the surface water quality within the study area, including seasonal trends and effects due to precipitation events. The study will assess potential land use impacts on surface water quality, mitigation strategies and BMPs for urban stormwater management and identify management, implementation and monitoring of the surface water quantity and quality.

Key Objectives

The goal of the surface water quality study is to establish the baseline surface water quality within the study area and identify water quality concerns and/or restraints. This study will focus on water quality monitoring at the far upstream and downstream reaches of each watercourse in the study area to allow for robust characterization of baseline conditions and comparison to future conditions during and following development.

Workplan Requirements

The scope of work required to complete the surface water quality study includes a review of currently available background information to provide a preliminary understanding of the baseline water quality in the subwatershed. The existing datasets will be reviewed to understand the existing water quality status in the study area. The existing water quality status will then be assessed to provide the baseline reference and identify any water quality concerns and constraints in the study area. Other published documents including, but not limited to, Conservation Authority's Source Water Protection documents will be reviewed for additional background information. The study will also locate existing SWM facilities and the respective catchment areas, as the baseline reference for stormwater management in terms of water quantity and control.

A surface water quality sampling program within the study area will be completed in order to characterize the surface water quality based on the contributing land use, soils, and stormwater quality management practices during both wet (storm) and dry (baseflow) periods. Surface water quality monitoring and stream gauging will be completed at the same locations in order to correlate the surface water quality with the study area hydrology. Six (6) surface water quality monitoring events will be completed between April and December 2024. Surface water quality samples will be collected at each station for one (1) wet and one (1) dry event for each season. Spring is

considered to encompass April and May, summer is considered to encompass June through August, and fall is considered to encompass September through December. Two (2) grab samples will be collected for each wet weather event; one grab sample will be collected during the onset of the storm and one grab sample will be collected during the recession of the storm. A “dry” weather event is considered to be an event completed where precipitation has not occurred within the previous 72 hours. A “wet” weather event is considered to be any precipitation event of 5 mm or more in a 24-hour time period.

The grab samples for each wet weather and dry weather event will be analyzed for the following contaminants:

- Oil and Grease;
- Total Phosphorus;
- Anions (Nitrate, Nitrite, Phosphate, Chloride);
- Ammonia;
- Total Kjeldahl Nitrogen (TKN);
- Conductivity;
- Total Solids (TS);
- Total Suspended Solids (TSS);
- Biochemical Oxygen Demand (BOD5);
- PH/alkalinity;
- Total Coliforms/Fecal Coliforms/E.Coli;
- PAH;
- Metals (Al, Sb, As, Ba, Be, B, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Mo, Ni, P, K, Se, Si, Ag, Na, Sr, Tl, Sn, Ti, W, U, V, Zn, Zr);
- Hardness as CaCO3; and
- Turbidity.

Field measurements of the following contaminants will be measured using a water quality probe during the sampling event:

- Dissolved Oxygen;
- PH;
- Salinity; and
- Temperature.

A surface water quality section in the SWS report will be prepared summarizing the location of the water quality sampling stations and results of the quality analyses and provide an assessment of the surface water quantity and quality. The report will provide an assessment of potential land use impacts on surface water quality, mitigation strategies and BMPs for urban stormwater management. The report will also identify management, implementation and monitoring of the surface water quantity and quality.

Future Study Requirements

The SWS will include a summary of future study requirements related to surface water quality. Additional investigations may be recommended for many reasons, including inconsistent data or unexpected results that may require confirmation or further delineation, or the results indicate a more complex environment than anticipated. As the proposed stormwater management plan for the study area evolves, additional studies may also be necessary to adequately characterize baseline conditions close to proposed stormwater management facilities.

Some additional investigation recommendations may be included that can be completed in future work when more detailed site studies are being completed for site plan or zoning approvals. Additional tasks that may be required for immediate assessment or as recommendations to be included in future detailed site plan studies, may include any or all of the following:

- Additional water quality sampling events;
- Additional water quality sampling locations;
- Change in frequency and schedule of water quality sampling events;
- Additional streamflow or baseflow assessment; and
- Additional groundwater and/or surface water sampling.

Geotechnical Assessment

The purpose of the geotechnical assessment is to complete a subsurface investigation to determine the underlying soil and groundwater conditions, characterize the site geology, and to support the hydrogeological study. The scope also includes an erosion hazard assessment and slope stability study to determine the long-term stable top of slope (LTSTOS) position for confined valley systems on site. The site is within TCRA jurisdiction; therefore the slope stability study will follow TRCA guidelines within *"The Living City Policies,"* dated November 28, 2014. The study will also follow provincial guidelines within *"Technical Guide – River and Stream Systems: Erosion Hazard Limit,"* dated 2002, by Ministry of Natural Resources.

Key Objectives

Objective 1: Complete a subsurface investigation including borehole drilling, monitoring well installations, and geotechnical laboratory testing.

Objective 2: Characterize the subsurface soil and groundwater conditions encountered below the site.

Objective 3: Complete an erosion hazard assessment and slope stability study to determine the LTSTOS position for the confined valley systems within the site limits.

Workplan Requirements

Geotechnical Field Work Investigation and Reporting

The field investigation to be completed is generally summarized below:

- Obtain public and private utility locates;
- Advance boreholes across the site on participating properties and collect soil samples using the Standard Penetration Test. Borehole depths are established to support typical development, with deeper boreholes in locations along the valley systems to support detailed slope stability analysis;
- Monitoring wells and nested wells will be installed in strategic locations;
- The boreholes with monitoring wells/nested wells will be instrumented with a 50 mm diameter PVC casing. All installations will be conducted in accordance with Ontario Regulation 903 for subsequent monitoring and testing purposes; and
- Conduct geotechnical laboratory testing on selected soil samples to determine soil index properties.

Borehole locations are depicted in Figure 4 (**Appendix B**).

A geotechnical section will be prepared and included in the SWS report which will include background site information, work methodology, etc.; a site location plan showing the site in relation to relevant landmarks in the area; a borehole location plan showing the locations of the boreholes advanced on site; and borehole logs which will provide an illustrative view of the subsurface conditions encountered. The subsurface conditions encountered in the boreholes will be summarized in the report.

Slope Stability Assessment

To assist with preliminary constraints mapping, GEI will conduct a preliminary slope stability assessment for the confined valley systems on the participating properties. The scope will generally include:

- A visual slope inspection of the valleylands on the participating properties;
- Cutting cross-sections through the slopes, watercourses and valleylands using the topographic plan available for the site;
- Conservative estimates for the toe erosion allowance and stable slope allowance will be used at this time to estimate the LTSTOS;
- Assessment of the erosion access allowance and total development setbacks related to slope and erosion hazards;
- Review of proposed grading strategy related to site servicing and stormwater management ponds;
- Plan and profile views of the preliminary setback distances to assist with development constraint mapping; and
- A report summarizing the slope inspections, methodology and results.

Due to timing, this work will be completed to a preliminary level prior to the subsurface investigation, to support the overall site constraints mapping. More detailed slope stability analysis can be completed once the subsurface investigation is completed and detailed topographic information is available for the confined valley systems.

Future Study Requirements

Additional boreholes and monitoring wells would need to be advanced at the site as the design progresses to draft plan and into detailed design. The depths and locations of future boreholes and monitoring wells would need to cater to the proposed development concept. The future geotechnical reports should provide additional recommendations for earthworks,, foundation design, earth pressures,, excavations requirements, etc. as needed to support the proposed development.

Timing: Draft Plan, Detailed Design

Climate Change

When this TOR was prepared, the Caledon Green Development Standards (Sustainability Solutions Group, July 2023) was still in draft. When the standards are finalized, the Local SWS may be updated to accommodate requirements identified by the Town. In general, climate change will be considered as it is related to each of the aforementioned disciplines including potential impacts on the Natural heritage system and water resource system and will address how the proposed development concepts and proposed management will impact climate change considerations. Climate change considerations will also demonstrate alignment with Peel Region's Climate Change Master Plan (2019).

APPENDIX A

Detailed SWS Terms of Reference, May 2024

Terms of Reference

Local Subwatershed Studies

May 2024

Contents

1.0 INTRODUCTION

The Growth Plan for the Greater Golden Horseshoe (2019), along with other guiding documents, promotes integrated land use planning processes which consider multiple factors when planning for communities and neighbourhoods. These factors include the natural and physical environment, infrastructure needs, transportation, and socio-economic considerations. A cornerstone to contemporary planning, as recognized by the Growth Plan (2017), is the need for multi-disciplinary subwatershed studies which comprehensively establish a baseline characterization of the environmental conditions and natural systems and resources in a subject study area planned for growth developed based on a subwatershed unit, and from this establish an integrated management plan for the natural and water-based systems.

For each Secondary Plan within the New Urban Area (Settlement Area Boundary Expansion), a Local Subwatershed Study (Local SWS) must be completed to develop a sustainable development plan that protects and enhances the natural and human environments through the implementation of the direction, targets, criteria and guidance of the Settlement Area Boundary Expansion Scoped Subwatershed Study (Wood et. al., January 2022). The Local Subwatershed Study is intended to confirm, refine and implement a natural heritage and water resource systems management approach and will will protect, rehabilitate, and enhance the natural and water-based environments within the subject Secondary Plan Areas, and the surrounding lands in the respective subwatershed.

It is the Town's requirement that for any developer-led Secondary Plan, a Local Subwatershed Study must be completed. This document provides a framework to guide applicants on the Town's minimum requirements for a Local Subwatershed Study. For every Local Subwatershed Study completed, the Town requires the applicant to develop a Terms of Reference for their Local Subwatershed Study that outlines how they will fulfill the Local Subwatershed Study requirements. The Terms of Reference will need to be approved by the Town prior to initiation of the study.

1.1 Purpose

The lands being proposed for development through a Secondary Plan are generally referred to as the Primary Study Area (PSA) while those lands beyond the PSA within the subwatershed limits are referred to as the Secondary Study Area (SSA). Local SWS work in the PSA is typically more detailed and supported by field investigations, whereas the work in the SSA is generally less detailed and primarily supported by desktop information and limited field work, largely of a confirmatory nature. The broader watershed/subwatersheds may have existing downstream constraints beyond the identified Secondary Plan study area and, to the appropriate extent, these constraints either environmental or public safety will have to be considered in establishing the management strategies in the subject Secondary Plan area based on the overall study objectives and ultimate targets. Where there are watershed wide management strategies established through approved watershed studies, the established strategy is to be considered a minimum requirement.

The Local Subwatershed Studies will need to:

- Identify the location, extent, present status, significance, and sensitivity of the existing natural environment;
- Identify environmentally sensitive areas and natural hazards, including constraints and opportunities;
- Confirm or refine the natural environment system(s) (i.e., natural heritage system and water resource system) to protect, rehabilitate, and enhance the water quality/quantity,

ecological form, function and the interactions and interdependences between the system within the Secondary Plan Area and local environs;

- Identify lands where development may be considered, and determine how existing and future land uses can be developed to be compatible with the natural environment system(s);
- Undertake an iterative Impact Assessment based on an initial Preliminary Preferred Land Use Plan for the Secondary Plan area (This inherently will require establishing an initial land use concept which will need to be tested and assessed), followed by a second refined land use concept developed through the feedback from the initial testing, including input from other technical studies and feedback from stakeholders;
- Provide direction on best management practices (BMPs) to manage impacts from the urbanization proposed through the Secondary Plan (from an environmental and water management perspective), and, where there are established BMPs for infrastructure, these are to be considered a minimum requirement;
- Provide direction on future study requirements (i.e., Environmental Implementation Study or equivalent), infrastructure needs (i.e., Master Environmental Servicing Report (MESR) - planning and implementing servicing and transportation infrastructure from an environmental and water management perspective);
- Establish an implementation and management strategy and requirements for environmental systems monitoring;
- Support the Class Environmental Assessment processes being undertaken as part of the infrastructure planning for the Secondary Plan area, specific to constraints and opportunities associated with the natural and water-based systems.

As noted above, the extent and form of study varies based on the discipline and the areas of interest, with more intensive field investigations in the Secondary Plan area and less intensive desk-top forms of study in the lands beyond the Secondary Plan area to provide an overall subwatershed context. This systems-based assessment is required to examine the role of water (both surface and ground) in sustaining area resources, including creeks, wetlands, and other water-based features, including headwater drainage features. This baseline characterization is built on a period of field data collection and monitoring (minimum 2-years preferred 3-years), which then serves as the basis from which to examine and assess potential impacts due to planned urbanization. The impact assessment process includes a vetting of land use concept plans through an integrated and comprehensive planning exercise, that includes consideration of the findings and requirements of other infrastructure studies such as Master Servicing (Water/wastewater) and Transportation Plans, which need to be concurrently advanced for consideration through a consultative process involving local (Caledon) and the Regional municipality (Peel), other provincial agencies, landowners, Indigenous Nations and Peoples, and the public. This public consultation is vital to ensure that the varied interests of all stakeholders are appropriately considered in the study. Once appropriately vetted, management and monitoring recommendations to implement the recommendations of the Local Subwatershed Study and related municipal Master Plans are required to be translated into policy and strategies for community development as part of the Secondary Plan which will be enacted through an Official Plan Amendment (OPA).

1.2 Study Area

In alignment with Future Caledon Official Plan, a Local Subwatershed Study is required for each secondary plan area or new development in the New Community Areas and New Employment areas. The limits of the study area of the Local Subwatershed Study will:

- Consider Policy 21.3.3 and Figure F3 of Future Caledon Official Plan
- Ensure that the study will:
    - Characterize the location, extent, sensitivity and significant of the water resource system, and Natural Environment System form and functions, within and across the secondary plan area or development area; and,
    - evaluate the factors and influences that are important to the sustainability of the water resources system, and Natural Environment System form and functions, to the satisfaction of the Town; and,
- be determined in consultation with the Town, the Region and the Conservation Authority/Authorities; and,
- be approved by the Town.

1.2 The Secondary Planning Process

This Section is meant to assist in the understanding of the context of the Local Subwatershed Study (Local SWS) in relation to the Town's Secondary Planning Process. The relationship between the Secondary Planning process and the integrated Local Subwatershed Study and Infrastructure Planning Processes is presented in Figure 1.

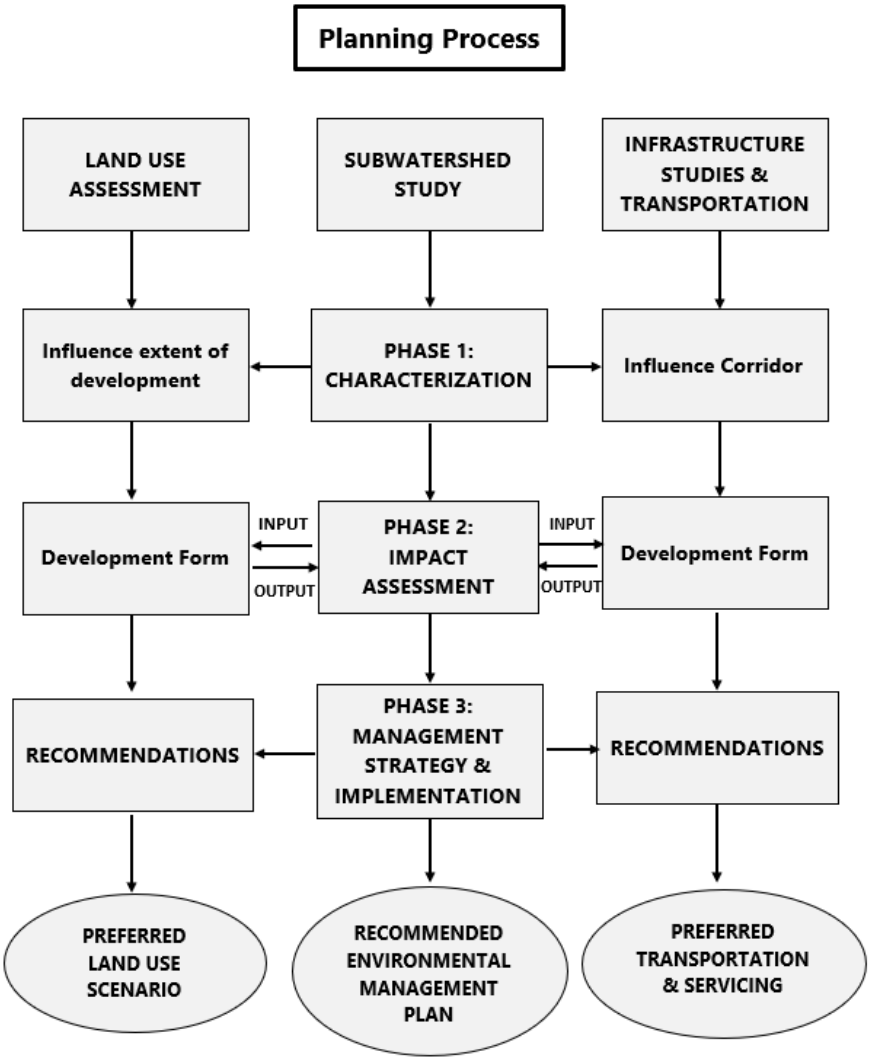


Figure 1: Integrated Land Use, Subwatershed, and Infrastructure Study Process

The Secondary Plan, with the accompanying studies, supports the development of a community development plan (with accompanying development policies). The Secondary Plan, and the related studies (i.e., Local Subwatershed Study, Transportation Master Plan, Water and Wastewater Master Plans, Agricultural Impact Study, and Fiscal Impact/Asset Management Study and others), are part of a comprehensive and coordinated planning process that will be required to meet the approvals necessary under the Planning Act and the Environmental Assessment (EA) Act.

The Local SWS will provide the environmental base and context for the natural and water-based systems to support the infrastructure planning for the Secondary Plan Area. Combining the Planning Act and Municipal Class EA process permits the Municipality and Region to plan the Secondary Plan area and its required infrastructure collaboratively in a holistic manner, whereby the Local SWS will provide important resource and management guidance to the Environmental Assessments for roads, water and wastewater servicing.

The concurrent infrastructure related studies, as part of the Secondary Plan, are intended to follow the Municipal Class EA Master Planning Process (typically adopting Approach #2). The level of investigation, consultation, and documentation will need to be sufficient to address Phases 1 and 2 of the Class EA process

to fulfill the requirements for Schedule A, A+ and B projects and thereby establish in the documentation the basis for specific future investigations if Schedule C projects are identified.

To facilitate consultation, a Technical Advisory Committee (TAC) will be formed comprising of staff from the Municipality, the Region, Conservation Authority, various applicable Provincial representatives, landowner technical representatives, and the consulting team(s). For specific and specialized matters, "sub TACs", involving discipline-specific professionals, will be established. The TAC will advise and help direct the development of the Secondary Plan and its component studies throughout the study process. The TAC will assist in ensuring that the Secondary Plan evolves from the foundational basis of the Local Subwatershed Study to a Community Development Plan in a collaborative manner through the integration of the outputs and recommendations from the concurrent studies.

Overall, the Secondary Plan will identify the community structure for the subject portion of the Settlement Area Boundary Expansion (SABE) lands to ensure appropriate integration and consideration for development opportunities within the community. The Secondary Plan will include land use categories, a road/transit/cycling/trail and municipal servicing network, a natural heritage system and open space/major community facility requirements. The objective is to ensure that the new community neighbourhoods and employment areas in the current SABE lands are developed sustainably in the optimal location, meeting the objectives and requirements of the Growth Plan (2017), as implemented through the Regional Official Plan and the Municipal Official Plan.

As noted above, the environmental base for the Secondary Plan (i.e., the natural heritage system and the water resource system) will be defined by the Local Subwatershed Study. The natural heritage system and water resource system established through the Province and Regional Official Plan, refined through the Municipal Official Plan, will be further refined or confirmed through the Local Subwatershed Study in support of the Secondary Plan.

A fundamental objective of the Secondary Plan is to ensure the Municipality develops as a sustainable community. To achieve sustainability, the community will be developed based on the vision to be a sustainable, healthy, connected and complete community.

2.0 GENERAL SUMMARY OF THE SUBWATERSHED STUDY PROCESS

2.1 Local Subwatershed Studies – Scope and Approach

The Secondary Plan Scope and related Studies will guide the development of the Secondary Plan area through a consultative, collaborative, and coordinated process to establish a sustainable, healthy, connected and complete community.

The Local Subwatershed Studies for the various Secondary Plan Areas in Caledon will need to describe the location, extent, sensitivity and significance of natural features and functions within the identified study area and evaluate the factors and influences that are important to their sustainability. The respective studies will establish goals and objectives for terrestrial and aquatic systems (i.e., natural heritage) and water resource systems in accordance with the Provincial Policy Statement, the Region's Official Plan, Future Caledon Official Plan, and the applicable Watershed Plans and Subwatershed Studies, including the Settlement Area Boundary Expansion Scoped Subwatershed Study (Wood et. al., January 2022). Using existing desktop information and available studies, as well as reconnaissance-level and detailed field work, the respective studies will document existing conditions, assess potential impacts of existing and future development and recommend management strategies to manage and mitigate the predicted impacts of urbanization, including comprehensive stormwater management strategies to protect, enhance and restore

hydrologic functions. In conjunction with the concurrent development of Secondary Plans, including Transportation and Servicing Master Plans (water and wastewater), the Local Subwatershed Studies will reflect and refine the Scoped SWS Natural Heritage System and Water Resource System in the Secondary Plan area and identify strategies to protect, enhance and restore ecological functions and promote compatible activities.

In addition, the Local Subwatershed Study will be required to include monitoring pre-development (minimum 2 years preferred 3 years, additional years may also depend on climatic conditions to characterize existing features and systems and establish baseline conditions. The initiation of monitoring prior to development is necessary to properly characterize the study area and further to conduct a thorough impact assessment at a detailed level for the local SWS and Secondary Plan. The post-development monitoring program, implemented following completion of the Local Subwatershed Study, is also required to provide appropriate recommendations for potential adaptive environmental management incorporating the findings from the environmental monitoring program in Town-led or Conservation Authority-led initiatives, such as broader scale planning strategies and secondary planning recognizing that development and secondary planning will be staged and phased with opportunities to adjust requirements in subsequent planning stages. In this regard, the Local Subwatershed Study is required to provide guidance for developing and implementing a monitoring program post-development, as well as to provide direction regarding the timing and duration associated with each monitoring component, the party responsible for the various monitoring components, and funding, timing and implementation strategy.

The Local Subwatershed Studies will be conducted in three (3) phases, discussed in further detail below and presented in the Figure 2. The formulation and TAC acceptance of the Technical Work Plan is a core component of the process for Local Subwatershed Studies. The Technical Work Plan needs to be developed under a separate process, prior to initiating the Local Subwatershed Study and site monitoring. The Technical Work Plan needs to include details on the scope of field work and monitoring along with preliminary mapping to characterize the study area and provide the basis for required modelling for the subwatershed area. **The Local Subwatershed Study process requires that the Technical Work Plan be finalized and approved by the municipality, with consultation with relevant Conservation Authority and Region prior to initiating field surveys to support the Characterization phase (Phase 1) and prior to proceeding into the Impact Assessments (Phase 2).**

An overview of each phase of the Local SWS process is provided below, with further details provided in the subsequent section.

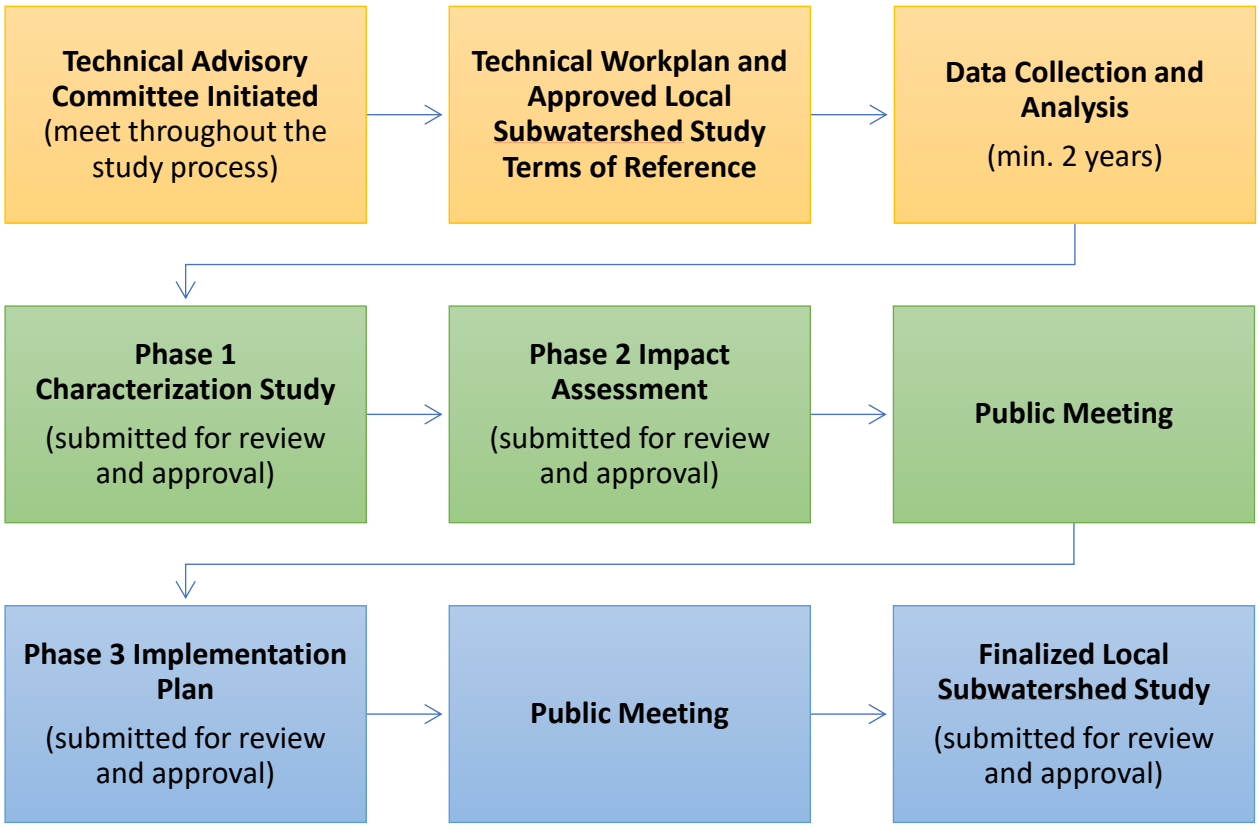


Figure 2: Local Subwatershed Study Process

Technical Workplan and Approved Terms of Reference

Developer-led Local Subwatershed Studies should commence with a proposed Terms of Reference to be submitted to the Town and approved by the Town and agency partners before initaiton of the work. The proposed Terms of Reference should undertake, at minimum, the work outlined in this document and include a detailed explanation of how the work will be completed. The Local Subwatershed Study Terms of Reference will need to be accompanied by a data gap analysis and development a technical workplan that outlines the methodology (i.e. how, what and where) for collection of all of the data and the analysis of that data, including the models that will be used and how they will be calibrated and validated. The Local Subwatershed Study will need to include a Technical Advisory Committee, comprised of representatives from Caledon, Peel, CAs, landowner groups and various Provincial agencies, that meets regularly throughout the study process.

Phase 1: Characterization and Integration

Phase 1 of the Local SWS will need to fully consider the data and information in the Scoped Subwatershed Study to characterize the resources associated with each subwatershed organized by study discipline (i.e., hydrology/hydraulics, groundwater, water quality, stream morphology, aquatic, and terrestrial ecology). Background and supplemental field data are to be assessed by each discipline, and then across disciplines, to:

- establish the form, function and linkages of the environmental resources,
- confirm, refine and identify environmental constraints and opportunities related to terrestrial and aquatic habitat, features, and systems using the targets and objectives set out in the Scoped Subwatershed Study

- establish surface water and groundwater constraints and opportunities associated with flooding, erosion, water quality, water budgets, including recharge and discharge areas through new numerical tools (models) suitably calibrated to local conditions,
- Refine and implement criteria and constraints for management opportunities associated with the environmental features and systems.

Goals, objectives and targets developed through the Scoped Subwatershed Study and Future Caledon should form the basis of the goals, objectives and targets for the Local Subwatershed Study. As part of Phase 1, the Local Subwatershed Study will need to finalize the goals, objectives and targets to be area specific, carrying through, as indicated above, the goals, objectives and targets of the Scoped Subwatershed Study and including additional ones should there need to be for the specific area in consultation with the Technical Advisory Committee (TAC)..

The Phase 1 characterization will need to include a minimum of two-years of pre-development monitoring, with three-years being preferred to characterize existing systems and features, as well as to inform establishing baseline conditions for comparison with predictions associated with post-development conditions. Should the two years of minimum data be undertaken during abnormal climatic conditions, a third year will be required.

Phase 2: Subwatershed Impact Assessment

Phase 2 of the Local SWS identifies future stressors, describes (past, present) and predicts (future) impacts, and assesses these impacts against the preliminary goals, objectives, and targets developed as part of Phase 1. Future land use scenario(s) are evaluated based on input from the Secondary Plan Land Use Team. For various disciplines (i.e., groundwater, hydrology, hydraulics and water quality) analytical tools are required to be used to predict changes to existing conditions in relation to subwatershed-based targets associated with the development of the Secondary Plan area. Information and analyses from previous background studies (i.e., Watershed Plan, Regional Scoped Subwatershed Study, Hydrologic Investigations, Tier 3 Groundwater Studies, etc.) will be used to assist modelling future land use scenarios. For others (i.e., terrestrial and aquatic ecology) predictions will inherently be semi-quantitative, qualitative or conceptual, integrated with predictions from other subwatershed disciplines (i.e., hydrogeology, hydrology, hydraulics and water quality) and experience elsewhere including knowledge of habitat/biota interactions.

As noted earlier, the Subwatershed Impact Assessment process is expected to be an iterative process whereby an initial land use concept will be evaluated/tested against the preliminary targets, and the feedback from this initial test may then inform the establishment of a refined land use concept.

Phase 3: Management Strategies, Implementation, and Monitoring Plan

Phase 3 of the Local SWS will use the findings of Phase 2: Subwatershed Impact Assessment to refine and finalize the evaluation of various land use scenarios and recommend a set of preferred management strategies, addressing the preferred land use designations and form, established through broader planning input to achieve the identified goals and objectives, and to establish the recommended strategies. An Implementation Plan will be prepared to offer guidance on locations and types of SWM facilities including Low Impact Development (LID) practices, staging/phasing, future study requirements, monitoring, Environmental Assessment requirements, and general economics.

Phase 3 also involves the development of a long-term monitoring initiative that is to evaluate the effectiveness of the proposed management strategies post-development by assessing whether the assumptions made at the Local SWS scale are appropriate and predictions made are sufficiently accurate. The feedback from this post-development monitoring will then be used through a process of adaptive management to determine if parts of the Local Subwatershed Study strategies and/or recommendations

should be modified as part of future development applications. While the execution of the post-development monitoring plan is not included within the scope of work for the Local Subwatershed Studies, the Local Subwatershed Studies are nevertheless to provide framework-level direction regarding the components, methods, duration, and key locations for the execution of the monitoring program, as part of future work. In addition, the subject monitoring approach and plan should will fulfill the CLI-ECA monitoring requirements. Further details on area specifics would need to be considered as part of future neighbourhood scale studies.

Public Meetings

At minimum, two public meetings should be held to share the findings of the study with residents and to gain their feedback. The meetings should be held as part of the Phase 2 Impact Assessment work and following the Phase 3 work.

The following provides further information on the technical work that needs to be completed as part of each phase of the Local Subwatershed Study.

2.2 Background Information Review/Gap Analysis/Work Plan Confirmation

Background Information Review:

During Phase 1, the Study Area will need to be characterized and preliminary mapping of constraints and opportunities will need to be developed. Information shall be obtained through three (3) levels of investigation, including (i) review of desk-top secondary sources (compiling information from existing documents); (ii) reconnaissance-level fieldwork; and (iii) detailed field work (Minimum 2 years, 3 years preferred).

Existing desk-top information relevant to the Local Subwatershed Study Area will need to be reviewed. Appendix A has a comprehensive database and summary of the area studies relevant to these study areas and should be established as the starting point.

Gap Analysis:

Background data used to prepare the Local Subwatershed Study, will need to be documented listing its source and format (e.g., municipal report/agency website/personal communication). For map data, the map scale shall be specified. The list of source materials shall follow a generally accepted bibliographic format. The purpose of documenting the background data is to facilitate a "gap analysis" and identify possible preferred methods by which to appropriately address the information gaps in Phase 1, as required.

A summary of each document from which information was used to prepare the Local Subwatershed Study characterization will need to be prepared. For each source, a brief review shall be produced, summarizing the source's content, and describing its relevance to the Local Subwatershed Study.

Technical Work Plan Confirmation:

Once all of the background data have been collected, the need and requirements for obtaining additional information shall be determined, and a proposed program for collecting additional data shall be outlined to the TAC. This process allows for collaborative consultation on the Technical Work Plan. It will be important to receive final sign-off from the TAC prior to advancing the updated/refined work plan.

2.2 Phase 1 – Subwatershed Characterization and Integration

2.2.1 Hydrology and Hydraulics

Background information on the study area is to be collected from all available sources. Maps of the study area will be provided by the Town, Region, and Conservation Authority. For each subwatershed and associated outlet, the physical features (e.g., subwatershed boundary, physiography, topography, soils, major watercourses, drainage swales, and wetland features) within the Secondary Plan Area shall be established. Any specific areas of interest shall be defined, identifying important implications on development potential, environmental features, and / or watercourse system function.

Hydrology:

The Hydrologic Modelling should apply a hybrid approach whereby:

- the hydrologic modelling of the Local Subwatershed shall apply the approved hydrologic modelling from the Conservation Authorities for Regulatory Flood Hazard assessments, and
- new local detailed continuous hydrologic modelling will need to be prepared for assessment of frequency flows, water balance and erosion.

The detailed continuous hydrologic model shall be selected for use in the Local SWS; the model(s) will need to be developed and calibrated for the subwatershed's existing condition. The local hydrologic model shall be a continuous, deterministic, hydrologic model, approved by TAC**,** with a strong physical representation of surface runoff, baseflows, and surface and groundwater interaction. It will be necessary to justify the applicability and sufficiency of the proposed numerical model(s). The modelling should ensure that the hydrologic and hydraulic features are appropriately represented for each subwatershed/catchment within the study area. The development of the model(s) will need to be in accordance with applicable standards to support future Municipal or Conservation Authority use of the model, and model results.

It is recommended as part of the review of background data, that the locations for streamflow gauges and rain gauges be identified. Field data for model calibration and validation should be collected between April and November inclusive. Once calibrated and validated the model is to be executed in both event (synthetic design storms) and continuous mode (using frequency analyses) to generate peak flows for a range of return period storms including 2, 5, 10, 25, 50, 100, 350 year and Regional Storm.

The results from the surface water modelling should be used to corroborate the water budget developed as part of the Hydrogeologic assessment (ref. Section 2.2.3).

The hydrologic modelling is to establish the baseline hydrology for the subwatershed system. As noted, it is required that the model(s) will be calibrated andvalidated based upon both historical rainfall and flow monitoring data, as well as new hydro-meteorological data collected as part of this study. The exercise should meet Provincial standards to provide a comprehensive understanding of the existing hydrologic conditions of the study area. The model shall be calibrated andvalidated to provide comparable flows at the subwatershed outlets to those determined in any previous watershed or drainage studies for the given watercourses, and any differences need to be rationalized. The model input parameters shall be compared to previous studies and modified to represent more detailed subwatershed modelling and shall be completed to the satisfaction of the TAC. The extent of area modelled should be sufficient to generate results at key/important downstream locations/confluence points and locations of interest (i.e. Special Policy Areas, Flood Vulnerable Areas, Flood Vulnerable Roads etc.) to confirm that the development of the Secondary Plan Area will not have any adverse impacts on the peak flow rates and runoff volumes specific to the objectives of managing the impacts due to adverse flooding and erosion.

The Erosion potential assessment of receiving and downstream watercourses shall be carried out using continuous simulation of watercourse flows over a suitable period of time, to evaluate the duration of critical discharge exceedance, cumulative erosion index (Ontario Ministry of Environment, 2003), cumulative effective work (per TRCA SWM Criteria, 2012), and other methodologies proposed by the study team stream morphologist (e.g. cumulative effective discharge, number of exceedances), to determine erosion thresholds (discharge, velocity and shear stress) established by the study stream morphologist and the associated guidance on the appropriate methodology.

Hydraulics:

The Local SWS will involve a field inventory of creeks, road crossings (culverts and bridges), stormwater facilities, etc. The current drainage systems and outlets shall be characterized as to potential drainage constraints and opportunities. The intent of the hydraulic modelling is to define area flood hazards and system constraints.

For established and regulated watercourses located in the study area, hydraulic analyses shall be conducted. Flood lines shall be established for the Regulatory Event (i.e., based on the flows associated with the greater of the Regional Storm event or 100 Year Storm) for existing conditions. For the creeks that have floodplain delineation, as identified in previous studies, the flood lines shall be updated to reflect the current limits of the flood hazard, for land use planning purposes, but not as a formal flood plain map. The floodplain delineation should be based on hydraulic modelling, using the latest Hydrologic Engineering Center's River Analysis System (HEC-RAS) model from the U.S. Army Corps of Engineers, to generate the associated flood lines based on the peak flows established through the hydrologic analysis conducted for the Local SWS. As noted, this component of the Local SWS, while preparing preliminary floodlines for land use planning purposes, is not intended to be a formal floodline mapping study.

2.2.2 Hydrogeology

The goal of the Local SWS with respect to hydrogeology is to establish a geological conceptual model for the study area, determining the key characteristics of the bedrock and overburden systems, in addition to their functions in terms of controlling groundwater movement, availability, and quality in the subwatershed study area. An integral component of the hydrogeologic study is to assess the interactions between the groundwater system and the surface water system, and to determine the overall role or function of these interactions in an ecosystem context. It is also important to establish an understanding of the effects of future development on the local groundwater resource to assist in the need and implementation of measures to address overall water balance. This Local Subwatershed Study will build upon the understanding derived through the SABE Scoped Subwatershed Study. The incorporation of additional field monitoring using new data and refined modelling tools will provide additional spatial and temporal insights on the groundwater system. The refined analysis will be needed to achieve the primary objectives and extend the understanding of the following key matters:

- Presence of potentially significant local recharge areas, linked with local discharge,
- Shallow depth to groundwater,
- Locations of strong upward gradient,
- Groundwater/surface water interaction,
- Dewatering needs,
- Seepage areas and
- Existing tile drainage.

In order to accomplish the above, additional data made available over the course of the local study will need to be reviewed prior to finalizing the groundwater field program, as part of the Technical Work Plan. The groundwater field program, which is to be prepared by a qualified hydrogeologist, is expected to be

tailored to the characteristics and resources in the subject Subwatershed area and include but not be limited to the following: :

- Monitoring well installations with borehole logs,
- Drivepoint piezometers,
- Manual and continuous water level measurements,
- Groundwater and surface water chemistry,
- Hydraulic conductivity measurements and
- Spot baseflow measurements.

Depending upon the needs of the local study area, the refinement of the conceptual groundwater model provided in the Scoped Subwatershed Study may include the following:

- Refine geologic interpretation and hydrostratigraphy including surficial geology and hydrogeologic parameters.
- Refined understanding of observed shallow groundwater conditions as they relate to response to storm events, upward gradient and potential impacts on infrastructure.
- Refine mapping and interpretations groundwater discharge areas (subwatershed scale and reach scale).
- Refinements to understanding of groundwater flow including contributions to and from areas outside the subwatershed(s).

The baseline groundwater conceptual model and more detailed numerical groundwater model and analysis should incorporate observations and technical assessment from the hydrologic, terrestrial, aquatic and fluvial geomorphologic characterizations; these would include for example:

- Observations of seepage and discharge,
- Fish habitat,
- Phreatophytic observations,
- Streambed composition, and
- Low flow analysis and water quality.

In turn, the groundwater characterization should provide technical input to aid in confirming or guiding the characterization of the other component disciplines associated with the Local SWS.

Field observations for groundwater discharge must be coordinated at the outset of the field program. In order to efficiently use the field resources, observations from all disciplines should be captured, as it is expected that more field reconnaissance is carried out by terrestrial, aquatic and fluvial geomorphology in the course of their work.

The SABE Scoped Subwatershed Study provided an existing conditions water balance for the Focus Study Area utilizing the water balance parameters estimated from an Oak Ridges Moraine Groundwater Program model. This water balance methodology should be considered for the Local Subwatershed Study to provide a refined baseline water balance for comparative purposes in the Phase 2 Impact Assessment. This water balance, should be compared to the numerically-derived hydrological model water balance results described above.

2.2.3 Stream Morphology

Several objectives concerning aquatic habitat are intended to protect the morphological and fluvial character of the study area streams, with the intent (where feasible and required) to restore sinuosity, maintain physical habitat attributes (e.g., pools, riffles etc.), diversity and fluvial processes (e.g., bed load

transport, energy reduction through sinuosity, etc.), and to prevent increases in erosion and deposition through the maintenance of the hydrological regime.

The fluvial geomorphological assessments in support of Local Subwatershed Studies should meet or exceed the criteria outlined in Appendix B – Erosion and Geomorphology - of the TRCA Stormwater Management Criteria (2012).

Available data for the subwatershed and other existing sources, are to be reviewed to confirm the need for updating the existing information. Surface water feature types (watercourses and headwater drainage features) should be defined and identified appropriately as a reach delineation is performed. Reach delineations and feature types are to be confirmed and/or updated based on refined mapping and field investigations. A baseline morphologic assessment, according to stream characterization and flood /erosion considerations, is required including a detailed inventory of stream morphology observations. Through field-based observations of channel processes and stability, sensitive and/or representative sites are to be selected to complete detailed field surveys for an erosion threshold analysis at the systems scale.

An erosion potential analysis is to be conducted, based on the erosion data collected to understand the erosion processes and to identify areas which are prone to erosion, or where existing structures may be at risk. This will be completed though desktop and field analyses. The erosion potential analysis is also to determine the threshold flows for erosion at strategic points in the subwatershed for input to the hydrologic assessment to support the development of stormwater management guidance. Assessments will identify those sites most sensitive to erosion, with reasonable details covering the entire study area.

An erosion hazard delineation will be completed for each watercourse reach. The valley setting will determine whether a meander belt (unconfined systems), or a long-term stable top of slope (confined systems) is delineated. These assessments and application of setbacks will conform to Provincial Policy and applicable Conservation Authority Regulations.

In addition, the Study Team's Stream Morphologist, along with others on the Study Team including aquatic and terrestrial ecologists and surface and groundwater specialists, are to conduct an assessment of watercourse constraints (high, medium, or low constraints) to confirm or refine the results from the SABE, while also completing an assessment of the headwater drainage features (HDFs) in accordance with the application methodology presented in *Evaluation, Classification and Management of Headwater Drainage Features Guidelines (*TRCA/CVC 2014). The assessment will need to involve multi-seasonal field work (minimum two years) and an integrated interpretation of the data to establish current classification and future management (Phase 3). Any site-specific modifiers to the protocol will need to be vetted through the study's Technical Advisory Committee, prior to finalizing and proposing management recommendations. The classification and management of HDFs provides for detailed, field verified assessments to maintain overall system function and contributions, that previously may have been estimated through the application of legacy drainage density targets.

2.2.4 Aquatic Environment

The available background information on fish habitat in the study area, including information on permanence of flow and thermal regime, fish communities, fish species present, aquatic species at risk present, and benthic invertebrate communities should be acquired and used to characterize the aquatic environment. Some aspects of aquatic habitat, such as channel form and stability, headwater drainage feature classification, and riparian vegetation will be addressed by, or in conjunction with, other disciplines (e.g,, fluvial geomorphology, terrestrial ecology). Data gaps should be identified, if present. If data gaps exist that will limit the effectiveness of the subsequent phases of the Local SWS, field programs should be conducted to address these gaps. In some cases, data gaps may be addressed through baseline monitoring.

Baseline monitoring sites should be established and monitoring initiated. Baseline monitoring sites should be representative of larger reaches based on key parameters such as the fish community and thermal regime and on expected susceptibility to development impacts. Baseline monitoring methods should follow established protocols (e.g., Ontario Stream Assessment Protocol, Ontario Benthic Biomonitoring Protocol) and conform with the monitoring methodologies employed by TRCA and CVC, if possible, to maximize the utility of the data.

2.2.5 Terrestrial Environment

Landscape Scale Screening

To better understand the ecological context of the proposed development area, as part of the overall subwatershed, the Local Subwatershed Studies will need to review and build upon the direction and guidance in the Regional Scoped SWS. The purpose of this review will be to generate information on the ecological context of the Study Area, consider its position and role in the overall Natural Heritage System of the Scoped SWS and potential connectivity of the Study Area within the broader landscape. This Landscape Scale Screening supports identification of terrestrial and wetland habitat connectivity, potential wildlife movements, and the ecological context of the Secondary Plan Area, in relation to the surrounding environs to help understand, confirm and, where appropriate recommend additional linkages between the ecological systems and enhancement opportunities within the Secondary Plan area and with lands beyond their boundaries on the landscape. This screening will rely on existing desktop information sources.

Building on the approaches used in the SABE Scoped SWS, a variety of metrics should be used to quantify existing landscape-scale conditions and functions. Given the broader scale of interest for the Landscape Scale Screening, the objective should be to characterize patches of natural cover that occur within the subwatershed and the area surrounding the Secondary Plan Area being studied. Metrics should include, but are not limited to, those that quantify:

- The occurrence and diversity of vegetation community types within and across patches
- The size and shape characteristics of vegetation and habitat patches
- Landscape composition (i.e., matrix influences) influence on features and/or natural area patches
- Connectivity of patches (i.e., physical and functional connectivity)
- The occurrence and coverage of features and/or habitats that have policy implications (e.g. habitat for Species at Risk, species that are provincially rare, Significant Wildlife Habitat, etc.)

Detailed Assessment of Terrestrial Resources

A detailed assessment of terrestrial resources in the subwatershed shall be undertaken. The Natural Area Inventory information from the Conservation Authority and the Town of Caledon, should be consulted prior to the initiation of field work. The data collected shall be used to ensure that future land-use planning and proposed development is consistent with Section 2.1 of the Provincial Policy Statement, Region of Peel's Official Plan, and Future Caledon Official Plan

Depending on the vegetation community, Ecological Land Classification (ELC) results and habitats determined to be present in the study area, it may be appropriate to undertake targeted surveys for certain taxa or species, rather than rely solely on incidental observation. The Significant Wildlife Habitat Eco-Region 6E Criteria Schedules (MNR, 2015) should be used in conjunction with the Significant Wildlife Habitat Technical Guide (MNR, 2000) when assessing Significant Wildlife Habitat (SWH); this analysis should incorporate advancements in SWH analysis that are provided by stakeholders and agencies (e.g., watershed-scale SWH mapping).

Detailed field assessment of the subwatershed's terrestrial resources shall be provided to characterize the terrestrial environment and establish a baseline terrestrial environment for the Secondary Plan Area,

including the proximity to, and the degree of linkage with other habitats. When assessing species, status should include federal, provincial and local rankings. In addition, maps that identify natural heritage features and the results of the terrestrial investigations shall be provided. Features are to be assessed against criteria and direction outlined in the Scoped Subwatershed Study (Part A) to inform implementation of management guidelines for features and other components of the NHS (Parts B and C of the Scoped Subwatershed Study). Specific consideration shall be given to the location and relationship of features and areas within the NHS (e.g., occurring within the Province's NHS, linkage, proximity to Key Features, etc.). Opportunities for enhancement of the terrestrial environment shall build on those identified in the Scoped Subwatershed study, including confirmation of enhancement areas, objectives and targets.

Table 1: Terrestrial Environment Inventory Requirements

Biophysical Inventory	**Inventory Requirements**
Vegetation Community Identification	Use Ecological Land Classification to classify vegetation communities according to Lee et al. (1998).
Botanical Inventory	3 season survey (spring, summer and fall) to identify species.
Native / Invasive Flora Survey	Determine the percentage of Native and Invasive Species in surveyed vegetation communities.
Woodland Evaluations	Inventory within woodland areas should be sufficient to evaluate the significance of woodland features based on relevant criteria and policy definitions. Woodland boundaries should be field verified with responsible authorities where feasible.
Evaluation of Unclassified Wetlands	Document species records and wetland community types consistent with methods used in the Ontario Wetland Evaluation System (OWES).
Breeding Bird Surveys	2 surveys at least 10 days apart; the first between May 24th and June 16th and the second between June 17th and July 10th using 10-minute point counts and area searches. Breeding evidence by species should be recorded according to the Ontario Breeding Bird Atlas protocol.
Reptile Surveys	Use active searching or other commonly accepted. MNRF protocols/methods (April- July and Sept.-Oct.)
Amphibian Breeding Surveys	3 surveys between April and June corresponding to specific nighttime temperatures of >5°C, >10°C and >17°C, according to the Marsh Monitoring Protocol. Salamander surveys are required using active searching and should be completed in spring in appropriate ponds to determine the presence of salamander breeding areas.
Incidental Wildlife Observations	Incidental sightings of all wildlife (mammals, birds, butterflies, dragonflies, damselflies, amphibians, and reptiles) should be recorded during site investigations

Biophysical Inventory	Inventory Requirements
Species at Risk Screening	Screening should include results from all available sources, i.e. Natural Heritage Information Centre, wildlife atlases, MNRF Municipal List and Conservation Authority database.
Significant Wildlife Habitat Screening and Assessment	This assessment will include identifying candidate and confirmed Significant Wildlife Habitat and will utilize the MNR's *Significant Wildlife Habitat Technical Guide 2000)* and associated Criteria Schedules (MNRF 2015).

2.2.6 Surface Water Quality

Currently available background information shall be used to provide a preliminary understanding of the baseline water quality in the Secondary Plan Area and subwatershed. The existing datasets shall be reviewed to understand the existing water quality status to provide the baseline reference and identify any water quality concerns and constraints in the study area. Other potential studies, such as the Conservation Authority's Source Water Protection work will have some relevant data to contribute to this understanding. The study will also complete an inventory of existing SWM facilities within the subwatershed and the respective catchment areas, as the baseline reference for stormwater management in terms of water quantity/ quality control.

Local water quality monitoring data will need to be collected to support characterizing the area's surface water quality based upon the contributing land use, soils, and existing stormwater quality management practices during both wet (storm) and dry (baseflow) periods. Surface water quality monitoring at the same locations as the streamflow gauging is preferred in order to correlate the surface water quality with the study area hydrology. For all permanently flowing streams continuous monitoring of temperature, dissolved oxygen and turbidity is required between April and December for a minimum of two years. Surface water quality monitoring needs to be conducted between the months of April and December. Water quality grab sampling should be completed at each station for three (3) dry weather events and three (3) wet weather events, capturing at least one (1) wet and one (1) dry event for each season. Two (2) grab samples would be obtained for each wet weather event, with the objective of characterizing the surface water chemistry during the onset of the storm with the first sample and characterizing the surface water chemistry during the recession of the storm with the second sample. Grab sampling has been recommended over the use of automated samplers as prior experience with the use of automated samplers has demonstrated logistical issues related to the pre-determination of the sampling duration and interval, functional issues related to the "triggering" of the sampler and siting on a flat surface, as well as other issues related to protection against vandalism.

The grab samples for each wet weather and dry weather event may need to be analyzed for the following contaminants:

- Oil and Grease
- Total Phosphorus
- Anions (Nitrate, Nitrite, Phosphate, Chloride)
- Ammonia
- Total Kjeldahl Nitrogen (TKN)
- Conductivity
- Total Solids (TS)

- Total Suspended Solids (TSS)
- BOD_5
- Dissolved Oxygen
- pH/alkalinity
- Salinity
- Total Coliforms/Fecal Coliforms/E. Coli
- PAH
- Metals (Al, Sb, As, Ba, Be, B, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Mo, Ni, P, K, Se, Si, Ag, Na, Sr, Tl, Sn, Ti, W, U, V, Zn, Zr)
- Hardness as $CaCO_3$
- Turbidity

2.2.7 Phase 1 Report – Subwatershed Characterization and Integration

At the completion of Phase 1, the general characteristics of the study area subwatershed will have been identified and a clear understanding of the constraints and opportunities will have been developed. Constraints and opportunities mapping shall be developed, and a preliminary Natural Heritage System and Water Resource System should be identified, building upon that identified in the Region's Scoped SWS. The Phase 1 Report will establish the general characteristics of the subwatershed and the Secondary Plan Area, which will be the starting point from which the proposed land uses are to be developed. Of importance, the Phase 1 Characterization report should identify/delineate all key natural heritage and key hydrologic features and assess their status and significance tied to policy requirements, as a key deliverable and component of the constraint mapping.

The Phase 1 Report shall include:

- Summary of background literature and data reviewed;
- Subwatershed study area characterization including:
    - Climate, landform, geology, and soils
    - Hydrogeology/groundwater quantity and quality
    - Surface water quantity and quality
    - Stream geomorphology
    - Aquatic and Terrestrial ecosystems
    - Natural Environment Systems
- Integrated assessment of above identified features and functions to evaluate their significance
- Summary of the subwatershed study area major issues, concerns and constraints.

The constraint-based framework that is developed should be consistent and inclusive of all relevant federal, provincial, municipal, and CA policies and clearly identify areas that are protected from development and those that provide opportunities for development.

Note: It is expected that a Draft Table of Contents will be submitted for review and comment well in advance of the Draft Report submission.

2.3 Phase 2 – Subwatershed Impact Assessment

Based on the outcomes of Phase 1, including the review of background information sources and supplementary field work, Phase 2 will require an iterative assessment of the potential impacts of proposed

future land use changes on the natural environment and water-based system within the study area. The findings from the Phase 1 Characterization Study, completed by the various disciplines, along with the outcomes of the initial servicing and transportation needs, will be considered in an integrated manner in developing the preliminary preferred land use concept. A screening of the preliminary land use concepts is to be undertaken to determine a preliminary preferred concept(s) for the impact assessment in Phase 2.

The Phase 2 Impact Assessment will be completed concurrently to the other component studies such as the Transportation Master Plan, and Water/Wastewater Master Servicing Plan, which will also assess the impacts and requirements of the preliminary preferred land use concept.

The intent of Phase 2 is to assess the impacts of the preliminary preferred land use concept and inform the preliminary establishment of initial management strategies which:

- protect the critical elements and systems of the subwatershed and local drainage system;
- prevent environmental degradation;
- provide adequate flexibility for integration with adjacent development and redevelopment areas where present;
- assist in the establishment of open space linkages;
- address opportunities and constraints to development;
- provide a strategy to manage legacy impacts from existing land uses;
- Establish details on preliminary locations and areas for stormwater management (LID BMPs and end-of-pipe facilities);
- identify restoration and enhancement opportunities to meet system targets; and
- ensure that the land use plan meets the goals, objectives and targets of the Local Subwatershed Study.

In Phase 2, a detailed analysis shall be completed to assess the impacts of future land use changes in the Secondary Plan Area. Various options and practices for mitigating these impacts shall be reviewed and management strategies to create net benefit shall be advanced. As noted, the assessment of future land use changes is premised on an iterative approach whereby the feedback from the initial land use assessment shall be provided to the TAC and the Land Use Planning Team. The impact assessment shall also consider the impacts of climate change to the Natural Heritage System and Water Resources System, and the manner in which the proposed development and management plan may exacerbate or mitigate these impacts. In this regard, the impacts resulting from the proposed development and climate change are intended to be assessed in an integrated manner, rather than evaluating the impacts separately.

As part of the Humber River Watershed Study currently being undertaken the Toronto and Region Conservation Authority an assessment of the impacts of climate change has been undertaken by applying a quantitatively or qualitatively tiered approach assessing the impact of two climate scenarios. The two climate scenarios include a moderate emissions scenario (SSP2-4.5) and a very high emissions scenario (SSP5-8.5), which translate to approximately 2.7°C and 4.4°C of global warming by the end of the century, respectively (IPCC, 20211). Further information can be provided by the Town as part of inititing the Local

[1] IPCC, 2021: *Climate Change 2021: The Physical Science Basis. Contribution of Working Group I to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change* [Masson-Delmotte, V., P. Zhai, A. Pirani, S.L. Connors, C. Péan, S. Berger, N. Caud, Y. Chen, L. Goldfarb, M.I. Gomis, M. Huang, K. Leitzell, E. Lonnoy, J.B.R. Matthews, T.K. Maycock, T. Waterfield, O. Yelekçi, R. Yu, and B. Zhou (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA, 2391 pp. doi:10.1017/9781009157896.

Subwatershed Study process. It is the intent of the Local Subwatershed Study to apply a similar methodology. For the Local Subwatershed Studies being undertaken within the Humber River Watershed this will include downscaling TRCAs approach to the applicable study area. In this case, the work done by TRCA can provide supporting information. For the areas of SABE outside of the Humber River Watershed, the same approach should be taken but can not be supported by a similar broader scale analysis. Should the applicant prefer to devise a different approach this should be provided in the Technical Workplan and approved by the TAC. Please note that both CVC and TRCA have undertaken considerable climate change impact assessment work over the last decade which may provide valuable insights and considerations including TRCA's Vulnerability Assessment for Natural Systems in Peel Region.

The information from the Local SWS at this stage, will be considered along with the information from the concurrent transportation and servicing assessments to refine the preliminary preferred land use concept option(s) to eventually develop a preferred Secondary Plan land use.

The next iteration of impact assessment will be expected to be more scoped and focused on the specific changes to the land use and proposed environmental impact management strategies. Hence the scope outlined in the following sections will need to be conducted iteratively, whereby the initial assessment will inherently be more complex and detailed than the subsequent assessments. It is expected that the majority of the impacts and associated management and land use changes will have been captured as part of the initial iteration.

2.3.1 Hydrologic and Hydraulic Analysis

Hydrology:

A hydrologic analysis shall be conducted for the initial future development land use concept to determine post-development flows, hydrographs and water balance (integrated with the groundwater assessment).

The existing conditions hydrologic model(s) shall be modified to reflect post-development conditions and executed both continuously (using flow frequency analysis) and in event mode (using design storms) to generate peak flows for all events ranging from 2, 5, 10, 25, 50, 100 and 350 year, and the Regional Storm. As in the hydrologic analysis for existing conditions, the model results shall be reviewed by the TAC. The modelling will be used to determine the potential impacts of planned development on surface water, groundwater and water budgets. The Phase 2 Impact assessment hydrologic analysis will need to:

- Delineate discrete drainage areas based on potential future development;
- Calculate post-development flows for all event storms and the Regional Storm at predetermined locations, as per the discretized drainage area plan and model schematic diagram for the study area. The post-development flows shall be compared to existing flows for all storm events at the hydrologic nodes of interest. If the Conservation Authority has an approved hydrologic model which establishes unit release rates for development, then the results of the local modelling as part of this local study are to be validated against the existing guidance from local Conservation Authorities;
- Conduct the water budget assessment at the nodes of interest coordinated with the Groundwater modelling (see below).
- Identify constraints related to imperviousness and intensity of development. Assess the requirement and/or performance of proposed stormwater management facilities including the potential approach for Regulatory flow impact management per the details outlined in the Regional Scoped SWS;
- Assess the future discharge impacts (both flows (peak and volume) and erosion potential) on the local systems and the broader creek systems based upon the methods completed as part of the

Phase 1 hydrologic assessment (critical discharge, cumulative erosion index, and cumulative effective work), in coordination with the Study Team Stream Morphologist;

- Complete a climate change assessment consisting of evaluating the hydrologic impacts for projected design storms (i.e., 2080s IDF projections applying an RCP of 8.5 (Climate Trends and Future Projections in the Region of Peel, February 2016, TRCA et al.) and four (4) local historic storms, and the formative timeseries for four (4) formative storm events which occurred in other jurisdictions, as well as applying the Humber River Watershed climate change impact assessment methodology.
- Any preliminary stormwater management strategies, required to match the post-development flows to existing conditions, shall be identified.

The future development impact assessment should evaluate the impacts on both runoff volumes and peak flow rates, without and with mitigation. SWM practices will be required to be sized to a preliminary level of detail as related to managing the flows for 2 to 100 year event. Furthermore, impacts to Regulatory flows (Hurricane Hazel) will need to be assessed including consideration for Regional Storm management facilities. Guidance from the Scoped SWS, and a review of downstream FVAs and FVRs will need to be considered as part of this task. The hydrologic impact assessment should be integrated with the ecological component impact assessments and could include environmental flows analysis (eg. Indicators of Hydrologic Alteration).

Hydraulics:

The existing hydraulic conditions shall be reviewed in the context of the proposed development, with the land use changes, runoff increases and/or channel modifications. For those watercourses which may receive additional flow or perhaps require no controls, the study shall assess the impacts of the proposed development on watercourse water levels, flow velocities and water surface profiles for all storm events. Any potential erosion based upon critical erosion parameters (i.e., critical flow, critical shear, critical velocity) and/or flood risk concerns due to the proposed development shall be identified and compared to those identified under Phase 1, in consultation with stream morphologists. Again, for any watercourses where the flow regime would change, current flood line information shall be updated for post-development scenarios. The model results shall be reviewed and approved by the TAC.

The updated future land use flood lines (where changes are considered) are to be presented on the maps, with Regulatory Event flood line locations and cross sections identified with flood elevations. The level of service for hydraulic structures within the study area and the resulting overtopping depths, caused by the Regulatory Event, shall be assessed and documented on existing roads at all crossing structures. The floodplain maps should confirm the post-development flood levels are consistent with the current condition. Any changes in the flood inundation magnitude must be listed in inventory, with explanations of such changes.

For those watercourses which are anticipated to be altered (realigned and reconfigured) as part of the watercourse management plan, full hydraulic modelling is not required however the geometry (cross-section and longitudinal slope) needs to be checked using approved methods, and documented accordingly.

2.3.2 Hydrogeology

The hydrogeologic impact analysis shall examine the potential impact of future development land use changes on the groundwater systems, as well as the impacts of climate change. An impact analysis is to be completed to evaluate the sensitivity of the groundwater flow system to changes in land use resulting from a potential reduction in recharge. Impacts are expected to include a decrease in the water table elevation,

changes to stream flow (e.g., baseflow/groundwater discharge) and the potential degradation of groundwater quality. The hydrogeological component of the subwatershed investigation shall:

- Ensure the groundwater sensitive areas are recognized and protected from future urbanization and disturbances;
- Within the water balance assessment, update the overall groundwater budget model along with the surface water components for both existing and future scenarios; the water budget for the study area shall estimate precipitation, evapo-transpiration, runoff and infiltration, in addition to the groundwater recharge and discharge; and
- Consider any relevant needs within the Source Water Protection Plan.

The baseline water balance assessment described in Phase 1, should be updated to reflect changes in the various parameters related to development scenarios and climate change to consider potential impacts particularly to changes in groundwater recharge. As presented in Phase 1, the hydrological model is also to be used to carry out a water balance, and a comparison and differences rationalized. Integration with the hydrologic modelling and consistency of the various input parameters is required. It is understood the hydrologic and groundwater analysis may have some differences in their physical representation. These potential limitations should be reflected in the overall impact assessment.

The groundwater impact assessment should be integrated with the ecological component impact assessments, as it relates to the groundwater function for discharge or water table depth.

2.3.3 Stream Morphology and Erosion Analysis

Erosion hazards as mapped and confirmed through Phase 1 will need to be evaluated against the proposed land use plan to ensure that area watercourses which are proposed to be protected in-place are protected from encroachment by development, but also to ensure that risk to property and infrastructure is minimized. Where realignments are proposed, and provided there is sufficient rationale, realignment alternatives should be evaluated through an integrated process with other members of the Study Team to maintain flood conveyance, habitat requirements, and linkages. Any realignment will require that appropriate erosion hazards and setbacks are delineated and mapped.

The continuous erosion analysis (see hydrologic assessment above) for the existing conditions shall be updated with the future development scenarios for each of the critical parameters as described in Section 2.2.2 (critical discharge, cumulative erosion index, and cumulative effective work). Erosion potential for the study area shall be estimated by applying erosion thresholds to the existing channel / bank conditions using the post-development flows. This analysis is to be completed for the same cross sections that were assessed as part of the detailed geomorphological assessment. Appropriate mitigation measures shall be recommended for sections showing a significant increase in erosion potential. Erosion thresholds shall be used to establish discharge rates for stormwater management systems for the proposed development to ensure there is no increase in downstream erosion, by applying the methodology per the approved Technical Work Plan. This process will involve determination of the impacts without mitigation and then defining the necessary levels of control in an iterative manner to ensure downstream systems are appropriately protected.

Based on the results presented in Phase 1, identify which watercourses and headwater drainage features (HDFs) in the proposed development area are stable and have sufficient conveyance capacity, and which watercourses and headwater drainage features need restoration or alteration through the application of natural channel design principles. Stream morphology shall be assessed downstream of future development areas, with a focus on existing and potential erosion concerns. The extent to which downstream areas need to be assessed will be based on a sensitivity review by the Stream Morphologist

and the Hydrologist. Existing and future development impacts shall be evaluated with the development strategy indicated to limit the potential for negative impacts, while accommodating opportunities to restore and improve the existing watercourses or HDF condition. This approach will need to consider watercourse constraints (high or medium constraint, as per the SABE Scoped SWS) and HDF management classifications (protection, conservation, mitigation, no management) which determine the recommendations for those features which remain on the landscape (protected in-place or realigned) versus those (HDFs) which can be removed subject to appropriate management practices.

For areas of new development, the size of the channel block necessary to allow natural channel design to occur shall be determined. The sizing will include the erosion hazard, hydraulic criteria, fisheries setbacks and Natural Heritage System planning, and all buffers and setbacks. The natural channel design information on which the preliminary assessments are made, shall be documented for use at the next stages of planning (i.e., neighbourhood scale and/or tertiary plan). The natural channel design strategy must clearly define that all channel blocks can convey flows associated with the Regulatory event. As noted, the size determination should be made based on stream morphology, in addition to the considerations of aquatic and terrestrial features and setbacks. The determination of which watercourses and HDFs are to be maintained and considered for relocation or removal, needs approval of the TAC. The Conservation Authority and MNRF and others will ultimately need to be consulted for any recommended channel works.

2.3.4 Aquatic Environment

Assess the potential impacts of future land uses and climate change on the aquatic habitats through direct modifications (e.g., watercourse realignments, watercourses crossings) and impacts arising from changes to the hydrologic and hydrogeologic regimes and disruption to riparian vegetation. Opportunities for aquatic habitat enhancement by direct modification (e.g., eliminating barriers to fish migration) or enhancement of riparian buffers should also be considered. The effects of the anticipated changes to aquatic habitat on aquatic biota will need to be assessed.

Consideration is to be given to the presence and role of aquatic features and functions as part of the Natural Heritage System. This is to include, at a minimum, thermal regime, species diversity, water quality and quantity, and their long-term protection within the NHS to inform the assessment of impacts at the system scale.

2.3.5 Terrestrial Environment

The Study Team is to investigate potential land use impacts and climate change on terrestrial features, their associated functions and their role within the NHS based on the integrated system analysis completed in Phase 1. Appropriate mitigation strategies, including establishing appropriate buffers/setbacks, will be identified to protect the natural heritage features and functions from disturbance. In addition, linkages and enhancement areas identified through the Scoped SWS will need to be confirmed or refined according to the Scoped Subwatershed Study, and consideration for additional linkages (e.g., site scale linkages) is to be assessed. The function and conceptual location of linkages and enhancements shall be confirmed and defined through this phase. Linkages are important in reducing the potential for adverse impacts of habitat fragmentation on natural areas. The management strategies shall be documented to:

- Demonstrate protection of features retained as components of the NHS;
- Demonstrate efficacy of mitigation measures to protect features from impacts associated with proposed development.
- Clearly identify linkages and enhancements necessary to maintain system connectivity (and thus functions).
- Demonstrate how system targets are met.

Where a continuous ELC-defined vegetation community extends beyond the subject areas, the assessment shall generally address the entire community, including portions beyond the study area boundaries.

Additionally, the impact assessment should consider the degree to which any changes in the recommendations of the Scoped SWS could have potential for negative impacts. For example, this may include assessing changes to/removal of proposed linkages and/or enhancement areas, Alterations and impacts are to be considered at both the site-scale and system-scale.

In addition to management strategies that address land use impacts, consideration should also be given to impacts or opportunities associated with the active transportation network (particularly NHS/WRS crossings) and trail networks.

2.3.6 Surface Water Quality

The Study Team shall investigate potential land use impacts (i.e., increased imperviousness, land use type changes, etc.) and develop strategies to maintain or enhance in-stream water quality. Actions to address existing point and non-point sources of pollution potentially resulting in degraded water quality shall be developed. Within the New Urban Area and New Employment Area includes occupied and contributing Redside Dace habitat. To ensure sufficient thermal mitigation the impact assessment will need to consider the resulting thermal impact of the changing land uses.

Best Management Practices (BMPs) for urban stormwater management shall be recommended for all new developments to address stormwater quality. The proposed BMPs shall be in accordance with the requirements of the MECP and the Municipality including the Provincial guidance which focuses on a treatment train approach using LID BMPs.

2.3.7 Phase 2 Report – Impact Assessment

At the completion of the Phase 2 Impact Assessment the results of the iterative land use assessments will need to be prepared (i.e., one for each iteration) outlining the findings of the Impact Assessment. The Report shall be submitted to document the results of the impact assessment and the preliminary evaluation of the stormwater management options and recommended subwatershed management strategies, as they relate to the proposed development. The water (surface/ground) modelling input and output files shall be appended to this report. In addition, constraints and opportunities present in the study area, in terms of urban expansion, environment impacts and protection, shall be clearly documented with GIS maps for the associated locations.

Note: It is expected that a Draft Table of Contents will be submitted for review and comment well in advance of the Draft Report submission.

2.4 Phase 3 – Management, Implementation and Monitoring Plan

Phase 3 shall identify and set the framework for implementation and monitoring of the preferred subwatershed's management strategy building from the results of the iterative land use impact assessments, as part of Phase 2. Management recommendations are required to address the objectives identified in the Settlement Area Boundary Expansion Scoped Subwatershed Study, as well as the goals, objectives and targets from the parent watershed plan for the respective Secondary Plan Areas. A Management, Implementation, and Monitoring Plan shall be developed, which sets out the requirements for phasing, operation of facilities, and monitoring to ensure that the future development(s) are in compliance with the recommendations associated with the approved Local Subwatershed Study and Secondary Plan Policies. The direction provided in the Settlement Area Boundary Expansion Scoped Subwatershed Study - Part C: Implementation Plan (Wood et. al., January 2022) shall be used as the foundation for developing the monitoring plan to further refine, develop and identify management recommendations and requirements established through the detailed subwatershed studies. The Phase 3

work will be completed when a preferred land use plan has been determined based upon the findings and recommendations from Phase 1 and 2 of the detailed Subwatershed Study, considering the natural heritage system and water resource system direction and guidance, as well as the companion studies for transportation and servicing. The findings of this study will provide implementation recommendations and a technical framework for future infrastructure works and support the future development proposals in accordance with the approved Secondary Plan.

The stormwater management strategy will need to outline the siting for various components of the overall stormwater management plan, including key locations for facilities and general guidance for selecting green infrastructure and LID practices to manage the impacts to the Natural Heritage System and Water Resources System. The scope for additional studies will also need to be identified that are to be completed in support of future Tertiary Plans, Draft Plans of Subdivisions or Condominium, and Site Plans as required, to meet the objectives and targets of the Local Subwatershed Study. The Local Subwatershed Study is to identify preliminary locations for logical development blocks based on contiguous drainage sheds for consideration as part of future neighbourhood plans and/or tertiary plans. The scope for additional studies should include requirements to complete hydrologic and/or hydraulic modelling to verify the stormwater management criteria established in the higher-level studies based upon more detailed information, and revise/refine the criteria as required.

Management strategies are required that will consider and preserve the local and functional linkages of sensitive groundwater recharge and discharge areas, the potential groundwater quantity impacts on the private wells and groundwater quality degradation. Groundwater management strategies should include technical input (quantitative and qualitative) into the determination or refinement of hydrogeologically sensitive areas relating to both recharge and discharge, issues related to shallow water table or strong upward gradients, potential location and function of Stormwater Management facilities and other BMPs, as well as planning and policy recommendations for groundwater quantity and quality protection.

Watercourse management recommendations will be made at the reach scale and based on an integrated characterization of feature constraints, with site-specific opportunities presented as appropriate. Similarly, headwater drainage feature management recommendations will be based on the outcome of the Local Subwatershed Study, through the application of the TRCA/CVC (2014) guidelines with reach-scale recommendations. Deviations from the recommendations of the HDF guidelines will require that site modifiers are identified to justify changes in the management recommendation. Management recommendations and opportunities are to be developed in consultation with the Study's TAC, with agreement prior to study conclusion.

Managing features of the NHS will build on the proposed strategy outlined in the Scoped Subwatershed Study following the recommended Net Gain Mitigation Hierarchy approach. Specific management strategies and implementation recommendations should be prescribed for features/areas based on - avoidance (i.e., protect in-situ), minimize and mitigate, linkage, enhance, replicate, and compensate. The framework outlined in the Scoped SWS provides a detailed overview of the various management approaches. Avoidance is required and/or recommended for key features (e.g., protected by policy) and/or supporting features included in the NHS. Minimization of impacts and mitigation strategies should identify the required set of integrated approaches that reduce the degree of disturbance and impacts on natural features resulting from the proposed land use changes. Linkage recommendations should include specific design and implementation requirements to support connectivity at multiple scales (landscape, local, and site-scale). Enhancement recommendations should identify improvements to biological composition and function of areas in the context of the local landscape (e.g., habitat diversity / availability) or within the

system (e.g., under-represented habitats). Replication and/or compensation management strategies should be identified, as a last resort, for features that cannot be protected in-situ, but require inclusion in the NHS; sufficient guidance should be presented such that the success of the proposed replication and/or compensation can be assured based on appropriate site selection, restoration protocols, financing, and long-term ownership/management responsibility

Phase 3 shall outline the agencies/organizations that are responsible for carrying out the various recommendations and specify when in the development process the various recommendations need to be initiated. Phase 3 shall include:

- Timing and Phasing recommendations for the construction of any required facilities with respect to the future development; these recommendations will inherently need to consider the influence of other infrastructure as well;
- Asset Management Strategies such as:
    - A Phasing and Funding strategy for the construction and maintenance of the facilities;
    - Recommendations for future studies;
- An Adaptive Management and Monitoring Plan to monitor the subwatershed's response to land use change and suggest adaptive responses where impacts are being observed; the monitoring program will need to ensure compliance with the Local Subwatershed Study, and a strategy for corrective actions which may be necessary based on results of the monitoring program; it is notable that MECP is advancing industry guidance for broad-based community monitoring plans to support the Consolidated Linear Infrastructure ECA process; this guidance is expected in 2024 at which point the Municipality will have 2 years to prepare a plan for MECP review and approval; the Local SWS monitoring program should take this into consideration and align with its requirements accordingly;
- Assist Secondary Plan Team with developing policies for consideration in the Secondary Plan;
- Criteria and time frame for the review/update of the Local Subwatershed Plan;

The Management, Implementation, and Monitoring Plan shall also recommend the phasing of development, and provide guidance to address climate change considerations, particularly demonstrating compliance with the Town of Caledon's Community Climate Change Action Plan and the Peel Region's Climate Change Master Plan. This will permit changes to recommend mitigation measures and management strategies for future phases of the development, in the case where results of monitoring from the initial phases suggest that changes are warranted.

Note: It is expected that a Draft Table of Contents will be submitted for review and comment well in advance of the Draft Report submission.

Consultation and Engagement:

Fulsome consultation and engagement are the cornerstone to a successful land use study process. It is important to integrate and coordinate the consultation and engagement associated with the Secondary Plan and companion studies with the Local Subwatershed Study. The reason for this is to ensure that the public understands the relationship of environmental and water-based studies to the community planning associated with the Secondary Plan.

As noted, a TAC should be formed and at minimum three (3) meetings of the TAC will be required roughly aligned with each phase of the Subwatershed Study. A minimum of two (2) Public Information Centers (PICs) should be held and canagain aligned with those points of contact for the Secondary Plan.

Indigenous Peoples and Nations engagement is similarly important to consider throughout the land use planning process, hence it is again recommended that the local SWS work to align communications with Indigenous People and Nations in accordance with the protocols of the Province and the Town of Caledon, fully coordinated with the land use planning provisions.

Appendix A – Available Data and Data Sources

Table 1: Peel SABE Secondary Plan Area Screening (Water Resources and Natural Heritage System)

Proposed Secondary Plan Area	1. Are there any Secondary Plan boundaries that cross multiple watershed and subwatershed boundaries?	2. Given different sizes of Secondary Plan boundaries, are there any concerns, from a subcatchment/drainage perspective?	3. Any large contiguous natural heritage areas divided by Secondary Plan boundaries?	4. Are there important dependencies on contiguous Secondary Plan units that would need to be considered?	5. General Recommendations/Considerations of grouping Secondary Plan areas for detailed SWSs
A1	Two watershed and four subwatersheds. Overlap with Credit River includes Glen Williams to Norval, Huttonville, and Fletchers.	Subcatchments do not overlap with other Secondary Plan areas	No. Divisions are generally broken by the GTA West roadway.	Water resources are generally not dependent on other SPAs. However, being within two Conservation Authority jurisdictions and within the headwaters of four subwatersheds will result in some complexities related to downstream impacts. Natural Heritage System implications will largely relate to understanding cross watershed connectivity, and ensuring systems planning for linkages and enhancements within the Etobicoke Creek subwatershed are consistent with SPA B.	Consolidate SPAs A, B, C, and D (west and south) for west side SWS.
B1	Entirely within Etobicoke Creek.	Subcatchments overlap with Secondary Plan Area C.	Complex overlap with natural heritage and water resource system. Divides various Etobicoke Creek valley corridors. Northwest area splits two HDF corridors. Resulting in 10 +/- segregated tableland areas.	Water resources are contiguous with those in SPA A and C, as well SPA B has shared Subcatchments with the west section of SPA C. Natural Heritage System implications are complex with various linkage and enhancement considerations that will require systems coordination with SPA A and C.	Consolidate SPAs A, B, C, and D (west and south) for west side SWS.
B2, C3	Predominantly Etobicoke Creek: east section overlaps into West Humber River.	Subcatchments in west section overlap with SPA B, subcatchments in east section overlap with SPA D.	Generally supportable. Overlaps with four Etobicoke Creek valley corridors.	Water resources are generally not dependent on other SPAs. However, the west section of SPA C drains into SPA B, and the east section drains to SPA D (west). Natural Heritage System implications are complex with various linkage and enhancement considerations that will require systems planning with SPA B and D (west).	Consolidate SPAs A, B, C, and D (west and south) for west side SWS.
C2, C1, D1, E1	Overlaps Etobicoke Creek and West Humber River, and very small section of Spring Creek.	Subcatchments overlap with SPA C. East unit subcatchments overlap with SPA E.	West community area unit is most problematic, overlapping with a complex series of valley corridors. East section of west unit also crosses from Etobicoke Creek to West Humber River.	Water resources for SPA D (west) are contiguous with those in the east section of SPA C, and have overlapping subcatchments with the southeast section of SPA C. The northeast and southeast units are generally not dependent on other SPAs; however, the northeast unit does have overlapping subcatchments with SPA E. Natural Heritage System implications are complex for SPA D (west) with linkage and enhancement considerations with SPA B and SPA C. The northeast and southeast units are less complex.	Consolidate SPAs A, B, C, and D (west and south) for west side SWS. Consolidate SPAs D (east), E, F, and G for west central SWS.
D2, E2, E3, E4, E5	Entirely within West Humber River	West area subcatchments overlap with SPA D.	Secondary Plan area is divided by major valley; major features/corridors maintained.	Water resources for SPA E are generally not contiguous with other those in other SPAs. However, subcatchments within the west section of SPA E overlap with SPA D (northeast unit). Natural Heritage System linkage and enhancements are generally contained with the SPA. There are however important interfaces with major valley corridors that are shared with SPA F.	Consolidate E1, E2, E3, E4, D2, F1, F2, G1, and G2 G for west central SWS.
F1, F2	Entirely within West Humber River	East area subcatchments overlap with SPA G.	Major valley corridor splits Secondary Plan area.	Water resources in SPA F are generally not contiguous with other SPAs. There are however subcatchment overlaps with SPA E and SPA G. As well, drainage from much of the east section of SPA F flows into SPA G. Natural Heritage System linkage and enhancements are moderately complex. The west section of SPA F interfaces with the major valley corridor shared with SPA E; as well, localized linkages and enhancements along small watercourse systems are shared with SPA G.	Consolidate SPAs E1, E2, E3, E4, D2, F1, F2, G1, and G2 for west central SWS.
G1, G2	Entirely within West Humber	West area subcatchments overlap with SPA F2.	Significant headwater features	Water resources in west section of SPA G are contiguous and share subcatchments with SPA F2. The east section of SPA G is not contiguous with other SPAs.	Consolidate SPAs E1, E2, E3, E4, D2, F1, F2, G1, and G2 as part of west central SWS.

Proposed Secondary Plan Area	1. Are there any Secondary Plan boundaries that cross multiple watershed and subwatershed boundaries?	2. Given different sizes of Secondary Plan boundaries, are there any concerns, from a subcatchment/drainage perspective?	3. Any large contiguous natural heritage areas divided by Secondary Plan boundaries?	4. Are there important dependencies on contiguous Secondary Plan units that would need to be considered?	5. General Recommendations/Considerations of grouping Secondary Plan areas for detailed SWSs
				Natural Heritage System linkages and enhancements in the west section of SPA G are shared with SPA F. As well, on the east boundary interfaces with a major valley system shared with SPA H.	
H1	Entirely within West Humber River	North area subcatchments overlap with SPA H2 & H3.	No issues	Water resources in SPA H are contiguous with a complex network of watercourses and headwater drainage features in SPA I (which in turn is contiguous with water resources in SPA J). Natural Heritage System linkage and enhancements are contiguous with those proposed for SPA I. As well, the west boundary interfaces with a major valley system shared with SPA G.	Consolidate SPAs H2, H3, and H4 as part of east central SWS.
H2, H3	Entirely within West Humber River	North area subcatchments overlap with SPA H4. South area subcatchments overlap with SPA H1.	No major issues. Some HDF/valley corridors divided along boundary with SPA J.	Water resources in SPA H2 and H3 are contiguous with SPAs H1 and H4. Natural Heritage System linkage and enhancements are shared between SPAs J and H.	Consolidate SPAs H1, H2, H3 and H4 as part of east central SWS.
H4, Part of H3 (northest of King and Emil Kolb)	Overlaps West Humber and Main Humber Rivers	South area subcatchments overlap with SPA in the south section of H3 (south of King).	Some HDF/valley corridors divided along boundary with SPA H3. North boundary bisects supporting features.	Water resources in SPA J are not dependent on other SPAs, but are contiguous with SPA I, including shared subcatchment boundaries.	Consolidate SPAs H, I, and J as part of east central SWS.
I1, I2	Entirely within Main Humber River	Subcatchements do not overlap with other Secondary Plan areas	North edge of west unit bisects key/supporting feature. East unit bisects a variety of supporting features.	Water resources and Natural Heritage System linkage and enhancements are not contiguous with or directly linked to those in other SPAs.	SPA I1 and I2 can stand alone as a separate SWS.

Table 2: Subwatershed System Summary of Available Data

SUBWATERSHED GROUPING	SUBWATERSHED SYSTEMS	SECONDARY PLAN AREAS	HYDROLOGY	HYDRAULICS	HYDROGEOLOGY	STREAM MORPHOLOGY	TERRESTRIAL ECOLOGY	AQUATIC ECOLOGY
1	Credit River Systems	Partial A	**Streamflow Gauge:** *Station ID: EM7* • Data Type: flow and water level • Collection method: N/A • Period of record: 2012-2019 • Time step: 15 mins • Ownership: CVC *Station ID: EM8* • Data Type: flow and water level • Collection method: N/A • Period of record: 2012-2019 • Time step: 15 mins • Ownership: CVC *Station ID: Huttonville Creek at Lionhead Gold Course* • Data Type: water level and air temperature • Collection method: N/A • Period of record: 2013-2019 • Time step: 15 mins • Ownership: CVC	**Floodplain Mapping:** • Engineered flood lines beyond the SPA boundaries (west and downstream). **Hydraulic Model:** *Huttonville Creek* • Hydraulic Model: HEC-RAS • Year Completed: 2011 • Source: AMEC *Fletcher's Creek* • Hydraulic Model: HEC-RAS • Year Completed: 2011 • Source: AMEC	• Oak Ridges Moraine Groundwater Monitoring Program (ORMGP). • Provincial Water Well Information System. • Provincial Permit to Take Water Database. • Provincial Groundwater Monitoring Database. • Ontario Geological Survey Mapping.	**Watercourses:** • CVC rivers and streams • Scoped SWS for SABE (2021) – New mapping or geoprocessed base data – Region, updated to reflect 2018 air photo and based on LiDAR; Watercourse constraint rankings (high, medium, low constraint); Potential headwater drainage features delineated. **Erosion Hazard Mapping:** • TRCA (2019) meander belt width. • Scoped SWS for SABE (2021) - Meander belt widths updated accordingly.	**Existing Data** • Ecological Land Classification (TRCA and CVC) • GIS layers for each Conservation Authority jurisdiction that includes identification of vegetation community types • Various features layers (wetlands, woodlands, watercourses, ponds/lakes) • Flora/Fauna records (TRCA and CVC monitoring; NHIC, open source data) • Significant Wildlife Habitat (CVC – various types) • Climate Change Vulnerability data (TRCA - various types) **Scoped SWS Data**	**Thermal regime by stream segment:** • Identifies segments as warm, cool, or coldwater. • Available from Land Information Ontario (LIO). **Fish sampling data** • Includes sampling date, method, and species captured. • Available from Land Information Ontario (LIO). **Locations of Redside Dace (*Clinostomus elongatus*) occupied stream reaches and potential contributing habitat** • Occupied reaches present downstream.

SUBWATERSHED GROUPING	SUBWATERSHED SYSTEMS	SECONDARY PLAN AREAS	HYDROLOGY	HYDRAULICS	HYDROGEOLOGY	STREAM MORPHOLOGY	TERRESTRIAL ECOLOGY	AQUATIC ECOLOGY
			Station ID: Fletcher's Creek at Highway 7 • Data Type: water level • Collection method: N/A • Period of record: 2010-2019 • Time step: 15 mins • Ownership: CVC **Water Quality Station:** *Station ID: 06007600302* • Monitoring condition: unknown • Period of record: 1965-2016 • Ownership/provider: MECP *Station ID: EM7* • Monitoring condition: Wet and Dry weather condition • Period of record: 2013 May to October, 2015 June to August • Ownership/provider: CVC *Station ID: EM8* • Monitoring condition: Wet and Dry weather condition • Period of record: 2013 June to October, 2015 June to August • Ownership/provider: CVC *Station ID: 501070008 (Huttonville Creek at Lionhead Golf and Country Club)* • Monitoring condition: Unknown • Period of record: 2014 August to November, 2016 January to November, 2018 January to November • Ownership/provider: CVC **Hydrologic Models:** • Hydrologic Model: HSP-F • Type of Assessment: continuous simulation • Year Completed: 2011 • Source: Northwest Brampton Subwatershed Study, AMEC			**Erosion Threshold Sites** • North West Brampton Urban Development Area - Huttonville and Fletcher's Creeks Subwatershed Study (2010)– Existing erosion threshold site SW-4 downstream of FSA. • Scoped SWS for SABE (2021) - Proposed erosion threshold site within FSA **Orthoimagery/LiDAR** • Digital Air Photos of Southern Ontario (Hunter Corporation 1954) – are publicly available through University of Toronto • 2018 Orthophoto (Region) – Coverage of City of Brampton	• Landscape sensitivity L-rank (Woodlands, Wetlands, Meadows) • Landscape Connectivity • Vegetation community L-rank • Locally rare/sensitive species occurrence • Species of Conservation Concern/Species at Risk • Significant Wildlife Habitat • Valley crossing sensitivity • Natural Heritage System Components (Woodlands, Wetlands, Meadows, Valleylands, Watercourses, Savannah, Redside Dace) • Preliminary NHS • Preliminary NHS Linkages • Preliminary NHS Enhancements	
	Etobicoke Creek	Partial A1, B1, B2, C2 and C3	**Precipitation Gauge**: *Station ID: Sue Grange Farms (HY061)* • Data Type: precipitation (rain/snow) • Period of Record: 1981-2019 • Time Step: N/A	**Floodplain Mapping:** • Estimated floodplain. • Flood line from engineered flood study in south of watershed • Limited engineered floodplains, found in	• Oak Ridges Moraine Groundwater Monitoring Program (ORMGP). • Provincial Water Well Information System.	**Watercourses:** • TRCA watercourses, waterbodies, drainage, wetlands • Scoped SWS for SABE (2021) – New mapping or	**Existing Data** • Ecological Land Classification (TRCA and CVC) • GIS layers for each Conservation Authority jurisdiction that includes	**Thermal regime by stream segment:** • Identifies segments as warm, cool, or coldwater. • Available from Land Information Ontario (LIO).

SUBWATERSHED GROUPING	SUBWATERSHED SYSTEMS	SECONDARY PLAN AREAS	HYDROLOGY	HYDRAULICS	HYDROGEOLOGY	STREAM MORPHOLOGY	TERRESTRIAL ECOLOGY	AQUATIC ECOLOGY
			• Ownership: TRCA **Streamflow Gauge:** *Station ID: Etobicoke at 410 (HY101)* • Data Type: water level • Collection method: sensors • Period of record: 2017-2020 • Time step: N/A • Ownership: TRCA *Station ID: Etobicoke Creek at Brampton (02HC017)* • Data Type: flow and water level • Collection method: continuous recorder from 2003-2020 • Period of record: 1957-2020 (active) • Time step: 5 mins • Ownership: Environment Canada *Station ID: Etobicoke at Brampton* • Data Type: water level • Collection method: sensors • Period of record: 2007-2020 • Time step: N/A • Ownership: TRCA **Water Quality Station:** *Station ID: Mayfield-EC1* • Monitoring condition: unknown • Period of record: 2016-Jan to 2018-March • Ownership/provider: TRCA *Station ID: Mayfield-EC3* • Monitoring condition: unknown • Period of record: 2016-Jan to 2018-March • Ownership/provider: TRCA *Station ID: Mayfield-EC4* • Monitoring condition: unknown • Period of record: 2016-Jan to 2018-March • Ownership/provider: TRCA *Station ID: Mayfield RWMP* • Monitoring condition: unknown	southern and eastern region of watershed. **Hydraulic Model:** *Etobicoke Creek* • Hydraulic Model: HEC-RAS • Year Completed: 2016 • Source: Aquafor Beech Limited *Downtown Brampton SPA* • Hydraulic Model: HEC-RAS • Year Completed: 2014 • Source: Amec Foster Wheeler **Hydraulic Structures:** *Etobicoke Creek – 26.795* • HEC-RAS Coding: Bridge • Structure Type: Open bridge *Etobicoke Creek – 26.735* • HEC-RAS Coding: Multiple opening • Structure Type: Open bridge	• Provincial Permit to Take Water Database. • Provincial Groundwater Monitoring Database. • Ontario Geological Survey Mapping.	geoprocessed base data – Region, updated to reflect 2018 air photo and based on LiDAR; Watercourse constraint rankings (high, medium, low constraint); Potential headwater drainage features delineated. **Erosion Hazard Mapping:** • TRCA (2019) meander belt width and crest of slope mapping • Scoped SWS for SABE (2021) - Meander belt widths and erosion hazard limits updated accordingly. **Erosion Threshold Sites** • Mayfield West, Phase 2 Secondary Plan Comprehensive Environmental Impact Study and Management Plan, Part A (2014) - Existing erosion threshold sites within FSA • Scoped SWS for SABE (2021) - Proposed erosion threshold site within FSA **Orthoimagery/LiDAR** • Digital Air Photos of Southern Ontario (Hunter Corporation 1954) – are publicly available through University of Toronto • 2018 Orthophoto (Region) – Coverage of Town of Caledon • LiDAR (1m) and LiDAR derived contours (1m) **Regulation Limits** • TRCA 2019 Regulation Limits **Erosion Monitoring Locations**	identification of vegetation community types • Various features layers (wetlands, woodlands, watercourses, ponds/lakes) • Flora/Fauna records (TRCA and CVC monitoring; NHIC, open source data) • Significant Wildlife Habitat (CVC – various types) • Climate Change Vulnerability data (TRCA - various types) **Scoped SWS Data** • Landscape sensitivity L-rank (Woodlands, Wetlands, Meadows) • Landscape Connectivity • Vegetation community L-rank • Locally rare/sensitive species occurrence • Species of Conservation Concern/Species at Risk • Significant Wildlife Habitat • Valley crossing sensitivity • Natural Heritage System Components (Woodlands, Wetlands, Meadows, Valleylands, Watercourses, Savannah, Redside Dace) • Preliminary NHS • Preliminary NHS Linkages • Preliminary NHS Enhancements	**Fish sampling data** • Includes sampling date, method, and species captured. • Available from Land Information Ontario (LIO). **TRCA fish community monitoring data for Etobicoke Creek watershed:** • Includes sampling location, date, and number and total weight of fish captured, by species. • Provided to SABE team as Excel file by CVC – current to 2019. **TRCA benthic invertebrate monitoring data for Etobicoke Creek watershed.** • Includes sampling location, date, habitat type, and number of individuals in the sample, by family. • Provided to SABE team as Excel file by CVC – current to 2018.

SUBWATERSHED GROUPING	SUBWATERSHED SYSTEMS	SECONDARY PLAN AREAS	HYDROLOGY	HYDRAULICS	HYDROGEOLOGY	STREAM MORPHOLOGY	TERRESTRIAL ECOLOGY	AQUATIC ECOLOGY
			• Period of record: 2015-Jan to 2018-March • Ownership/provider: TRCA *Station ID: Mayfield-EC6* • Monitoring condition: unknown • Period of record: 2016-Jan to 2018-March • Ownership/provider: TRCA **Hydrologic Models:** • Hydrologic Model: Visual OTTHYMO Version 2.4 • Type of Assessment: Synthetic design storms • Year Completed: 2013 • Source: Etobicoke Creek Hydrology Update, MM Group Ltd			• TRCA - site locations, last year inspected, watercourse info, site status (active/inactive) and comments on site conditions/observations (details and completion of notes varies); downstream of FSA. **Stream Power Mapping** • Scoped SWS for SABE (2021) - LiDAR based		
2	West Humber (West)	D1, D2, E1, E2, E3, E4, E5, F1, F2, G1, G2	**Precipitation Gauge**: *Station ID: Toronto Pearson Airport (6152695)* • Data Type: precipitation (rain/snow), temperature (max/min), windspeed • Period of Record: 1953-2020 (active) • Time Step: hourly, daily, monthly • Ownership: Environment Canada *Station ID: Laidlaw Bus Depot/Tullamore (HY041)* • Data Type: precipitation (rain/snow) • Period of Record: 2013-2020 • Time Step: N/A • Ownership: TRCA **Streamflow Gauge:** *Station ID: Humber at Goreway* • Data Type: flow and water level • Collection method: sensors • Period of record: 2012-2020 • Time step: N/A • Ownership: TRCA *Station ID: West Humber at Hwy 7 (02HC031)* • Data Type: flow and water level	**Hydraulic Models:** *West Humber* • Hydraulic Model: HEC-RAS • Year Completed: 2017 • Source: Cole Engineering Ltd **Hydraulic Structures:** West Humber – 1380.675 • HEC-RAS Coding: Culvert • Structure Type: CSP Arch West Humber – 1355.061 • HEC-RAS Coding: Culvert • Structure Type: CSP Arch West Humber – 1353.874 • HEC-RAS Coding: Culvert • Structure Type: CSP Arch West Humber – 1304.84 • HEC-RAS Coding: Culvert • Structure Type: CSP Arch West Humber Crk – 679.4845 • HEC-RAS Coding: Bridge • Structure Type: Open Bridge with Pier **Floodplain Mapping:** • Estimated floodplain.	• Oak Ridges Moraine Groundwater Monitoring Program (ORMGP). • Provincial Water Well Information System. • Provincial Permit to Take Water Database. • Provincial Groundwater Monitoring Database. • Ontario Geological Survey Mapping.	**Watercourses:** • TRCA watercourses, waterbodies, drainage, wetlands • Scoped SWS for SABE (2021) – New mapping or geoprocessed base data – Region, updated to reflect 2018 air photo and based on LiDAR; Watercourse constraint rankings (high, medium, low constraint); Potential headwater drainage features delineated. **Erosion Hazard Mapping:** • TRCA (2019) meander belt width and crest of slope mapping • Scoped SWS for SABE (2021) - Meander belt widths and erosion hazard limits updated accordingly. **Erosion Threshold Sites** • Mayfield West, Phase 2 Secondary Plan Comprehensive	**Existing Data** • Ecological Land Classification (TRCA and CVC) • GIS layers for each Conservation Authority jurisdiction that includes identification of vegetation community types • Various features layers (wetlands, woodlands, watercourses, ponds/lakes) • Flora/Fauna records (TRCA and CVC monitoring; NHIC, open source data) • Significant Wildlife Habitat (CVC – various types) • Climate Change Vulnerability data (TRCA - various types) **Scoped SWS Data** • Landscape sensitivity L-rank (Woodlands, Wetlands, Meadows) • Landscape Connectivity • Vegetation community L-rank • Locally rare/sensitive species occurrence	**Thermal regime by stream segment:** • Identifies segments as warm, cool, or coldwater. • Available from Land Information Ontario (LIO). **Fish sampling data:** • Includes sampling date, method, and species captured. • Available from Land Information Ontario (LIO). **TRCA fish community monitoring data for Humber River watershed:** • Includes sampling location, date, and number and total weight of fish captured, by species. • Provided to SABE team as Excel file by CVC – current to 2019. **TRCA benthic invertebrate monitoring data for Humber River watershed.** • Includes sampling location, date, habitat type, and number of individuals in the sample, by family. • Provided to SABE team as Excel file by CVC – current to 2018. **Locations of Redside Dace (Clinostomus elongatus) occupied stream reaches and potential contributing habitat** • Occupied reaches provided in SABE report confirmed at the

SUBWATERSHED GROUPING	SUBWATERSHED SYSTEMS	SECONDARY PLAN AREAS	HYDROLOGY	HYDRAULICS	HYDROGEOLOGY	STREAM MORPHOLOGY	TERRESTRIAL ECOLOGY	AQUATIC ECOLOGY
			• Collection method: sensors • Period of record: 2007-2020 • Time step: N/A • Ownership: TRCA *Station ID: West Humber at Hwy 7* • Data Type: flow and water level • Collection method: continuous recorder from 2002-2020 • Period of record: 1965-2020 (active) • Time step: 5 mins (real time) • Ownership: Environment Canada **Water Quality Station:** *Station ID: 06008310302* • Monitoring condition: unknown • Period of record: 2002-2016 Ownership/provider: MECP	• Presence of engineered floodplains in southern region of watershed		Environmental Impact Study and Management Plan, Part A (2014) - Existing erosion threshold sites within FSA • Scoped SWS for SABE (2021) - Proposed erosion threshold sites within and downstream of FSA **Orthoimagery/LiDAR** • Digital Air Photos of Southern Ontario (Hunter Corporation 1954) – are publicly available through University of Toronto • 2018 Orthophoto (Region) – Coverage of Town of Caledon • LiDAR (1m) and LiDAR derived contours (1m) **Regulation Limits** • TRCA 2019 Regulation Limits **Erosion Monitoring Locations** • TRCA - site locations, last year inspected, watercourse info, site status (active/inactive) and comments on site conditions/observations (details and completion of notes varies); downstream of FSA. **Stream Power Mapping** • Scoped SWS for SABE (2021) - LiDAR based	• Species of Conservation Concern/Species at Risk • Significant Wildlife Habitat • Valley crossing sensitivity • Natural Heritage System Components (Woodlands, Wetlands, Meadows, Valleylands, Watercourses, Savannah, Redside Dace) • Preliminary NHS • Preliminary NHS Linkages • Preliminary NHS Enhancements	time by MOECP (current as of February 2021). • Potential contributing habitat in SABE report identified through desktop exercise.
3	West Humber (East)	H1, H2, H3, H4	**Streamflow Gauge:** *Station ID: Claireville Dan* • Data Type: water level • Collection method: sensors • Period of record: 2007-2020 • Time step: N/A • Ownership: TRCA	**Floodplain Mapping:** • Estimated floodplain. • Presence of engineered floodplains in southern region of watershed.	• Oak Ridges Moraine Groundwater Monitoring Program (ORMGP). • Provincial Water Well Information System. • Provincial Permit to Take Water Database.	**Watercourses:** • TRCA watercourses, waterbodies, drainage, wetlands • Scoped SWS for SABE (2021) – New mapping or geoprocessed base data – Region, updated to reflect	**Existing Data** • Ecological Land Classification (TRCA and CVC) • GIS layers for each Conservation Authority jurisdiction that includes identification of vegetation community types	**Thermal regime by stream segment:** • Identifies segments as warm, cool, or coldwater. • Available from Land Information Ontario (LIO). **Fish sampling data:** • Includes sampling date, method, and species captured. • Available from Land Information Ontario (LIO).

SUBWATERSHED GROUPING	SUBWATERSHED SYSTEMS	SECONDARY PLAN AREAS	HYDROLOGY	HYDRAULICS	HYDROGEOLOGY	STREAM MORPHOLOGY	TERRESTRIAL ECOLOGY	AQUATIC ECOLOGY
					• Provincial Groundwater Monitoring Database. • Ontario Geological Survey Mapping.	2018 air photo and based on LiDAR; Watercourse constraint rankings (high, medium, low constraint); Potential headwater drainage features delineated. **Erosion Hazard Mapping:** • TRCA (2019) meander belt width and crest of slope mapping • Scoped SWS for SABE (2021) - Meander belt widths and erosion hazard limits updated accordingly. **Erosion Threshold Sites** • Mayfield West, Phase 2 Secondary Plan Comprehensive Environmental Impact Study and Management Plan, Part A (2014) - Existing erosion threshold sites within FSA • Scoped SWS for SABE (2021) - Proposed erosion threshold sites within FSA **Orthoimagery/LiDAR** • Digital Air Photos of Southern Ontario (Hunter Corporation 1954) – are publicly available through University of Toronto • 2018 Orthophoto (Region) – Coverage of Town of Caledon • LiDAR (1m) and LiDAR derived contours (1m) **Regulation Limits** • TRCA 2019 Regulation Limits **Erosion Monitoring Locations** • TRCA - site locations, last year inspected, watercourse info, site status (active/inactive)	• Various features layers (wetlands, woodlands, watercourses, ponds/lakes) • Flora/Fauna records (TRCA and CVC monitoring; NHIC, open source data) • Significant Wildlife Habitat (CVC – various types) • Climate Change Vulnerability data (TRCA - various types) **Scoped SWS Data** • Landscape sensitivity L-rank (Woodlands, Wetlands, Meadows) • Landscape Connectivity • Vegetation community L-rank • Locally rare/sensitive species occurrence • Species of Conservation Concern/Species at Risk • Significant Wildlife Habitat • Valley crossing sensitivity • Natural Heritage System Components (Woodlands, Wetlands, Meadows, Valleylands, Watercourses, Savannah, Redside Dace) • Preliminary NHS • Preliminary NHS Linkages • Preliminary NHS Enhancements	**TRCA fish community monitoring data for Humber River watershed:** • Includes sampling location, date, and number and total weight of fish captured, by species. • Provided to SABE team as Excel file by CVC – current to 2019. **TRCA benthic invertebrate monitoring data for Humber River watershed.** • Includes sampling location, date, habitat type, and number of individuals in the sample, by family. • Provided to SABE team as Excel file by CVC – current to 2018. **Locations of Redside Dace (Clinostomus elongatus) occupied stream reaches and potential contributing habitat** • Occupied reaches provided in SABE report confirmed at the time by MOECP (current as of February 2021). • Potential contributing habitat in SABE report identified through desktop exercise

SUBWATERSHED GROUPING	SUBWATERSHED SYSTEMS	SECONDARY PLAN AREAS	HYDROLOGY	HYDRAULICS	HYDROGEOLOGY	STREAM MORPHOLOGY	TERRESTRIAL ECOLOGY	AQUATIC ECOLOGY
						and comments on site conditions/observations (details and completion of notes varies); downstream of FSA. **Stream Power Mapping** • Scoped SWS for SABE (2021) - LiDAR based		
4	Main Humber	I1, I2	**Streamflow Gauge:** *Station ID: Bolton McFall Dam (HY006)* • Data Type: flow and water level • Collection method: sensors • Period of record: 2007-2020 • Time step: N/A • Ownership: TRCA *Station ID: Cold Creek near Bolton (02HC023)* • Data Type: flow and water level • Collection method: continuous recorder from 2004-2020 • Period of record: 1962-2020 (active) • Time step: 5 mins (real time) • Ownership: Environment Canada **Hydrologic Models:** • Hydrologic Model: Visual OTTHYMO Version 4 • Type of Assessment: Synthetic design storms • Year Completed: 2015 • Source: Humber Hydrology Update Report, Civica	**Floodplain Mapping:** • Estimated floodplain. • Presence of engineered floodplains in southern region of watershed **Hydraulic Models:** *Bolton SPA* • Hydraulic Model: HEC-RAS • Year Completed: N/A • Source: N/A *Upper Main Humber* • Hydraulic Model: HEC-RAS • Year Completed: 2018 • Source: N/A *Lower Main Humber* • Hydraulic Model: HEC-RAS • Year Completed: 2017 • Source: Wood **Hydraulic Structures:** Lower Humber – 148.4585 • HEC-RAS Coding: Bridge • Structure Type: Open Bridge with Pier Lower Humber – 75.84924 • HEC-RAS Coding: Bridge • Structure Type: Open Bridge with Pier Lower Humber – 4264.165 • HEC-RAS Coding: Bridge • Structure Type: Open Span Bridge with Pier Lower Humber – 4201.13 • HEC-RAS Coding: Bridge	• Oak Ridges Moraine Groundwater Monitoring Program (ORMGP). • Provincial Water Well Information System. • Provincial Permit to Take Water Database. • Provincial Groundwater Monitoring Database. • Ontario Geological Survey Mapping.	**Watercourses:** • TRCA watercourses, waterbodies, drainage, wetlands • Scoped SWS for SABE (2021) – New mapping or geoprocessed base data – Region, updated to reflect 2018 air photo and based on LiDAR; Watercourse constraint rankings (high, medium, low constraint); Potential headwater drainage features delineated. **Erosion Hazard Mapping:** • TRCA (2019) meander belt width and crest of slope mapping • Scoped SWS for SABE (2021) - Meander belt widths and erosion hazard limits updated accordingly. **Erosion Threshold Sites** • Mayfield West, Phase 2 Secondary Plan Comprehensive Environmental Impact Study and Management Plan, Part A (2014) - Existing erosion threshold sites within FSA	**Existing Data** • Ecological Land Classification (TRCA and CVC) • GIS layers for each Conservation Authority jurisdiction that includes identification of vegetation community types • Various features layers (wetlands, woodlands, watercourses, ponds/lakes) • Flora/Fauna records (TRCA and CVC monitoring; NHIC, open source data) • Significant Wildlife Habitat (CVC – various types) • Climate Change Vulnerability data (TRCA - various types) **Scoped SWS Data** • Landscape sensitivity L-rank (Woodlands, Wetlands, Meadows) • Landscape Connectivity • Vegetation community L-rank • Locally rare/sensitive species occurrence • Species of Conservation Concern/Species at Risk • Significant Wildlife Habitat • Valley crossing sensitivity • Natural Heritage System Components (Woodlands,	**Thermal regime by stream segment:** • Identifies segments as warm, cool, or coldwater. • Available from Land Information Ontario (LIO). **Fish sampling data:** • Includes sampling date, method, and species captured. • Available from Land Information Ontario (LIO). **TRCA fish community monitoring data for Humber River watershed:** • Includes sampling location, date, and number and total weight of fish captured, by species. • Provided to SABE team as Excel file by CVC – current to 2019. **TRCA benthic invertebrate monitoring data for Humber River watershed.** • Includes sampling location, date, habitat type, and number of individuals in the sample, by family. • Provided to SABE team as Excel file by CVC – current to 2018. **Locations of Redside Dace (Clinostomus elongatus) occupied stream reaches and potential contributing habitat** • Occupied reaches provided in SABE report confirmed at the time by MOECP (current as of February 2021). • Potential contributing habitat in SABE report identified through desktop exercise

SUBWATERSHED GROUPING	SUBWATERSHED SYSTEMS	SECONDARY PLAN AREAS	HYDROLOGY	HYDRAULICS	HYDROGEOLOGY	STREAM MORPHOLOGY	TERRESTRIAL ECOLOGY	AQUATIC ECOLOGY
				• Structure Type: Open Span Bridge with Pier Lower Humber – 4098.95 • HEC-RAS Coding: Bridge • Structure Type: Open Span Bridge with Pier		• Scoped SWS for SABE (2021) - Proposed erosion threshold sites within FSA **<u>Orthoimagery/LiDAR</u>** • Digital Air Photos of Southern Ontario (Hunter Corporation 1954) – are publicly available through University of Toronto • 2018 Orthophoto (Region) – Coverage of Town of Caledon • LiDAR (1m) and LiDAR derived contours (1m) **<u>Regulation Limits</u>** • TRCA 2019 Regulation Limits **<u>Erosion Monitoring Locations</u>** • TRCA - site locations, last year inspected, watercourse info, site status (active/inactive) and comments on site conditions/observations (details and completion of notes varies); within and downstream of FSA. **<u>Stream Power Mapping</u>** • Scoped SWS for SABE (2021) - LiDAR based	Wetlands, Meadows, Valleylands, Watercourses, Savannah, Redside Dace) • Preliminary NHS • Preliminary NHS Linkages • Preliminary NHS Enhancements	

Table 3: Secondary Plan Area Summary of Available Data

SUBWATERSHED GROUPING	HYDROLOGY	HYDRAULICS	HYDROGEOLOGY	STREAM MORPHOLOGY	TERRESTRIAL ECOLOGY	AQUATIC ECOLOGY
1	• No existing monitoring stations within SPA.	• Estimated floodplain throughout SPA.	• See Table 4	• See Table 4; one potential erosion threshold site.	• See Table 4	• Thermal regime by stream segment • Fish sampling data • Redside Dace (*Clinostomus elongatus*) occupied stream reaches present downstream in Fletchers Creek watershed.

SUBWATERSHED GROUPING	HYDROLOGY	HYDRAULICS	HYDROGEOLOGY	STREAM MORPHOLOGY	TERRESTRIAL ECOLOGY	AQUATIC ECOLOGY
	• No existing monitoring stations within SPA.	• Estimated floodplain throughout SPA.	• See Table 4	• See Table 4; no potential erosion threshold sites.	• See Table 4	• Thermal regime by stream segment • Fish sampling data • TRCA fish community monitoring data • TRCA benthic invertebrate monitoring data
	• No existing monitoring stations within SPA.	• Estimated floodplain throughout SPA.	• See Table 4	• See Table 4; no potential erosion threshold sites.	• See Table 4	• Thermal regime by stream segment • Fish sampling data
	• One (1) water quality monitoring location.	• Estimated floodplain throughout SPA.	• See Table 4	• See Table 4; no potential erosion threshold sites.	• See Table 4	• Thermal regime by stream segment • Fish sampling data • TRCA fish community monitoring data • TRCA benthic invertebrate monitoring data
2	• No existing monitoring stations within SPA.	• Engineered and Estimated floodplain along the edges of the SPA.	• See Table 4	• See Table 4; no potential erosion threshold sites.	• See Table 4	• Thermal regime by stream segment • Fish sampling data • Locations of Redside Dace (Clinostomus elongatus) occupied stream reaches and potential contributing habitat • TRCA fish community monitoring data • TRCA benthic invertebrate monitoring data
	• No existing monitoring stations within SPA.	• Engineered flood lines in the northeast side and estimated floodplain in the west of SPA.	• See Table 4	• See Table 4; 5 potential erosion threshold sites downstream of SPA.	• See Table 4.1	• Thermal regime by stream segment • Fish sampling data • Locations of Redside Dace (Clinostomus elongatus) occupied stream reaches and potential contributing habitat • TRCA benthic invertebrate monitoring data
	• No existing monitoring stations within SPA.	• Engineered flood lines in the center of SPA and estimated floodplain on the east and west of area.	• See Table 4	• See Table 4; one potential erosion threshold site within SPA and one downstream.	• See Table 4.1	• Thermal regime by stream segment • Fish sampling data • Locations of Redside Dace (Clinostomus elongatus) occupied stream reaches and potential contributing habitat
	• No existing monitoring stations within SPA.	• Limited engineered flood lines in the east of the SPA and estimated floodplain.	• See Table 4	• See Table 4; one potential erosion threshold site within SPA and two downstream.	• See Table 4	• Thermal regime by stream segment • Fish sampling data • Locations of Redside Dace (Clinostomus elongatus)

SUBWATERSHED GROUPING	HYDROLOGY	HYDRAULICS	HYDROGEOLOGY	STREAM MORPHOLOGY	TERRESTRIAL ECOLOGY	AQUATIC ECOLOGY
						occupied stream reaches and potential contributing habitat
3	• No existing monitoring stations within SPA.	• Engineered flood lines in the center of SPA.	• See Table 4	• See Table 4; one potential erosion threshold site downstream of SPA.	• See Table 4 •	• Thermal regime by stream segment • Fish sampling data • Locations of Redside Dace (Clinostomus elongatus) occupied stream reaches and potential contributing habitat
	• No existing monitoring stations within SPA.	• Estimated floodplain in the north side of SPA.	• See Table 4	• See Table 4; three potential erosion threshold sites downstream of SPA.	• See Table 4 •	• Thermal regime by stream segment • Fish sampling data • Locations of Redside Dace (Clinostomus elongatus) occupied stream reaches and potential contributing habitat
	• No existing monitoring stations within SPA.	• Estimated floodplain in the west of SPA.	• See Table 4	• See Table 4; no potential erosion threshold sites.	• See Table 4 •	• Thermal regime by stream segment • Fish sampling data • Locations of Redside Dace (Clinostomus elongatus) occupied stream reaches and potential contributing habitat
4	• No existing monitoring stations within SPA.	• Estimated floodplain in north of SPA.	• See Table 4	• See Table 4; five potential erosion threshold sites downstream of SPA.	• See Table 4 •	• Thermal regime by stream segment • Fish sampling data • Locations of Redside Dace (Clinostomus elongatus) occupied stream reaches and potential contributing habitat • TRCA fish community monitoring data • TRCA benthic invertebrate monitoring data

Table 4: Subwatershed Systems - Future Data Requirements

SUBWATERSHED GROUPING	SUBWATERSHED SYSTEM	SECONDARY PLAN AREAS	HYDROLOGY	HYDRAULICS	HYDROGEOLOGY	STREAM MORPHOLOGY	TERRESTRIAL ECOLOGY	AQUATIC ECOLOGY
1	Credit River Systems	Partial A1	• No additional monitoring stations required.	• No Credit River System Floodplains within SPA A.	• Monitoring well installations with borehole logs. • Drivepoint piezometers. • Manual and continuous water level measurements. • Groundwater and surface water chemistry. • Hydraulic conductivity measurements. • Spot baseflow measurements. • Seeps and springs observations.	• Updated watercourse mapping based on recent orthophoto • Rapid Geomorphic Assessment • Seasonally Based Headwater Drainage Features Assessments • Confirm reach delineation, feature types, and erosion hazards • Detailed surveys for erosion thresholds • Confirm thresholds for MEC-R1, MEC-R2, MEC-R3, MEC-R8, MEC-R4(2), SW-4, and EM-10	• Incorporate any new available background data • Ecological Land Classification – desktop analysis and field verification for all vegetated features • Botanical inventories – three season inventories for all vegetated features • Wildlife Inventories – scoped based on features type and potential for Significant Wildlife Habitat • Validate Connectivity model – where appropriate, rapid assessment of linkage potential in high connectivity areas • Feature boundary delineation – where appropriate, field validated feature boundaries	• Site-specific determination of location and extent of Redside Dace contributing habitat.
	Etobicoke Creek	Partial A1, B1, B2, B3, C1, C2, and C3	**Precipitation Gauge**: • Two (2) Rainfall Gauges **Streamflow Gauge:** • Six (6) Stream Flow Gauges **Water Quality Station:** • Four (4) Water Quality Stations	**Hydraulic Structure Inventory:** • **Estimated Floodplain** = Twenty-one (21) hydraulic structures requiring topographic survey • **Engineered Floodplain** = Four (4) hydraulic structure requiring field verification	• Monitoring well installations with borehole logs. • Drivepoint piezometers. • Manual and continuous water level measurements. • Groundwater and surface water chemistry. • Hydraulic conductivity measurements. • Spot baseflow measurements. • Seeps and springs observations.	• Updated watercourse mapping based on recent orthophoto • Rapid Geomorphic Assessment • Seasonally Based Headwater Drainage Features Assessments • Confirm reach delineation, feature types, and erosion hazards • Detailed surveys for erosion thresholds	• Incorporate any new available background data • Ecological Land Classification – desktop analysis and field verification for all vegetated features • Botanical inventories – three season inventories for all vegetated features • Wildlife Inventories – scoped based on features type and potential for Significant Wildlife Habitat • Validate Connectivity model – where appropriate, rapid assessment of linkage potential in high connectivity areas • Feature boundary delineation – where appropriate, field validated feature boundaries	• Fish community information where sufficient information is not available (to be determined). • Fish and benthic invertebrate monitoring stations where existing monitoring network is inadequate (to be determined)

2	West Humber (West)	D1, D2, E1, E2, E3, E4, E5, F1, F2, G1, and G2	**Precipitation Gauge**: • Three (3) Rainfall Gauges **Streamflow Gauge:** • Thirteen (13) Stream Flow Gauges **Water Quality Station:** • Seven (7) Water Quality Stations	**Hydraulic Structure Inventory:** • **Estimated Floodplain =** Sixteen (16) hydraulic structures requiring topographic survey • **Engineered Floodplain** = Fourteen (14) hydraulic structure requiring field verification	• Monitoring well installations with borehole logs. • Drivepoint piezometers. • Manual and continuous water level measurements. • Groundwater and surface water chemistry. • Hydraulic conductivity measurements. • Spot baseflow measurements. • Seeps and springs observations	• Updated watercourse mapping based on recent orthophoto • Rapid Geomorphic Assessment • Seasonally Based Headwater Drainage Features Assessments • Confirm reach delineation, feature types, and erosion hazards • Detailed surveys for erosion thresholds	• Incorporate any new available background data • Ecological Land Classification – desktop analysis and field verification for all vegetated features • Botanical inventories – three season inventories for all vegetated features • Wildlife Inventories – scoped based on features type and potential for Significant Wildlife Habitat • Validate Connectivity model – where appropriate, rapid assessment of linkage potential in high connectivity areas • Feature boundary delineation – where appropriate, field validated feature boundaries	• Fish community information where sufficient information is not available (to be determined). • Fish and benthic invertebrate monitoring stations where existing monitoring network is inadequate (to be determined) • Site-specific determination of location and extent of Redside Dace contributing habitat.
3	West Humber (East)	H1, H2, H3, H4	**Precipitation Gauge**: • One (1) Rainfall Gauge **Streamflow Gauge:** • Five (5) Stream Flow Gauges **Water Quality Station:** • Two (2) Water Quality Stations	**Hydraulic Structure Inventory:** • **Estimated Floodplain =** Seven (7) hydraulic structures requiring topographic survey • **Engineered Floodplain** = Seven (7) hydraulic structure requiring field verification	• Monitoring well installations with borehole logs. • Drivepoint piezometers. • Manual and continuous water level measurements. • Groundwater and surface water chemistry. • Hydraulic conductivity measurements. • Spot baseflow measurements. • Seeps and springs observations.	• Updated watercourse mapping based on recent orthophoto • Rapid Geomorphic Assessment • Seasonally Based Headwater Drainage Features Assessments • Confirm reach delineation, feature types, and erosion hazards • Detailed surveys for erosion thresholds	• Incorporate any new available background data • Ecological Land Classification – desktop analysis and field verification for all vegetated features • Botanical inventories – three season inventories for all vegetated features • Wildlife Inventories – scoped based on features type and potential for Significant Wildlife Habitat • Validate Connectivity model – where appropriate, rapid assessment of linkage potential in high connectivity areas • Feature boundary delineation – where appropriate, field validated feature boundaries	• Fish community information where sufficient information is not available (to be determined). • Fish and benthic invertebrate monitoring stations where existing monitoring network is inadequate (to be determined) • Site-specific determination of location and extent of Redside Dace contributing habitat.
4	Main Humber	I1 and I2	**Precipitation Gauge**: • One (1) Rainfall Gauge **Streamflow Gauge:**	**Hydraulic Structure Inventory:** • **Estimated Floodplain =** Four (4) hydraulic	• Monitoring well installations with borehole logs. • Drivepoint piezometers.	• Updated watercourse mapping based on recent orthophoto	• Incorporate any new available background data	• Fish community information where sufficient information is not available (to be determined).

			• One (1) Stream Flow Gauge	structures requiring topographic survey • **Engineered Floodplain** = Two (2) hydraulic structure requiring field verification	• Manual and continuous water level measurements. • Groundwater and surface water chemistry. • Hydraulic conductivity measurements. • Spot baseflow measurements. • Seeps and springs observations.	• Rapid Geomorphic Assessment • Seasonally Based Headwater Drainage Features Assessments • Confirm reach delineation, feature types, and erosion hazards • Detailed surveys for erosion thresholds	• Ecological Land Classification – desktop analysis and field verification for all vegetated features • Botanical inventories – three season inventories for all vegetated features • Wildlife Inventories – scoped based on features type and potential for Significant Wildlife Habitat • Validate Connectivity model – where appropriate, rapid assessment of linkage potential in high connectivity areas • Feature boundary delineation – where appropriate, field validated feature boundaries	• Fish and benthic invertebrate monitoring stations where existing monitoring network is inadequate (to be determined) • Site-specific determination of location and extent of Redside Dace contributing habitat.

Table 5: Secondary Plan Area Future Data Requirements

SUBWATERSHED GROUPING	HYDROLOGY	HYDRAULICS	HYDROGEOLOGY	STREAM MORPHOLOGY	TERRESTRIAL ECOLOGY	AQUATIC ECOLOGY
1	**Precipitation Gauge**: • One (1) Rainfall Gauge **Streamflow Gauge:** • One (1) Stream Flow Gauge **Water Quality Station:** • One (1) Water Quality Station	• **Estimated Floodplain** = Four (4) structures requiring detailed topographic survey.	• See Table 4	• See Table 4 • Confirm erosion thresholds for sites MEC-R1, MEC-R2, MEC-R3, MEC-R4(2), SW-4, and EM-10	• Incorporate any new available background data • Ecological Land Classification – desktop analysis and field verification for all vegetated features • Botanical inventories – three season inventories for all vegetated features • Wildlife Inventories – scoped based on features type and potential for Significant Wildlife Habitat • Validate Connectivity model – where appropriate, rapid assessment of linkage potential in high connectivity areas • Feature boundary delineation – where appropriate, field validated feature boundaries	• Fish community information where sufficient information is not available (to be determined). • Fish and benthic invertebrate monitoring stations where existing monitoring network is inadequate (to be determined) • Site-specific determination of location and extent of Redside Dace contributing habitat (Credit River watershed only).
	Streamflow Gauge: • Three (3) Stream Flow Gauges **Water Quality Station:** • Three (3) Water Quality Stations	• **Estimated Floodplain** = Ten (10) structures requiring detailed topographic survey.	• See Table 4	• See Table 4 • Confirm erosion thresholds for sites MEC-R1, MEC-R2, MEC-R3, MEC-R4(2), SW-4, and EM-10	• Incorporate any new available background data • Ecological Land Classification – desktop analysis and field verification for all vegetated features • Botanical inventories – three season inventories for all vegetated features • Wildlife Inventories – scoped based on features type and potential for Significant Wildlife Habitat • Validate Connectivity model – where appropriate, rapid assessment of linkage potential in high connectivity areas • Feature boundary delineation – where appropriate, field validated feature boundaries	• Fish community information where sufficient information is not available (to be determined). • Fish and benthic invertebrate monitoring stations where existing monitoring network is inadequate (to be determined)
	Precipitation Gauge: • One (1) Rainfall Gauge (South) **Other Streamflow / Water Quality:**	• **Estimated Floodplain** = Five (5) structures requiring detailed topographic survey.	• See Table 4	• See Table 4 • Confirm erosion thresholds for sites MEC-R1, and MEC-R8	• Incorporate any new available background data	• Fish community information where sufficient information is not available (to be determined).

SUBWATERSHED GROUPING	HYDROLOGY	HYDRAULICS	HYDROGEOLOGY	STREAM MORPHOLOGY	TERRESTRIAL ECOLOGY	AQUATIC ECOLOGY
	• Gauges / Stations installed downstream in SPA B & D.	• **Engineered Floodplain =** Four (4) structures requiring field verification.			• Ecological Land Classification – desktop analysis and field verification for all vegetated features • Botanical inventories – three season inventories for all vegetated features • Wildlife Inventories – scoped based on features type and potential for Significant Wildlife Habitat • Validate Connectivity model – where appropriate, rapid assessment of linkage potential in high connectivity areas • Feature boundary delineation – where appropriate, field validated feature boundaries	• Fish and benthic invertebrate monitoring stations where existing monitoring network is inadequate (to be determined.
	Precipitation Gauge: • One (1) Rainfall Gauge (North) **Streamflow Gauge:** • Two (2) Stream Flow Gauges **Other Streamflow / Water Quality:** • Additional Gauges / Stations installed downstream in SPA B.	• **Estimated Floodplain =** Three (3) structures requiring field verification.	• See Table 4	• See Table 4 • Confirm erosion thresholds for sites MEC-R1, and MEC-R8	• Incorporate any new available background data • Ecological Land Classification – desktop analysis and field verification for all vegetated features • Botanical inventories – three season inventories for all vegetated features • Wildlife Inventories – scoped based on features type and potential for Significant Wildlife Habitat • Validate Connectivity model – where appropriate, rapid assessment of linkage potential in high connectivity areas • Feature boundary delineation – where appropriate, field validated feature boundaries	• Fish community information where sufficient information is not available (to be determined). • Fish and benthic invertebrate monitoring stations where existing monitoring network is inadequate (to be determined).
2	**Streamflow Gauge:** • One (1) Stream Flow Gauge **Water Quality Station:** • One (1) Water Quality Station	• **Engineered Floodplain =** Two (2) structures requiring field verification.	• See Table 4	• Updated watercourse mapping based on recent orthophoto • Rapid Geomorphic Assessment • Seasonally Based Headwater Drainage Features Assessments • Confirm reach delineation, feature types, and erosion hazards	• Incorporate any new available background data • Ecological Land Classification – desktop analysis and field verification for all vegetated features	• Fish community information where sufficient information is not available (to be determined). • Fish and benthic invertebrate monitoring stations where existing monitoring network is inadequate (to be determined)

SUBWATERSHED GROUPING	HYDROLOGY	HYDRAULICS	HYDROGEOLOGY	STREAM MORPHOLOGY	TERRESTRIAL ECOLOGY	AQUATIC ECOLOGY
				• Detailed surveys for erosion thresholds	• Botanical inventories – three season inventories for all vegetated features • Wildlife Inventories – scoped based on features type and potential for Significant Wildlife Habitat • Validate Connectivity model – where appropriate, rapid assessment of linkage potential in high connectivity areas • Feature boundary delineation – where appropriate, field validated feature boundaries	• Site-specific determination of location and extent of Redside Dace contributing habitat.
	Precipitation Gauge: • One (1) Rainfall Gauge **Streamflow Gauge:** • Six (6) Stream Flow Gauges **Water Quality Station:** • Four (4) Water Quality Stations	• **Estimated Floodplain** = Five (5) structures requiring detailed topographic survey. • **Engineered Floodplain =** Nine (9) structures requiring field verification.	• See Table 4	• Updated watercourse mapping based on recent orthophoto • Rapid Geomorphic Assessment • Seasonally Based Headwater Drainage Features Assessments • Confirm reach delineation, feature types, and erosion hazards • Detailed surveys for erosion thresholds	• Incorporate any new available background data • Ecological Land Classification – desktop analysis and field verification for all vegetated features • Botanical inventories – three season inventories for all vegetated features • Wildlife Inventories – scoped based on features type and potential for Significant Wildlife Habitat • Validate Connectivity model – where appropriate, rapid assessment of linkage potential in high connectivity areas • Feature boundary delineation – where appropriate, field validated feature boundaries	• Fish community information where sufficient information is not available (to be determined). • Fish and benthic invertebrate monitoring stations where existing monitoring network is inadequate (to be determined) • Site-specific determination of location and extent of Redside Dace contributing habitat.
	Precipitation Gauge: • One (1) Rainfall Gauge **Streamflow Gauge:** • Six (6) Stream Flow Gauges **Water Quality Station:** • Three (3) Water Quality Stations	• **Estimated Floodplain** = Five (5) structures requiring detailed topographic survey. • **Engineered Floodplain =** Five (5) structures requiring field verification.	• See Table 4	• Updated watercourse mapping based on recent orthophoto • Rapid Geomorphic Assessment • Seasonally Based Headwater Drainage Features Assessments • Confirm reach delineation, feature types, and erosion hazards • Detailed surveys for erosion thresholds .	• Incorporate any new available background data • Ecological Land Classification – desktop analysis and field verification for all vegetated features • Botanical inventories – three season inventories for all vegetated features • Wildlife Inventories – scoped based on features type and	• Fish community information where sufficient information is not available (to be determined). • Fish and benthic invertebrate monitoring stations where existing monitoring network is inadequate (to be determined) • Site-specific determination of location and extent of Redside Dace contributing habitat.

SUBWATERSHED GROUPING	HYDROLOGY	HYDRAULICS	HYDROGEOLOGY	STREAM MORPHOLOGY	TERRESTRIAL ECOLOGY	AQUATIC ECOLOGY
					potential for Significant Wildlife Habitat • Validate Connectivity model – where appropriate, rapid assessment of linkage potential in high connectivity areas • Feature boundary delineation – where appropriate, field validated feature boundaries	
	Precipitation Gauge: • One (1) Rainfall Gauge **Streamflow Gauge:** • Four (4) Stream Flow Gauges **Water Quality Station:** • One (1) Water Quality Stations	• **Estimated Floodplain** = Six (6) structures requiring detailed topographic survey. • **Engineered Floodplain =** Two (2) structures requiring field verification.	• See Table 4	• Updated watercourse mapping based on recent orthophoto • Rapid Geomorphic Assessment • Seasonally Based Headwater Drainage Features Assessments • Confirm reach delineation, feature types, and erosion hazards • Detailed surveys for erosion thresholds	• Incorporate any new available background data • Ecological Land Classification – desktop analysis and field verification for all vegetated features • Botanical inventories – three season inventories for all vegetated features • Wildlife Inventories – scoped based on features type and potential for Significant Wildlife Habitat • Validate Connectivity model – where appropriate, rapid assessment of linkage potential in high connectivity areas • Feature boundary delineation – where appropriate, field validated feature boundaries	• Fish community information where sufficient information is not available (to be determined). • Fish and benthic invertebrate monitoring stations where existing monitoring network is inadequate (to be determined) • Site-specific determination of location and extent of Redside Dace contributing habitat.
3	**Streamflow Gauge:** • One (1) Stream Flow Gauge **Water Quality Station:** • One (1) Water Quality Station	• **Engineered Floodplain =** Two (2) structures requiring field verification.	• See Table 4	• Updated watercourse mapping based on recent orthophoto • Rapid Geomorphic Assessment • Seasonally Based Headwater Drainage Features Assessments • Confirm reach delineation, feature types, and erosion hazards • Detailed surveys for erosion thresholds	• Incorporate any new available background data • Ecological Land Classification – desktop analysis and field verification for all vegetated features • Botanical inventories – three season inventories for all vegetated features • Wildlife Inventories – scoped based on features type and potential for Significant Wildlife Habitat • Validate Connectivity model – where appropriate, rapid	• Fish community information where sufficient information is not available (to be determined). • Fish and benthic invertebrate monitoring stations where existing monitoring network is inadequate (to be determined) • Site-specific determination of location and extent of Redside Dace contributing habitat.

SUBWATERSHED GROUPING	HYDROLOGY	HYDRAULICS	HYDROGEOLOGY	STREAM MORPHOLOGY	TERRESTRIAL ECOLOGY	AQUATIC ECOLOGY
					assessment of linkage potential in high connectivity areas • Feature boundary delineation – where appropriate, field validated feature boundaries	
	Streamflow Gauge: • One (1) Stream Flow Gauge	• **Engineered Floodplain =** Two (2) structures requiring field verification.	• See Table 4	• Updated watercourse mapping based on recent orthophoto • Rapid Geomorphic Assessment • Seasonally Based Headwater Drainage Features Assessments • Confirm reach delineation, feature types, and erosion hazards • Detailed surveys for erosion thresholds	• Incorporate any new available background data • Ecological Land Classification – desktop analysis and field verification for all vegetated features • Botanical inventories – three season inventories for all vegetated features • Wildlife Inventories – scoped based on features type and potential for Significant Wildlife Habitat • Validate Connectivity model – where appropriate, rapid assessment of linkage potential in high connectivity areas • Feature boundary delineation – where appropriate, field validated feature boundaries	• Fish community information where sufficient information is not available (to be determined). • Fish and benthic invertebrate monitoring stations where existing monitoring network is inadequate (to be determined) • Site-specific determination of location and extent of Redside Dace contributing habitat.
	Precipitation Gauge: • One (1) Rainfall Gauge **Streamflow Gauge:** • One (1) Stream Flow Gauge **Water Quality Station:** • One (1) Water Quality Station	• **Estimated Floodplain** = Four (4) structures requiring detailed topographic survey.	• See Table 4	• Updated watercourse mapping based on recent orthophoto • Rapid Geomorphic Assessment • Seasonally Based Headwater Drainage Features Assessments • Confirm reach delineation, feature types, and erosion hazards • Detailed surveys for erosion thresholds	• Incorporate any new available background data • Ecological Land Classification – desktop analysis and field verification for all vegetated features • Botanical inventories – three season inventories for all vegetated features • Wildlife Inventories – scoped based on features type and potential for Significant Wildlife Habitat • Validate Connectivity model – where appropriate, rapid assessment of linkage potential in high connectivity areas • Feature boundary delineation – where appropriate, field validated feature boundaries	• Fish community information where sufficient information is not available (to be determined). • Fish and benthic invertebrate monitoring stations where existing monitoring network is inadequate (to be determined) • Site-specific determination of location and extent of Redside Dace contributing habitat.

SUBWATERSHED GROUPING	HYDROLOGY	HYDRAULICS	HYDROGEOLOGY	STREAM MORPHOLOGY	TERRESTRIAL ECOLOGY	AQUATIC ECOLOGY
	Streamflow Gauge: • One (1) Stream Flow Gauge	• **Estimated Floodplain** = Five (5) structures requiring detailed topographic survey. • **Engineered Floodplain =** Two (2) structures requiring field verification.	• See Table 4	• Updated watercourse mapping based on recent orthophoto • Rapid Geomorphic Assessment • Seasonally Based Headwater Drainage Features Assessments • Confirm reach delineation, feature types, and erosion hazards • Detailed surveys for erosion thresholds	• Incorporate any new available background data • Ecological Land Classification – desktop analysis and field verification for all vegetated features • Botanical inventories – three season inventories for all vegetated features • Wildlife Inventories – scoped based on features type and potential for Significant Wildlife Habitat • Validate Connectivity model – where appropriate, rapid assessment of linkage potential in high connectivity areas • Feature boundary delineation – where appropriate, field validated feature boundaries	• Fish community information where sufficient information is not available (to be determined). • Fish and benthic invertebrate monitoring stations where existing monitoring network is inadequate (to be determined) • Site-specific determination of location and extent of Redside Dace contributing habitat.
4	**Precipitation Gauge**: • One (1) Rainfall Gauge **Streamflow Gauge:** • One (1) Stream Flow Gauge	• **Estimated Floodplain** = Four (4) structures requiring detailed topographic survey. • **Engineered Floodplain =** Two (2) structures requiring field verification.	• See Table 4	• Updated watercourse mapping based on recent orthophoto • Rapid Geomorphic Assessment • Seasonally Based Headwater Drainage Features Assessments • Confirm reach delineation, feature types, and erosion hazards • Detailed surveys for erosion thresholds	• Incorporate any new available background data • Ecological Land Classification – desktop analysis and field verification for all vegetated features • Botanical inventories – three season inventories for all vegetated features • Wildlife Inventories – scoped based on features type and potential for Significant Wildlife Habitat • Validate Connectivity model – where appropriate, rapid assessment of linkage potential in high connectivity areas • Feature boundary delineation – where appropriate, field validated feature boundaries	• Fish community information where sufficient information is not available (to be determined). • Fish and benthic invertebrate monitoring stations where existing monitoring network is inadequate (to be determined) • Site-specific determination of location and extent of Redside Dace contributing habitat.

*Refers to Study Area depicted in Figure 4.

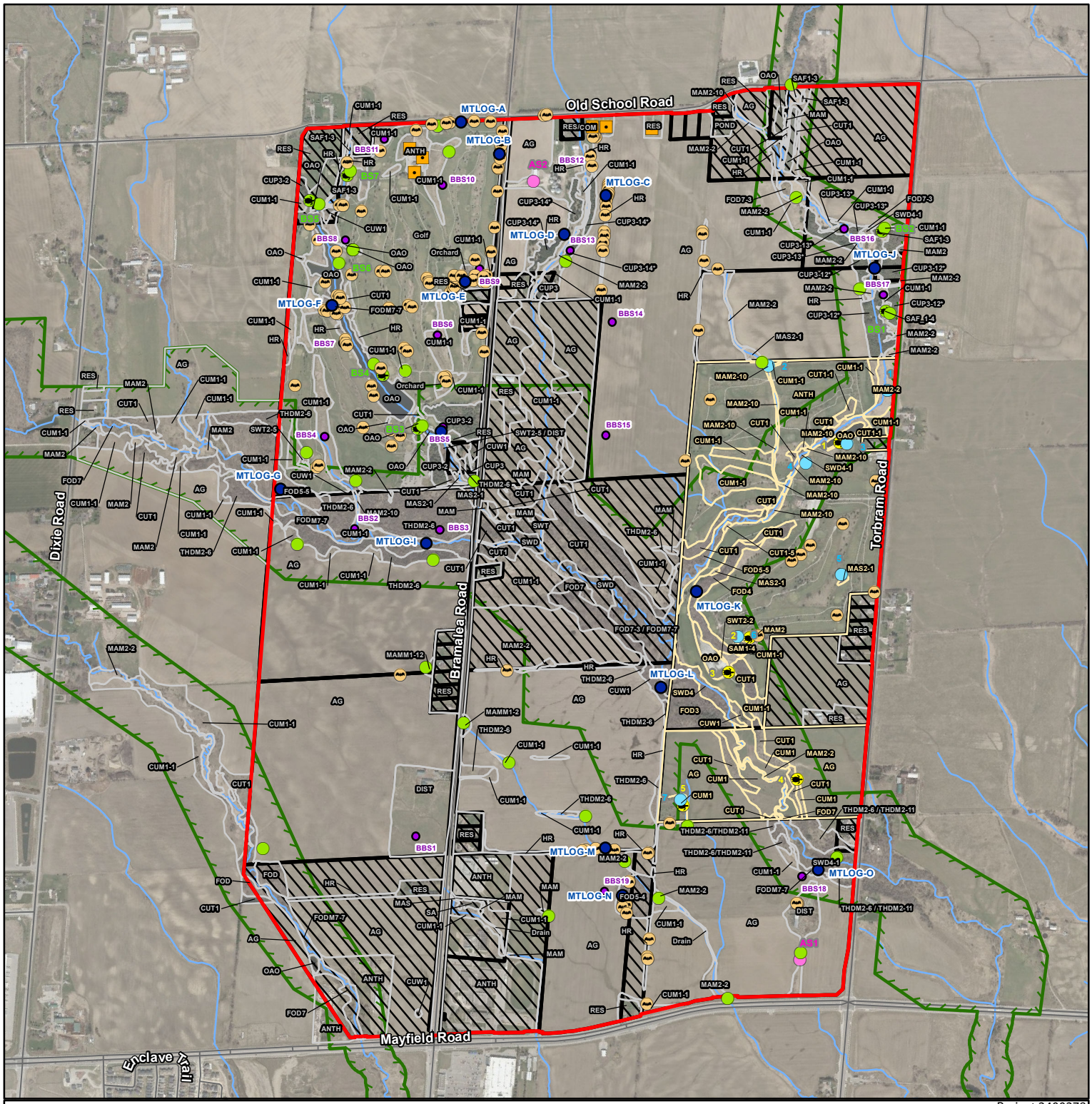
APPENDIX B

Figures

Figure 1 – Terrestrial Survey Stations

Figure 2 – Aquatic Survey Stations

Figure 3 – Monitoring Locations



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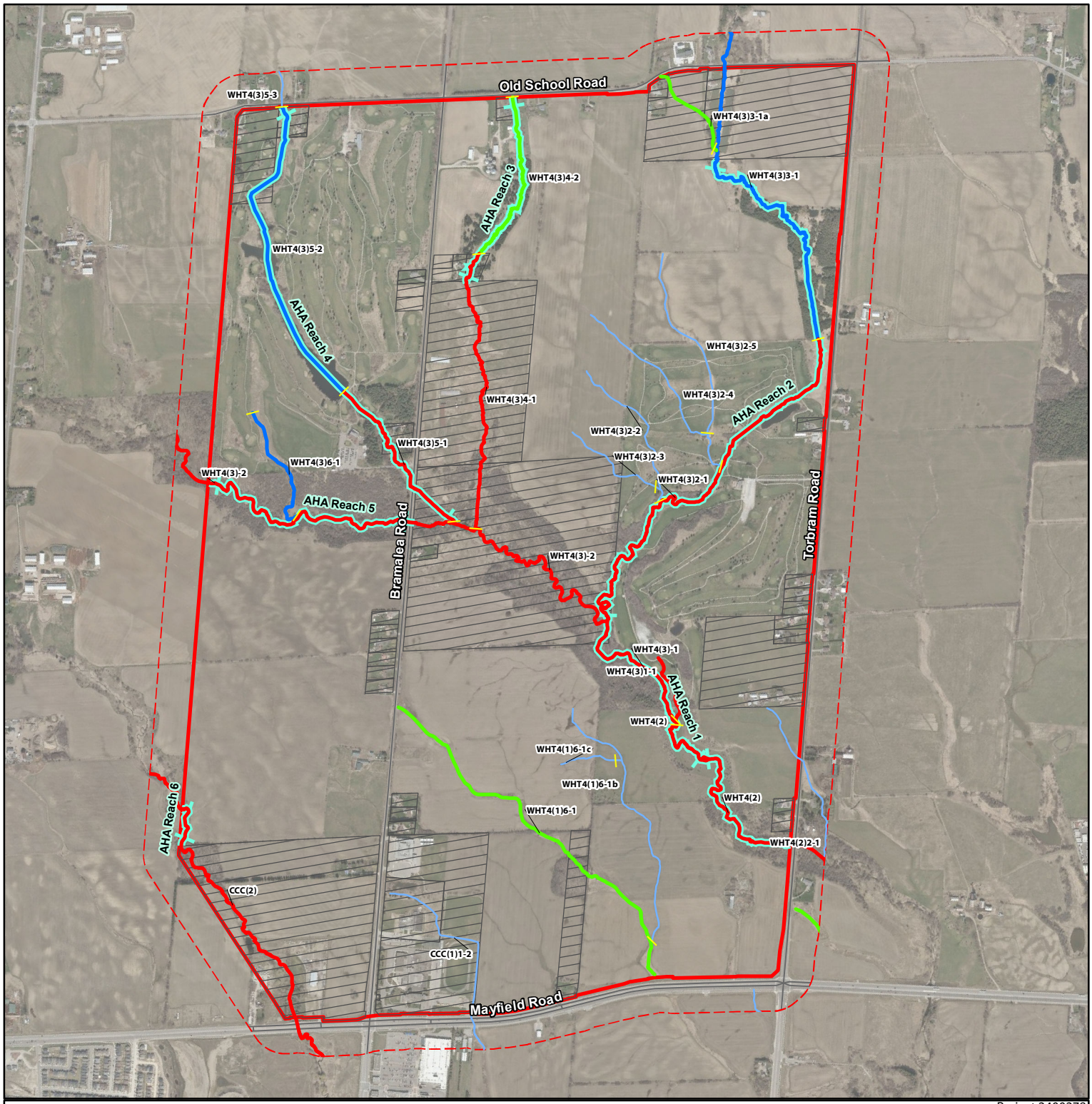
Legend

- Study Area
- Watercourse
- Greenbelt Plan Area
- Non-Participating Property
- Participating Property
- Breeding Bird Stations (GEI 2024)
- Turtle Basking Surveys (Beacon 2023)
- Snake Visual Encounter Surveys (GEI 2024)
- Turtle Basking Surveys* (GEI 2024)
- Amphibian Call Count Stations (GEI 2024)
- Amphibian Call Count Stations (Beacon 2023)
- Bat Exit Structure (GEI 2024)
- Bat Acoustic Stations (GEI 2024)
- Ecological Land Classification (GEI 2024)
- Ecological Land Classification (Beacon 2022,2023)

- All participating properties were reviewed for potential suitability for winter raptors. There are no specific stations for this survey type; rather, the entire property was surveyed to review for suitability

- Breeding bird surveys completed by Beacon Environmental (2022,2023) used a roving technique instead of point count locations.

*General turtle nesting suitability assessments were completed throughout the Study Area



Project 2400278

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Legend

- Study Area
- Study Area + 120m
- Non-Participating Property

Stream Constraints (Peel SABE 2020)

- High
- Medium
- Low
- Watercourse
- Reach Breaks
- Aquatic Habitat Assessment and Summer Fish Community Sampling

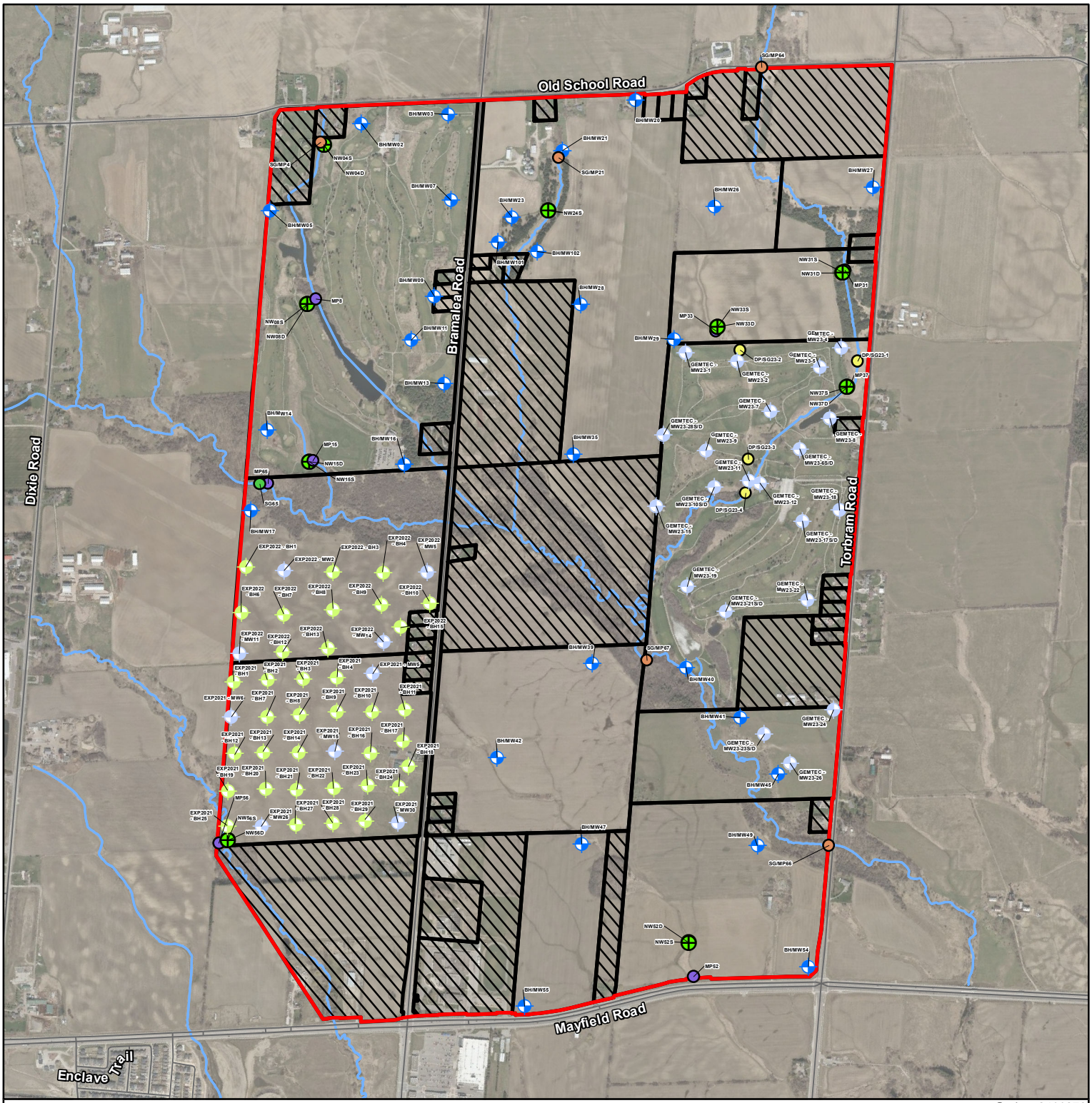
*Spring Fish Community Sampling was completed for all HDFs within participating properties

Mayfield Tullamore Landowner Group
Local Subwatershed Work Study Plan

Figure 2
Aquatic Survey Stations

0 420 m
1:18,000

GEI Consultants



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Legend

- Study Area
- Non-Participating Property
- Participating Property
- Borehole/Monitoring Well (GEI 2024)
- Nested Well (GEI 2024)
- Monitoring Well (EXP 2021, 2022 & GEMTEC 2023)
- Borehole (EXP 2021, 2022)
- Mini Piezometer (GEI 2024)
- Staff Gauge (GEI 2024)
- Staff Gauge/Mini Piezometer (GEI 2024)
- Drive Point/Staff Gauge (GEMTEC 2023)

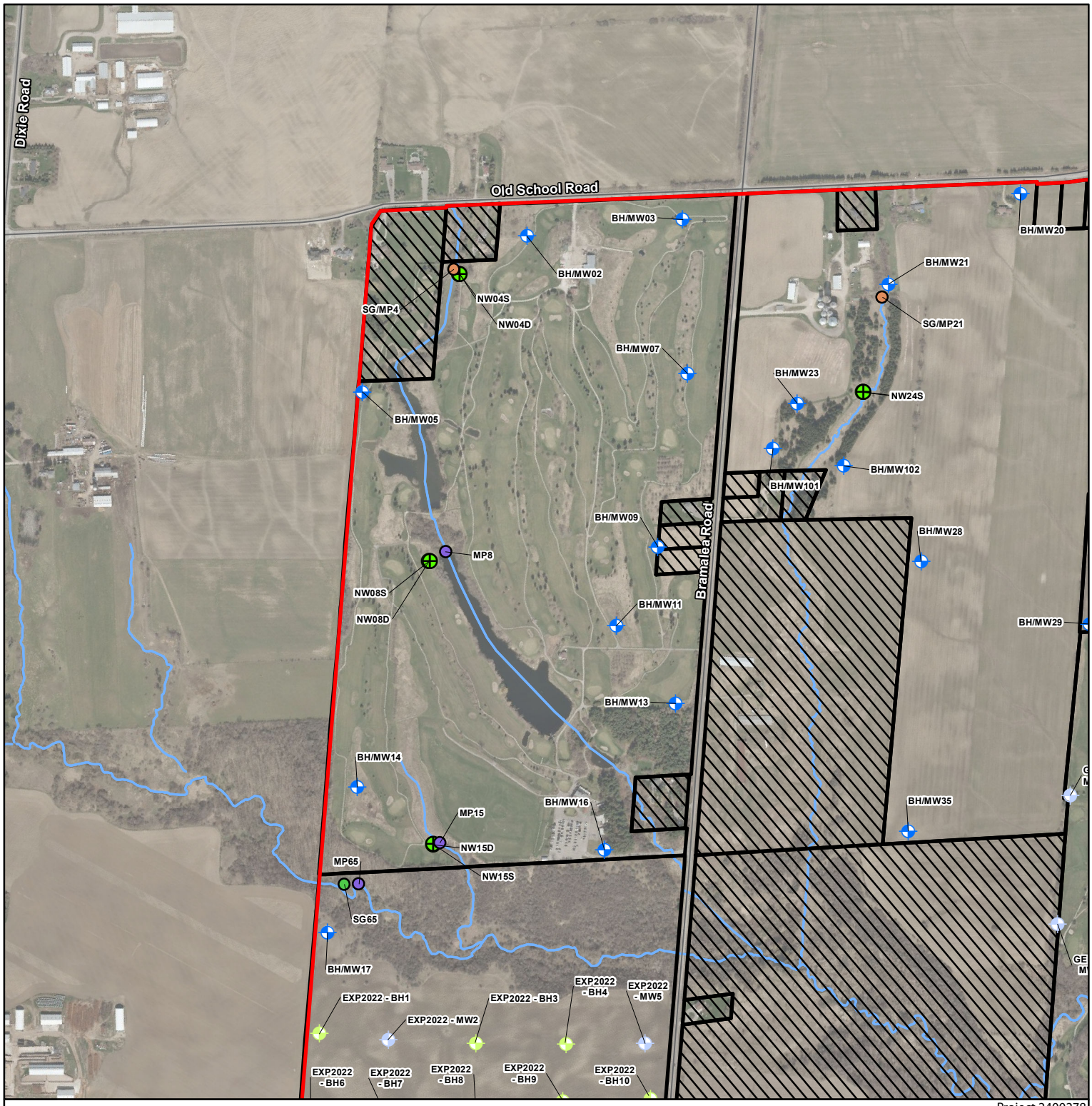
Mayfield Tullamore Landowner Group
Local Subwatershed Study Work Plan

Figure 3 A Hydrogeological and Geotechnical Monitoring Locations

0 390 m

1:18,000

GEI Consultants



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Legend

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- Borehole/Monitoring Well (GEI 2024)
- Nested Well (GEI 2024)
- Monitoring Well (EXP 2021, 2022 & GEMTEC 2023)
- Borehole (EXP 2021, 2022)
- Mini Piezometer (GEI 2024)
- Staff Gauge (GEI 2024)
- Staff Gauge/Mini Piezometer (GEI 2024)
- Drive Point/Staff Gauge (GEMTEC 2023)

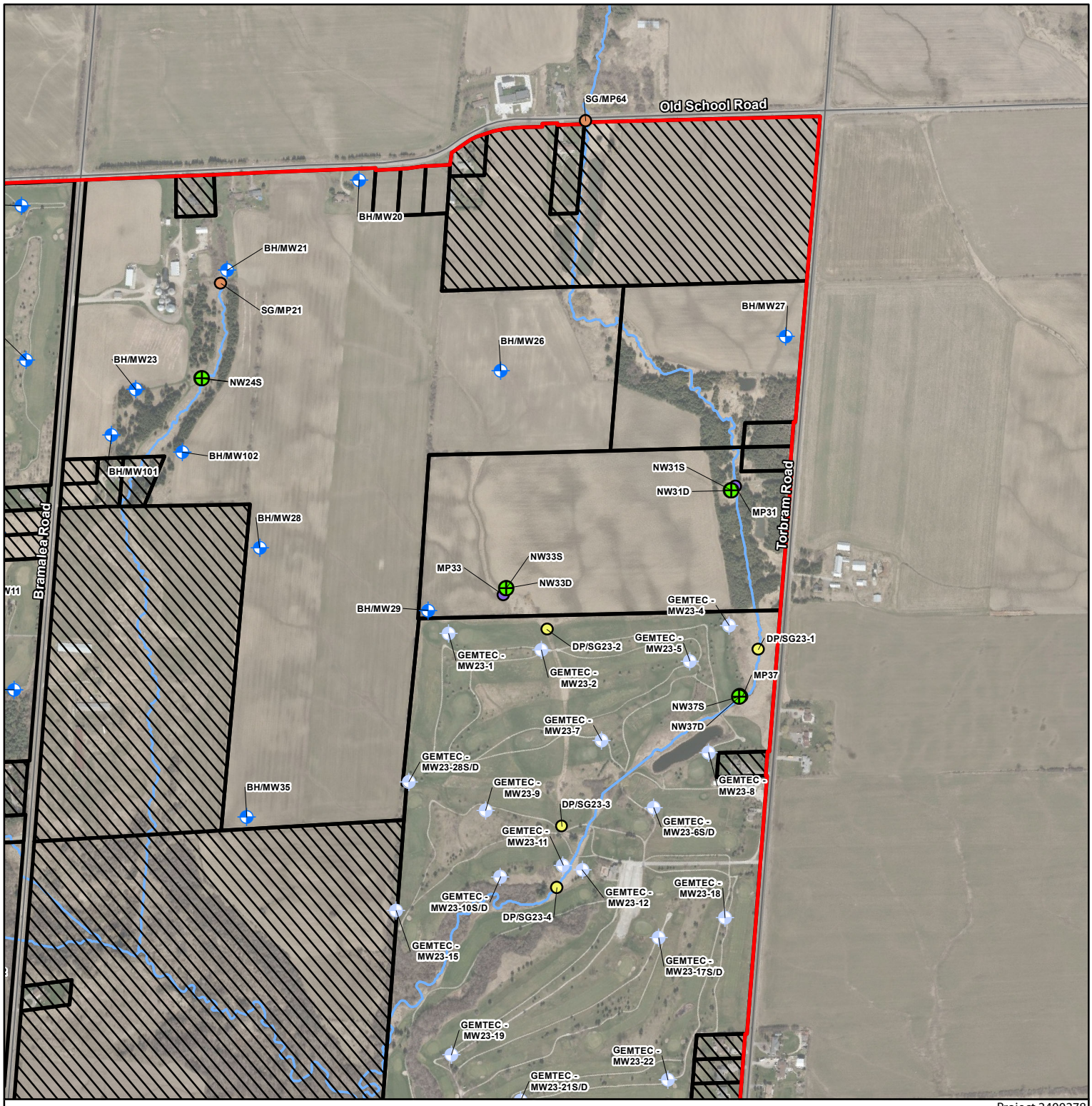
Mayfield Tullamore Landowner Group
Local Subwatershed Study Work Plan

Figure 3 B Hydrogeological and Geotechnical Monitoring Locations

0 220 m

1:10,000

GEI Consultants



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Legend

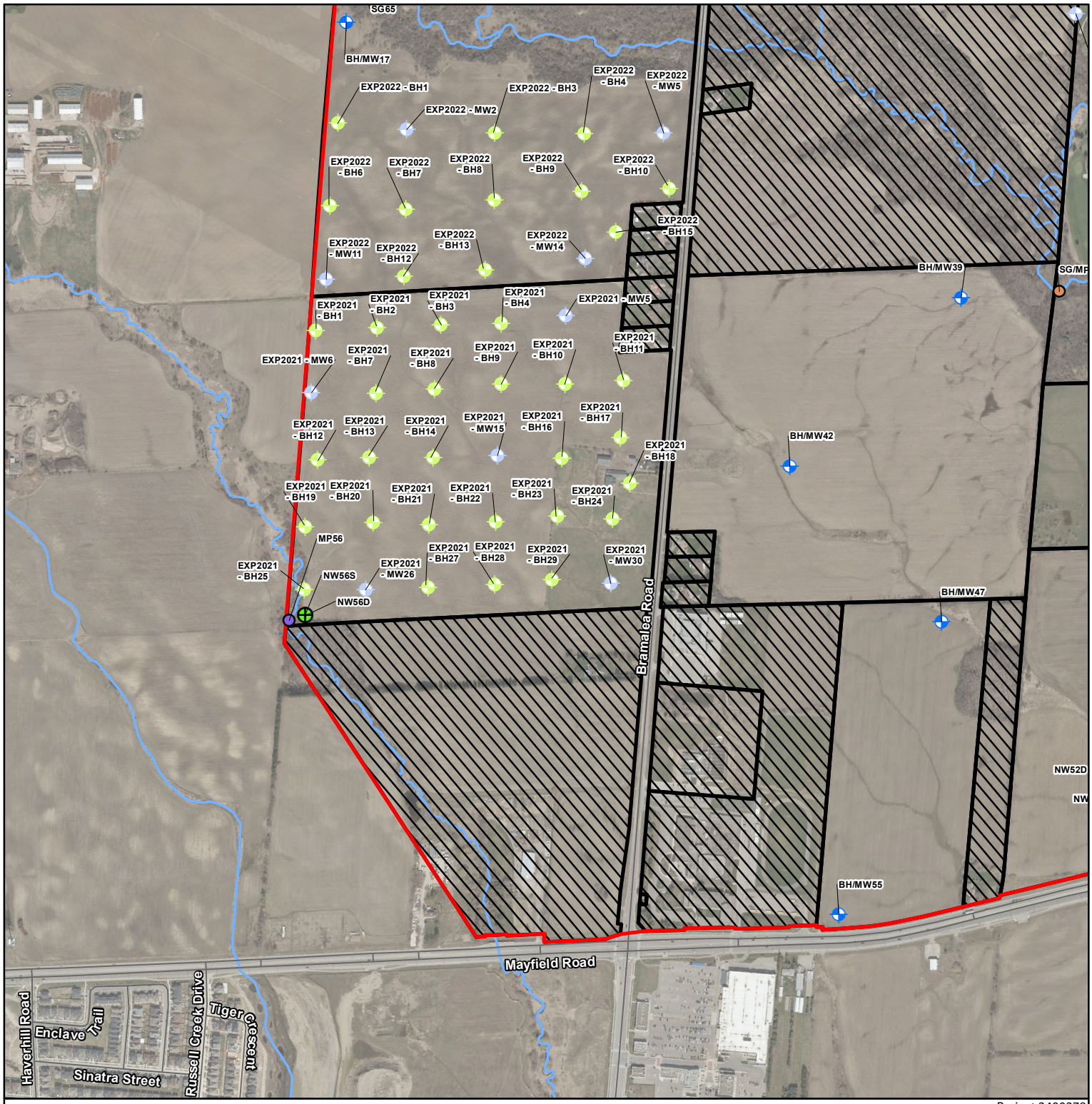
- Study Area
- Non-Participating Property
- Participating Property
- Borehole/Monitoring Well (GEI 2024)
- Nested Well (GEI 2024)
- Monitoring Well (EXP 2021, 2022 & GEMTEC 2023)
- Borehole (EXP 2021, 2022)
- Mini Piezometer (GEI 2024)
- Staff Gauge (GEI 2024)
- Staff Gauge/Mini Piezometer (GEI 2024)
- Drive Point/Staff Gauge (GEMTEC 2023)

Mayfield Tullamore Landowner Group
Local Subwatershed Study Work Plan

Figure 3 C Hydrogeological and Geotechnical Monitoring Locations

0 220 m
1:10,000

GEI Consultants



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Legend

- Study Area
- Non-Participating Property
- Participating Property
- Borehole/Monitoring Well (GEI 2024)
- Nested Well (GEI 2024)
- Monitoring Well (EXP 2021, 2022 & GEMTEC 2023)
- Borehole (EXP 2021, 2022)
- Mini Piezometer (GEI 2024)
- Staff Gauge (GEI 2024)
- Staff Gauge/Mini Piezometer (GEI 2024)
- Drive Point/Staff Gauge (GEMTEC 2023)

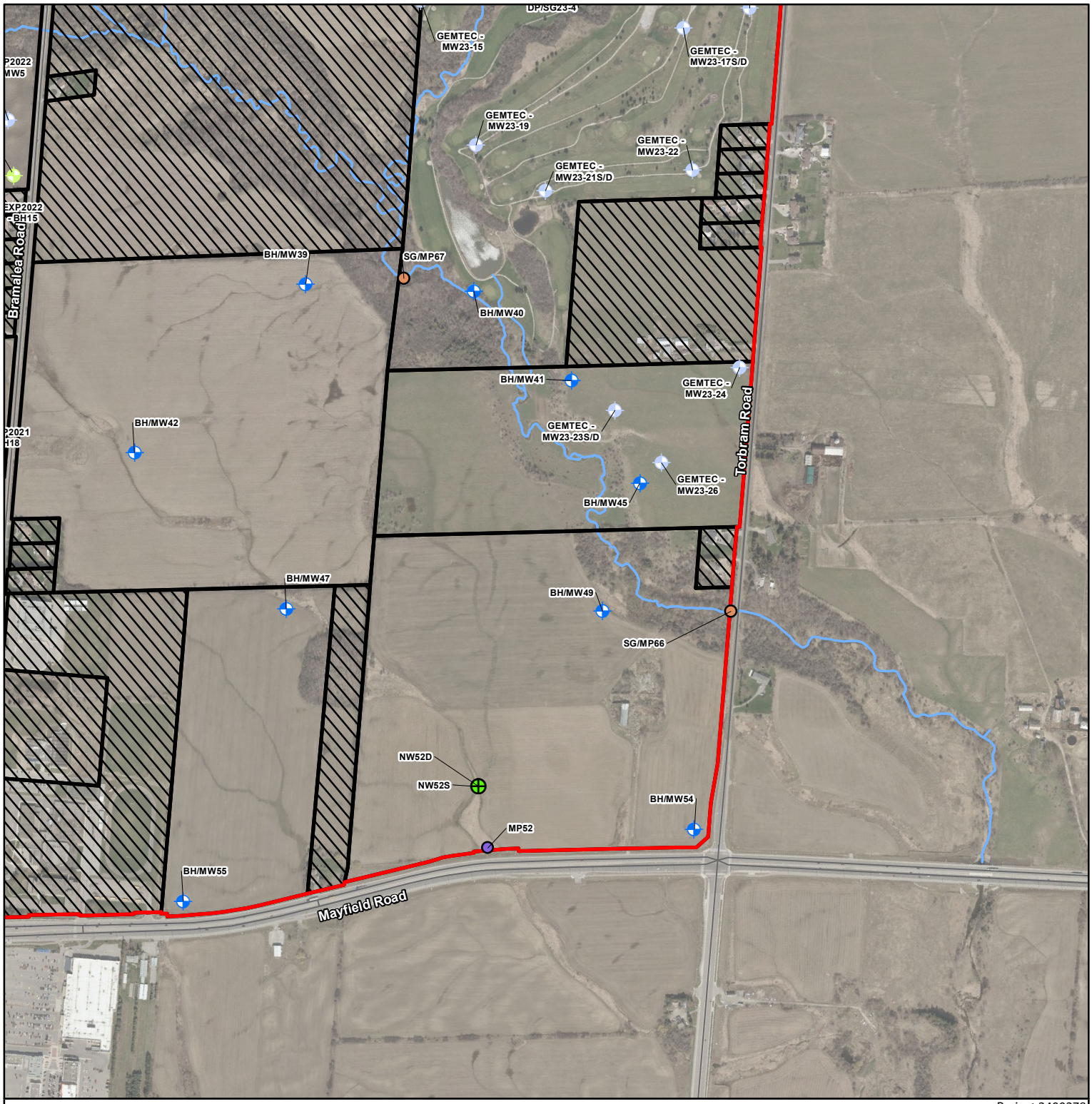
Mayfield Tullamore Landowner Group
Local Subwatershed Study Work Plan

Figure 3 D Hydrogeological and Geotechnical Monitoring Locations

0 220 m

1:10,000

GEI Consultants



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Legend

- Study Area
- Non-Participating Property
- Participating Property
- Borehole/Monitoring Well (GEI 2024)
- Nested Well (GEI 2024)
- Monitoring Well (EXP 2021, 2022 & GEMTEC 2023)
- Borehole (EXP 2021, 2022)
- Mini Piezometer (GEI 2024)
- Staff Gauge (GEI 2024)
- Staff Gauge/Mini Piezometer (GEI 2024)
- Drive Point/Staff Gauge (GEMTEC 2023)

Mayfield Tullamore Landowner Group
Local Subwatershed Study Work Plan

Figure 3 E
Hydrogeological and Geotechnical Monitoring Locations

0 220 m

1:10,000

GEI Consultants

APPENDIX C

Tables

Table 1 – Field Studies and Natural Inventories

Table 1: Field Studies and Natural Inventories (2024)

COMPLETE?	SURVEY ROUND	SURVEY TYPE	DATE (2024)	TIME		AIR TEMP (c°)	HUMIDITY (%)	CLOUD COVER (%)	BEAUFORT WIND SPEED	PRECIPITATION COMMENTS
				START	END					
Y	1	Winter Raptor Survey	08-FB	07:15	16:15	6	70	100	0	Freezing Fog
Y	1-1	Bat Habitat Assessment & Structure Screening	12-FB	08:40	17:00	0	70	90	2	None
Y	1-2	Bat Habitat Assessment & Structure Screening	15-FB	10:05	17:00	-3	70	100	3	None
Y	1-1	Headwater Drainage Feature Assessment	18-MR	09:00	15:30	1	65	100	4	None
Y	1-2	Headwater Drainage Feature Assessment	19-MR	09:00	16:00	1	73	90	4	Snow
Y	1-3	Headwater Drainage Feature Assessment	22-MR	09:00	16:00	-3	69	100	3	Snow
Y	1-4	Headwater Drainage Feature Assessment	27-MR	09:00	16:00	9	65	75	4	None
Y	1-1 1-1	Turtle Basking and Nesting Survey & Snake Transect Survey	09-AP	09:30	14:30	13	62	10	1	None
Y	1-2 1-2	Turtle Basking Survey & Snake Transect Survey	10-AP	10:00	14:40	17	72	10	1	None
Y	1	Spring Fish Community Sampling	15-AP	09:00	18:30	16	32	70	4	None

Table 1: Field Studies and Natural Inventories (2024)

COMPLETE?	SURVEY ROUND	SURVEY TYPE	DATE (2024)	TIME		AIR TEMP (C°)	HUMIDITY (%)	CLOUD COVER (%)	BEAUFORT WIND SPEED	PRECIPITATION COMMENTS
				START	END					
N	2	Headwater Drainage Feature Assessment – Round 2								
		Headwater Drainage Feature Assessment - Round								
Williamson, L. Love, S.	2-1 2-1	Snake Transect Survey & Turtle Basking Survey	16-AP	10:00	14:20	15	67	10	1	None
Williamson, L. Love, S.	1-1	Amphibian Call Count Survey	17-AP	20:30	22:00	11	38	10	1	None
Williamson, L. Cartwright, C.	2-2 2-2	Turtle Basking Survey & Snake Transect Survey	26-AP	13:00	16:00	11	29	5	2	None
Leslie, J.	1-1	Spring Ecological Land Classification and Botanical Inventories	2-MA	09:00	16:30	16	61	20	3	None
Williamson, L. Brunelle, P.	3-1 3-1	Snake Transect Survey & Turtle Basking Survey	2-MA	12:40	16:45	15	73	5	2	None
Leslie, J.	1-2	Spring Ecological Land Classification and Botanical Inventories	3-MA	09:00	16:00	16	64	80	3	Rain

Table 1: Field Studies and Natural Inventories (2024)

COMPLETE?	SURVEY ROUND	SURVEY TYPE	DATE (2024)	TIME		AIR TEMP (c°)	HUMIDITY (%)	CLOUD COVER (%)	BEAUFORT WIND SPEED	PRECIPITATION COMMENTS
				START	END					
Leslie J.	1-3	Spring Ecological Land Classification and Botanical Inventories	6-MA	09:00	15:00	18	45	80	3	None
Williamson, L. Love, S.	3-2 3-2	Snake Transect Survey & Turtle Basking Survey	6-MA	09:15	13:00	14	60	15	2	None
Leslie, J.	1-4	Spring Ecological Land Classification and Botanical Inventories	7-MA	09:00	15:30	20	45	80	3	None
Leslie, J.	1-5	Spring Ecological Land Classification and Botanical Inventories	8-MA	09:00	14:00	20	54	65	4	None
Williamson, L. Love, S.	2-1	Amphibian Call Count Survey	16-MA	21:00	23:00	17	73	5	1	None
Williamson, L. Love, S.	2-2	Amphibian Call Count Survey	17-MA	21:00	23:00	15	100	95	2	Rain, Fog
Robinson, O. Leslie, J. Wiginton, R. Huang, F. TRCA, Town of Caledon	1-1	Staked Top of Bank and Treed Limit	30-MA	09:00	16:00	17	36	0	3	None

Table 1: Field Studies and Natural Inventories (2024)

COMPLETE?	SURVEY ROUND	SURVEY TYPE	DATE (2024)	TIME		AIR TEMP (c°)	HUMIDITY (%)	CLOUD COVER (%)	BEAUFORT WIND SPEED	PRECIPITATION COMMENTS
				START	END					
Stemberger, H. Lohnes, S. Leslie, J. Wiginton, R. Huang, F. TRCA, Town of Caledon	1-2	Staked Top of Bank and Treed Limit	31-MA	09:00	16:00	21	37	5	2	None
Nieroda, M. Brunelle, P.	1-1	Bat Acoustic Survey Set-up	31-MA	08:00	18:00	22	36	5	2	None
Robinson, O. Lohnes, S. Doyle, T. Wiginton, R. Huang, F. TRCA, Town of Caledon	1-3	Staked Top of Bank and Treed Limit	03-JN	09:00	16:00	20	88	85	2	Fog
Burke, P.	1-1	Breeding Bird Survey	04-JN	05:25	10:00	17	93	75-50	0	None
Nieroda, M. Fleming, D. Kimble, B.	2	Headwater Drainage Feature Assessment	04-JN	08:30	17:00	24	60	80	3	None
Burke, P.	1-2	Breeding Bird Survey	05-JN	05:25	10:00	19	77	75	1	None
Burke, P.	1-3	Breeding Bird Survey	06-JN	05:15	09:30	19	100	100	2	Fog

Table 1: Field Studies and Natural Inventories (2024)

COMPLETE?	SURVEY ROUND	SURVEY TYPE	DATE (2024)	TIME		AIR TEMP (C°)	HUMIDITY (%)	CLOUD COVER (%)	BEAUFORT WIND SPEED	PRECIPITATION COMMENTS
				START	END					
Nieroda, M. Brunelle, P.	1-2	Bat Acoustic Survey Pick-up	10-JN	08:30	12:30	13	66	60	3	None
Williamson, L. Brunelle, P.	3-1	Amphibian Call Survey	24-JN	21:30	23:30	23	53	0	3	None
Williamson, L. Brunelle, P.	3-2	Amphibian Call Survey	25-JN	21:30	23:30	23	74	30	3	None
Burke, P.	2-1	Breeding Bird Survey	25-JN	06:30	08:30	19	72	50	3	None
Burke, P.	2-1	Breeding Bird Survey	26-JN	05:35	09:15	18	100	85	4	None
Stemberger, H. Leslie, J. Robinson, O. TRCA	1-1	Staked Wetland Limit	04-JL	09:00	16:00	26	62	80	4	None
Stemberger, H. Leslie, J. TRCA	1-2	Staked Wetland Limit	05-JL	09:00	16:00	26	52	0	1	None
Stemberger, H. Leslie, J. Robinson, O. TRCA	1-3	Staked Wetland Limit	08-JL	09:00	16:00	26	59	75	4	None

Table 1: Field Studies and Natural Inventories (2024)

LEGEND:

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

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

MAYFIELD TULLAMORE

Meeting Minutes

GEI Consultants

.GENERAL INFORMATION					
OWNER	:	Mayfield Tullamore Landowner Group	**DATE**	:	**22-Jul-24**
PROJECT NAME	:	Mayfield Tullamore Secondary Plan & Subwatershed Study			
PROJECT #	:	2400278	**TIME**	:	**10:00**
SUBJECT	:	Agency Meeting to discuss Terms of Reference Comments			☑ **AM** ☐ **PM**

GEI ATTENDEES	ENTITY	INITIALS
Cassie Schembri	Town of Caledon	CS
Jason Elliott	Town of Caledon	JE
Taral Shukla	Town of Caledon	TS
Maria Parish	TRCA	MP
Jehan Zeb	TRCA	JZ
Dilnesaw Chekol	TRCA	DC
Chrissy Pelopidas	Region of Peel	CP
Shelley Lohnes	GEI	SL
Holly Stemberger	GEI	HS
Olivia Robinson	GEI	OR
Russell Wiginton	GEI	RW
Bethany Gruber	GEI	BG
Frankie Huang	GEI	FH
Nick McIntosh	SCS	NM
Matthew Cory	MGP	MC
Rohan Sovig	MGP	RS
Dalton Young	MGP	DY
Zack Korn	Development Collective	ZK

Meeting Minutes:

- SL provided overview of the Mayfield Tullamore Local Subwatershed Study (SWS) process
- Consultant team (GEI, SCS) reviewed proposed responses to comments provided by the Town and TRCA on the Local SWS Terms of Reference (TOR)
- Study Area Boundary shown on Figure 1 of the TOR
    - Town requested to see all Study Areas – including catchments
    - **Action Item:** GEI and SCS to update Figure 1 to show all discipline Study Areas
    - **Action Item:** Town to provide hydrology catchment boundaries to indicate area of interest to be shown

- Technical Advisory Committee (TAC) Initiation
    - SL requested biweekly meetings starting next week (week of July 27)
    - Town indicated that there were 12 ongoing Local SWS and suggested monthly meetings
    - Town recommended having the TAC meeting coincident with the date of the standing monthly meeting for the Wildfield Village TAC (August 13 at 11 am)
    - **Action Item:** Consultant team to review August 13 (11 am) availability and confirm with agencies availability.
    - **Action Item**: Town to provide list of individuals from reviewing agencies to be involved in the TAC
    - At first TAC meeting the following to be on the agenda:
        - Gap Analysis Results
        - Work Plan
        - Fieldwork mapping and dates
- Field station mapping will not be included within the TOR. JE acknowledged that field investigations were completed at own risk since not reviewed with agencies ahead of time given timing constraints.
- Feature identification and Preliminary Natural Heritage System (NHS) Delineation
    - To acknowledge work completed within the Settlement Area Boundary Expansion (SABE) Reports and build off of those reports by all disciplines
    - **Action Item:** All disciplines to ensure that SABE is incorporated into the SWS Reports
- Feature-based Water Balance
    - JE stated that he wanted to make sure the fieldwork program was sufficient enough to inform detailed feature based water balance assessments, but acknowledged that detailed investigations may not be completed as part of the SWS rather site specific investigations. Instead a minimum of a Risk Assessment is required.
    - As a result of this, constraint lines can only be preliminary given the uncertainty regarding the risk assessment (i.e., VPZs can only be considered minimums)
    - Town and TRCA agreed that Feature Based Water Balance is to be completed for retained wetlands. Only continuous models are required for medium and high constraint wetlands.
- SWM Infrastructure within VPZs
    - JE clarified that SWM infrastructure can be located within the Greenbelt in accordance with Greenbelt Policies; however, no infrastructure to support the site water balance is permitted (except outfalls). Infrastructure to support the NHS (e.g., clean water collectors to feed wetlands) is permitted. All other SWM infrastructure is to be provided outside of the buffer.
- Low Impact Development (LID) Strategies
    - Intent to provide types of LIDs that could support future Feature-based Water Balance
    - Town clarified comment was more focused on the site wide water balance but LIDs should also be considered for feature-based water balance as well

- Significant Wildlife Habitat (SWH)
    - JE confirmed the Provincial SWH Criteria Schedules for Ecoregion 6E are more current than the Town of Caledon/Peel Region guidelines, SWH should only be evaluated using the Provinces SWH Guidelines
- Culverts
    - SCS noted that culvert condition assessments will be conducted as part of the EAs that will be conducted for the arterial roads surrounding the Secondary Plan.
    - SCS recommended limiting condition assessments to Phase 2 of the local subwatershed summary following the initial floodplain analysis to determine culverts of significance.
    - CS agreed to delaying the condition assessment and noted that it was mainly for culverts intended as part of proposed infrastructure (e.g. SWM Pond outlets/storm sewer connections.
    - CS noted that the Town may have completed condition assessments and would provide these records if available.
    - CS stated that any analysis should consider ongoing EAs (e.g., Mayfield Road EA)
    - **Action Item:** CS to provide Town culvert condition assessment reports.
    - **Action item:** SCS to follow up with Region to obtain culvert condition assessment reports.
- Access Requests into Non-Participating Lands
    - CS clarified that the Town is looking for some commitment that the consultant team tried to access the Non-Participating Lands to complete investigations. Does not need to be anything formal (e.g., Door Knocking).
    - **Action Item:** Confirmation that access requests were made to non-participating landowners to be included within SWS.
- Public Engagement Requirement
    - CS requested that one PIC occur as part of Phase 2; however, Town was going to review if required as part of the SWS.
    - **Action Item:** Town to review public engagement requirement
- TRCA Comment Review
    - SCS noted that the TRCA has clearly stated that Regional SWM Pond controls are required and will update the TOR accordingly.
- Region's Comments
    - CP provided brief summary of the Region's comments. Mostly related to updated process given recent shift of responsibility effective July 1. One development engineering comment is also provided.

Summary of Action Items:

Consultant Team

- GEI and SCS to update Figure 1 to show all discipline Study Areas
- Consultant team to review August 13 (11 am) availability and confirm with agencies availability
- All disciplines to ensure that SABE is incorporated into the SWS Reports
- Access requests to be included within SWS
- SCS to follow up with Region to obtain culvert condition assessment reports

Reviewing Agencies

- Town to provide list of individuals from reviewing agencies to be involved in the TAC
- Town to review public engagement requirement
- Town to provide hydrology catchment boundaries to indicate area of interest to be shown
- CS to provide Town culvert condition assessment reports

Comment Matrix - Town of Caledon

Parks, Natural Heritage, Planning Department

Section #	Comment	Comment Response
1	The Study Area displayed on Figure 1 is incorrect. In addition to what is displayed, it must include the catchments connected upstream and downstream to the secondary plan area. Refer to the secondary plan area as the Primary Study Area (PSA) and the remaining lands as the Secondary Study Area (SSA). It is acknowledged that background information will be the main source of data for the SSA.	The Study Area is inclusive of Participating and Non-Participating properties. Aerial and desktop studies used to characterize non-participating. Natural Heritage Study Area is inclusive of +120 m; Fluvial Study Area is inclusive of watercourses 250 m downstream of teh study area, and the Hydrology/Hydraulics Study Area is inclusive of upstream and downsteam catchment areas as relevant to the necessary modelling. These are defined in the TOR. The Study Area figure has been updated to include Fluvial Study Area.
	Explicitly state that background information will be used for non-participating properties as available.	Acknowledged.
	The 2014 Headwater Drainage Feature Guidelines are not interim.	Acknowledged.
	Clarify the intention for the workplan. It is stated that workplan confirmation and approval with the Town will occur after the background information review and gap analysis is completed. However, Section 2 and Appendix B provide what appears to be a workplan. The findings of the gap analysis and proposed workplan must be presented to the TAC for approval.	Acknowledged. GEI and SCS will work with Town staff to confirm TAC composition and will schedule the first TAC meeting for mid-August to discuss the workplan. The workplan has already been informed by background review completed in Spring 2024, and the scope of work is underway. The workplan with station mapping will be appended to the second TOR submission.
	Clarify the intent of the second last paragraph on pg. 7. Constraints based solely on background review is not appropriate. Further, it is not clear how high-level opportunities and constraints mapping can focus field investigations/monitoring or how it relates to the preceding comment.	Acknowedged. Updated to confirm that constraints have been further refined through targeted field studies.
	Clarify the intent of the second bullet in Section 2.1. The SABE SWS watercourse constraints rankings were only based on preliminary geomorphic analyses. As per the Part C report, the final rankings must refine geomorphic analyses and include aquatic, riparian, surface water and groundwater considerations.	Acknowledged. Geomorphic analyses have been completed.
	Clarify what is meant by when discussing minor modifications to NHS boundaries at the bottom of pg. 8. All features that meet designation and protection criteria must be included in the NHS regardless of whether they were mapped in the OP.	Acknowledged. This was alluding to modifications of the preliminary SABE NHS, and future refinements that may be a required through Phase 2 discussions of compensation activities and impact assessment. Updated for clarity.
2	Remove all references to specific buffer widths. Future Caledon indicates that buffers are to be established based on feature sensitivity and the magnitude of anticipated impacts. As these are not known prior to initiating the study, it is not appropriate to include in the ToR. Robust rationale for buffer widths must be included in the LSS. Future Caledon indicates that minimum buffer widths are to be established through the LSS and final buffer widths are to be established through site-specific EISs. If the LOG desires more certainty at the secondary plan stage, everything that could affect land use must be known. This includes items such as site and feature-based water balance requirements and demonstration that they can be met, finalized trails plan, etc. Further discussion on buffers should occur with the TAC.	Acknowledged. Updated to make reference to providing recommendations for minimum buffers.
	It is stated the linkage and enhancement opportunities will be reviewed. Explicitly state that the linkage and enhancement areas from the SABE SWS Preliminary NHS will be confirmed/refined according to that study's targets, criteria and guidance.	Acknowledged. This has been added to the TOR.
	Stations/locations for the field investigations have not been mapped. It is recommended that they be included for review and approval as part of the workplan. Otherwise, the field investigations are being conducted at the LOG's risk if it is determined something was missed during review of the Phase 1 report.	Acknowledged. The workplan including stations/location mapping will be included in the updated TOR submitted in tandem with the Phase 1 report. Further discussions are anticipated during future TAC meetings.
	Further to the preceding comment, clarify the intention for the last paragraph in Section 2.1 as it appears that field work is not being contemplated within features. All work necessary to establish feature significance and sensitivity and to determine buffer widths/extents must be completed.	Acknowledged. Text has been updated to confirm that desktop studies and aerial work were completed for the entire Study Area. Detailed fieldwork has been completed for features outside the greenbelt, and outer edges of the Greenbelt Lands to ensure appropriate Greenbelt Plan VPZs are in place.
	Clarify why the identification of a preliminary NHS is mentioned in several places (in this section and Appendix B). A Preliminary NHS has already been established. One purpose of the LSS is to confirm/refine the preliminary NHS according to the criteria, targets and guidance in the SABE SWS Part C report.	Acknowledged. Updated for clarity; the local SWS will be focused on delivering a refined version of the SABE SWS "Preliminary NHS" through the local SWS process.
	Confirm that the proposed hydrogeological monitoring will collect data sufficient to support site and feature-based water balance analyses and to demonstrate the feasibility of recommended LID BMPs (depth to groundwater).	Acknowledged. Hydrogeological monitoring data will support high level mitigation recommendations for medium/high risk retained features. Updated in the TOR for clarity.
	It is stated that an iterative impact assessment will be completed but all subsections that follow do not appear to incorporate an iterative assessment. One purpose of the LSS is to determine what land uses the PSA can support and where they are best located. As such, an iterative assessment is required.	Acknowledged. Extra language has been provided to acknowledge that the preliminary land use plan will be used to assess impacts across the disciplines and the results of these will influence the final land use plan for the Secondary Plan Area to ensure that Land Use Plan is refelctive of the goals and SABE Scoped SWS

	Clarify what is meant by “determine principles for buffer and infrastructure integration” and note that grey SWM infrastructure other that outlets are not permitted in buffers.	Acknowledged. We will clairfy that "naturalized SWM infrastructure" will be explored based on the language provided within Greenbelt policies.
	It is stated the linkage and enhancement opportunities will be reviewed. Explicitly state that the linkage and enhancement areas from the SABE SWS Preliminary NHS will be confirmed/refined according to that study’s targets, criteria and guidance.	Acknowedged. TOR and Phase 1 report are reflective of this.
3		
	Clarify the intent of the last bullet in Section 3.1. A feature-based water balance risk assessment must be completed as part of the LSS. Further, at minimum, any required monitoring and analyses resulting from the assessment must be outlined. If the LOG desires greater certainty, the monitoring and analysis and demonstration of the feasibility of implementing any required mitigation should be completed as part of the LSS. If not, limits of development can not be finalized at the Secondary Plan stage and an OPA policy must be included that the limits are preliminary and may be refined through subsequent study. The comments related to feature-based water balance provided by TRCA dated July 10, 2024 are supported.	Acknowledged. The local SWS will include a risk assessment and will be followed up with what mitigation may need to be considered at site specific (e.g., roof top drainage, LIDs, etc). For phase 2, any created wetlands, it will be demonstrated that the location we select can support the hydrology of the wetland.
	Include impacts to groundwater supported features in Section 3.4. Include Redside Dace water quality requirements in Section 3.6 (DO, TSS, T).	Acknowledged. This has been added to Section 3.4. Acknowledged. This has been added to Section 3.6.
	Similar to the comment above, clarify what is intended in stating that future requirements for additional feature-based water balance risk assessment will be identified. This would only be acceptable for non-participating lands.	Acknowledged. At the local SWS, we won't have site specific grading or exact sizing/location of SWM ponds. High-level mitigation recommendations will be made based on the risk assessments, but detailed next steps will be identified and they would need to be rev-evaluated within an EIS
	Clarify the intent of the last bullet on pg. 19. Potential feature removal and compensation should follow the guidance provided in the SABE SWS Part C report.	Acknowledged. The alignment with the SABE SWS has been added.
4		
	The intent regarding the identification of LID measures is not clear. In Section 4.3 it appears that the feature-based water balance will be completed in the LSS but that does not appear to be the case in other sections, including Section 4.4 (also see comments above). The feasibility of implementing all LID required to support site and feature-based water balance must be demonstrated prior to finalizing land use and buffer widths. Factors in this regard include items such as availability land/location/ownership and appropriate groundwater separation.	Acknowledged. At the local SWS, we won't have site specific grading or exact sizing/location of SWM ponds. High-level mitigation recommendations will be made based on the risk assessments, but detailed next steps will be identified and they would need to be rev-evaluated within an EIS
Appendix B	It is stated that a Key Objective of the LSS is to determine the limits of development (LOD) including buffer widths. As outlined above, be advised that all details related to land use must be known in order to finalize the LOD. This includes such things as demonstration of the feasibility of implementing all required mitigation for site and feature-based water balances, trails plan, nature of adjacent land uses, etc. Without these details, only minimum buffer widths and principles for finalizing the widths at subsequent planning stages can be established through the LSS/secondary plan.	Acknowledged. Language will be provide clarity; recommended minimum VPZ widths will be discussed in the local SWS.
	It is stated that a Key Objective of the LSS is to establish principles for works within buffers. As outlined above, grey SWM infrastructure is not permitted in buffers.	Acknowledged - naturalized SWM infrastructure may be explored; grey SWM will not.
	Include monitoring during construction (ESC, tree protection) in the development of the monitoring plan.	Acknowledged.
	Clarify why meander belt assessment is identified as a draft plan requirement. Meander belt assessment is required to finalize the LOD.	Acknowledged; TOR will be updated; meander belt assessment has been completed.
	Clarify why a preliminary slope stability assessment and preliminary constraints mapping are discussed in the Geotechnical section. These must be finalized to finalize the LOD.	Acknowledged; TOR will be updated; slope stability assessment has been completed.

	Infrastructure Planning and Environmental Engineering	
Section #	Comment	**Comment Response**
	Within the Introduction (page 1) it is identified that the draft LSS TOR is based on Region of Peel TOR provided as Appendix F to the Scoped Subwatershed Study (Wood et al., 2022) and the Town of Caledon's SWS TOR – Redline to Peel Region TOR (March 2024). Please note that the Town, Region and the CAs have finalized the Local Subwatershed Study Terms of Reference Guidance document and it can found on the Town's website at https://www.caledon.ca/en/town-services/resources/Engineering/Detailed-SWS-Terms-of-Reference_May2024.pdf	Acknowledged. Reference has been updated.
Section 1.1	Within Section 1.1 it is suggested that a Local Subwatershed Study is required as a result of the Region of Peel's Scoped Subwatershed Study. It is important to note that both the Region of Peel's Official Plan and Future Caledon Official Plan requires that a Local Subwatershed needs to be substantially completed to support a Secondary. Further to this, Future Caledon OP includes a number of policies that inform what is required as part of the Local Subwatershed Study. Please ensure that work completed as part of the Local Subwatershed Study fulfills the requirements of Future Caledon Official Plan.	Acknowledged. Specific reference made to the Caledon Future OP policies that will guide the SWS.
Section 1.1	Section 1.1 identifies a few high level SWS objectives (eg. Address the relevant natural features). While this list is high level, it's important to note that one of the fundamental objectives of the Local Subwatershed Study is to inform the work that will be done as part of later planning stages.	Acknowledged. TOR updated to address that the SWS will support and inform future planning stages for these lands.
Section 1.2	Within Section 1.2 the following statement is made 'This TOR is meant to cover the Subwatershed Study requirements specifically for lands owned by the LOG, regardless of the specific subwatershed'. It is unclear what this statement means. The Local Subwatershed Study boundary is not defined by the lands owned by the Landowner Group. The Town supports scoping the study area so that the Local Subwatershed includes only the subcatchments that flow into, through and out of the Secondary Plan area, noting that some disciplines will still be larger than that (eg. hydrology and hydraulics). In addition to this, Figure 1 appears to depict only the subject lands and not the study area. The figure and description of the study area need to be updated to reflect the requirements of the Local Subwatershed Study.	Acknowledged; Study Area includes the: Secondary Plan Area, a Natural Heritage Study Area, Hydraulics Study Area, and a Fluvial Study Area. Figure 1 includes the Secondary Plan Area, Natural Heritage Study Area, and Fluvial Study Area; Figure 2 includes the Hydraulics Study Area.
Section 1.2.4	Section 1.2.4 recognizes that access to non-participating lands may be restricted. The applicant will need to demonstrate effort to collect information on non-participating landowner properties. If access is not granted, secondary data sources can be relied upon.	Section 1.2 has been updated to acknowledge that effrots will be made to engage with non-participating land owners for site access to obtain more detailed site conditions to support the local SWS.
Section 1.4	Section 1.4 includes a list of some studies that will be referenced as part of the Local Subwatershed Study. While the draft LSS TOR recognized that this list is not exhaustive, it is important to note that the Region of Peel Scoped Subwatershed Study (Wood et al., 2022) is a foundational document from which the Local Subwatershed Study is intended to build from.	Acknowledged. This has been added.
Section 1.5	Section 1.5 identifies a list of organizations that will be a part of the Technical Advisory Committee. Both the Town of Caledon and the Region of Peel should be a part of the Technical Advisory Committee. As well, the Town's Local Subwatershed Study suggests a minimum number of TAC meetings and when within the study process they should be held. Please update the draft LSS TOR to provide clarity on proposed timing of meetings and objectives to confirm this meets the Local Subwatershed Study Terms of Reference.	Acknowledged. TOR updated.
Section 1.6	Section 1.6 indicates that public consultation will take place in conjunction with the Planning process. The Local Subwatershed Study is to be substantially advanced prior to the submission of an OPA. For this reason, public consultation will need to happen outside of the Planning Process to ensure meaningful consultation with the public.	Based on the timing of the anticipated OPA application, public consultation for the local SWS is anticipated to align with OPA public meetings.
Section 2.3	Section 2.3 indicates that field investigations of existing culverts will be undertaken to verify existing drainage patterns. As part of this investigation, a condition assessment should also be completed.	Condition assessments will be obtained from the Town and Region where available. If a previous assessment has not been completed for a culvert identified as a potential SWM Facility outfall, an assessment will be conducted as part of the Phase 2 report.
Section 2.4	Section 2.4 outlines the work that will be done as part of the hydrogeological investigation. An objective of this investigation should be to determine predevelopment infiltration, depth to groundwater throughout the year, groundwater flow direction/gradient, and the interaction with surface water features (eg. discharge locations). While these objectives are not explicitly stated it does appear that the information that is proposed to be collect will inform this characterization. This comment is provided only to ensure Engineering expectations are clearly understood.	Acknowledged and confirmed that data collection will be sufficient to respond to these items.

Section 3.0	Section 3.0 provides an overview of the Impact Assessment. identifies future stressors, describes (past, present) and predicts (future) impacts, and assesses these impacts against the preliminary goals, objectives, and targets developed as part of Phase 1. Future land use scenario(s) are evaluated based on input from the Secondary Plan Land Use Team. For various disciplines (i.e., groundwater, hydrology, hydraulics and water quality) analytical tools are required to be used to predict changes to existing conditions in relation to subwatershed-based targets associated with the development of the Secondary Plan area. Information and analyses from previous background studies (i.e., Watershed Plan, Regional Scoped Subwatershed Study, Hydrologic Investigations, Tier 3 Groundwater Studies, etc.) will be used to assist modelling future land use scenarios. For others (i.e., terrestrial and aquatic ecology) predictions will inherently be semi-quantitative, qualitative or conceptual, integrated with predictions from other subwatershed disciplines (i.e., hydrogeology, hydrology, hydraulics and water quality) and experience elsewhere including knowledge of habitat/biota interactions. Please ensure that the development of goals, objectives and targets are a part of the Phase 1 Report and developed in consultation with the Technical Advisory Committee. Furthermore, it is not clear from the draft LSS TOR that this is the approach being followed. Please provide clarity on how the Phase 2 Study will be completed.	Acknowledged. Description of Phase 2 has been updated to provide more detail on impact assessment methodology.
	As part of the Humber River Watershed Study currently being undertaken the Toronto and Region Conservation Authority an assessment of the impacts of climate change has been undertaken by applying a quantitatively or qualitatively tiered approach assessing the impact of two climate scenarios. The two climate scenarios include a moderate emissions scenario (SSP2-4.5) and a very high emissions scenario (SSP5-8.5), which translate to approximately 2.7°C and 4.4°C of global warming by the end of the century, respectively (IPCC, 20211). It is the intent of the Local Subwatershed Study to apply a similar methodology. For the Local Subwatershed Studies being undertaken within the Humber River Watershed this will include downscaling TRCAs approach to the applicable study area. In this case, the work done by TRCA can provide supporting information. Should the applicant prefer to devise a different approach this should be provided in the Technical Workplan and approved by the TAC. Please note that both CVC and TRCA have undertaken considerable climate change impact assessment work over the last decade which may provide valuable insights and considerations including TRCA's Vulnerability Assessment for Natural Systems in Peel Region.	Acknowledged. The TOR has been updated to note that this will be addressed in Phase 1 report and will be explored through the subsequent SWS phases.
	Please note that Engineering has organized a meeting on August 16, 2024 from 1:00pm to 2:00pm for TRCA to present the approach they took to evaluating the impact of climate change as part of their Humber River Watershed Study update. The consultants leading the Local Subwatershed Study for Mayfield-Tullamore are encouraged to attend. Please reach out to Cassie Schembri at cassie.schembri@caledon.ca to have the meeting invite forwarded should you have an interest in attending.	Acknowledged.
Section 2.0	Section 2 indicates that as part of Phase 1 a workplan will be developed following the completion of a gap analysis. However, Appendix B appears to include a discipline specific workplan. Given that the gap analysis has not been provided and that no supporting identification of monitoring locations, timing of monitoring and or length of monitoring has been provided, Engineering is unable to provide comments on Appendix B. Engineering suggests that a Technical Advisory Committee meeting be set-up to discuss the results of the gap analysis and review the proposed workplan.	Acknowledged. GEI has since had one TAC committee to discuss the submission of the updated TOR and Workplan. Figures showing monitoring stations will be included. This is being submitted in tandem with Phase 1, which has a thorough background review and gap analysis that influenced the workplan.

Comment Matrix - TRCA

Development Planning and Permits

Section #	Comment	Comment Response
1.2.2	The TOR states, "The geomorphic assessment will be undertaken for watercourses within the Secondary Plan area, as well as receiving watercourses for a distance of approximately 250 meters downstream of the study area. Please clarify why 250 metres was determined as the study limit threshold. It is TRCA's opinion that the details of the analysis should determine how far potential erosion impacts may extend.	The 250 m length was chosen as it represents an approximation of the reach scale, allowing for an initial assessment of several geomorphic units and permitting a useful characterization of the reach. Reaches are sections of the river that display similar characteristics, allowing them to be assessed together, and typically range from 200 m – 2 km in length (TRCA 2004). An assessment of a reach of approximately 10-20 times the bankfull width in length would define a useful scale over which to relate stream morphology to channel processes, response potential to disturbances, and habitat characteristics (Montgomery & Buffington 1997). Typically, the potential for impacts of the greatest magnitude as a result of development are observed in the reach immediately downstream of the development. As the distance increases downstream of the development, the impacts may be more difficult to track due to an increase in drainage area, or additional flows from adjacent lands. However, it is noted that the assessment of the reach immediately downstream is intended as a starting point for assessing sensitivity and the potential for erosion. An expansion of the study area would be considered if the findings of this assessment deem it necessary to do so.
	It is noted that most of the floodplain passes through lands belonging to non-participating landowners. The proposed development will increase regulatory flows, resulting in an expanded floodplain on these non-participating properties. This may affect future development on these lands. It is important that this study addresses this issue.	Acknowledged.
1.4	The following important guidelines and protocols, crucial for the study, are missing. Please include these guidelines: a. Wetland Water Balance Risk Evaluation, TRCA, 2017 b. Wetland Water Balance Monitoring Protocol, TRCA, 2016 c. Wetland Water Balance Modelling Guidance Document, TRCA, 2020	Acknowledged. TOR has been updated.
3.1	Completion of wetland screening and wetland water balance risk evaluation using the TRCA Wetland Risk Evaluation Protocol (based on Wetland Water Balance Risk Evaluation, Toronto and Region Conservation Authority, 2017) is necessary to identify the need for detailed wetland-specific water balance analyses. This includes monitoring wetlands (based on Wetland Water Balance Monitoring Protocol, TRCA, 2016) and completing water balance calculations and recommendations (based on Wetland Water Balance Modelling Guidance Document, TRCA, 2020) to manage water sources for TRCA regulated features.	Wetland screening and water balance risk evaluation will be completed during Phase 2. Hydrogeological monitoring data will be collected at a sufficient level of detail to support further feature assessments. As part of the local SWS, high level mitigation recommendations for medium and high-risk wetlands (e.g., roof top drainage, LIDs, etc) will be provided, and wetland relocation areas will be assessed to confirm can support the hydrology of proposed compensation wetland. It is GEI's opinion that detailed Feature Based Water Balance should be deferred to future site-specific development applications when conditions and site plans are better understood.
3.2	If the proposed SWM facilities discharge to ephemeral or intermittent watercourses, it is critical that the applicant completes a detailed Erosion Assessment in accordance with TRCA's Stormwater Management Criteria document using continuous hydrology modeling. This assessment must establish the required level of stormwater management (SWM) erosion control, specifying release rates and volume control requirements.	Acknowledged.
3.3	Update the HEC-RAS model and Floodplain Mapping using the proposed condition uncontrolled Regulatory peak flows (the greater of uncontrolled 100-year or regional storms) for all watercourses.	Acknowledged.

	Please note that the Floodplain Mapping for the subject site and downstream of the properties was developed using the updated Humber River Hydrology model. This model assumes that the subject site is predominantly agricultural land. However, the proposed development will definitely increase peak flows to downstream properties, impacting the existing floodplain mapping of the adjacent properties. Therefore, the TRCA requires that post-development regional peak flows be controlled to pre-development Regional peak flows, so that the regional control provides functional protection.	Acknowledged.
4.3	Please note that the Floodplain Mapping for the subject site and downstream of the properties was developed using the updated Humber River Hydrology model. This model assumes that the subject site is predominantly agricultural land. However, the proposed development will definitely increase peak flows to downstream properties, impacting the existing floodplain mapping of the adjacent properties. Therefore, the TRCA requires that post-development regional peak flows be controlled to pre-development Regional peak flows, so that the regional control provides functional protection.	Acknowledged.
Appendix B	Please note that the sizing of the proposed natural channel should ensure it has the capacity to convey the uncontrolled regulatory peak flows (100-year or regional storm) without overtopping, while maintaining a one-foot freeboard.	Acknowledged - realigned channels will be designed to incorporate all natural hazard limits. TOR to be updated.
	Should the uncontrolled post-development regulatory flows worsen the flooding situation at the crossings, it is imperative that the applicant assess various mitigation options. These options may include upsizing the crossings or implementing relief culverts to ensure that the increase in peak flows does not negatively impact the public or adjacent properties.	Acknowledged.
	It is our understanding that the following bullet point ("If warranted based on the hydrologic assessment, provide a recommended approach to the management of Regional storm flows.") should be replaced with: "Please note that the Floodplain Mapping for the subject site and downstream of the properties was developed using the updated Humber River Hydrology model, assuming the subject site is predominantly agricultural land. However, the proposed development will increase peak flows to downstream properties, affecting existing floodplain mapping. Therefore, TRCA requires controlling uncontrolled post-development Regional peak flows to match pre-development Regional peak flows."	Acknowledged.
	Please note that if the wetland water balance risk assessment results indicate a medium or high-risk level, the applicant is required to monitor the wetland and establish a continuous hydrology model to develop feasible mitigation measures that will maintain the natural hydroperiods of the wetlands. This should be done in accordance with the TRCA Wetland Water Balance Monitoring Protocol (Toronto and Region Conservation Authority, 2016) and the Wetland Water Balance Modelling Guidance Document (Toronto and Region Conservation Authority, 2020).	Detailed Feature Based Water Balance will be completed for future site-specific development applications when conditions and site plans are better understood.

Comment Matrix - Region of Peel

Development Engineering

Section #	Comment	Comment Response
3.8	Regional staff request clarification on the purpose of the "Preliminary Grading and Servicing Memo"– i.e., is the Memo in reality a Functional Servicing Report?	The Preliminary Grading and Servicing Memo is not a Functional Servicing Report. The purpose of the Preliminary Grading and Servicing Memo is to identify the internal and external water distribution main and trunk wastewater infrastructure required to service the Secondary Plan. The memo will provide a framework for how particular areas of the Secondary Plan will be serviced including: identifying Region Master Plan trunk sanitary sewers and water distribution mains, identifying preliminary trunk sanitary sewer and water distribution main alignments and connection locations, identifying external sanitary drainage conveyed through the Secondary Plan, preliminary sanitary service populations, sewer sizing, and invert design, and preliminary water distribution main sizing (subject to confirmation by Region model updates). The information provided in this memo will show that the Secondary Plan can be feasibly serviced and is in conformance with the Region Water and Wastewater Master Plan. The design of the water and wastewater infrastructure will be refined through the Tertiary Plan Process which will then be incorporated into Functional Servicing Reports for individual Draft Plans in accordance with the Town of Caledon Official Plan (2024).

APPENDIX B – Natural Heritage

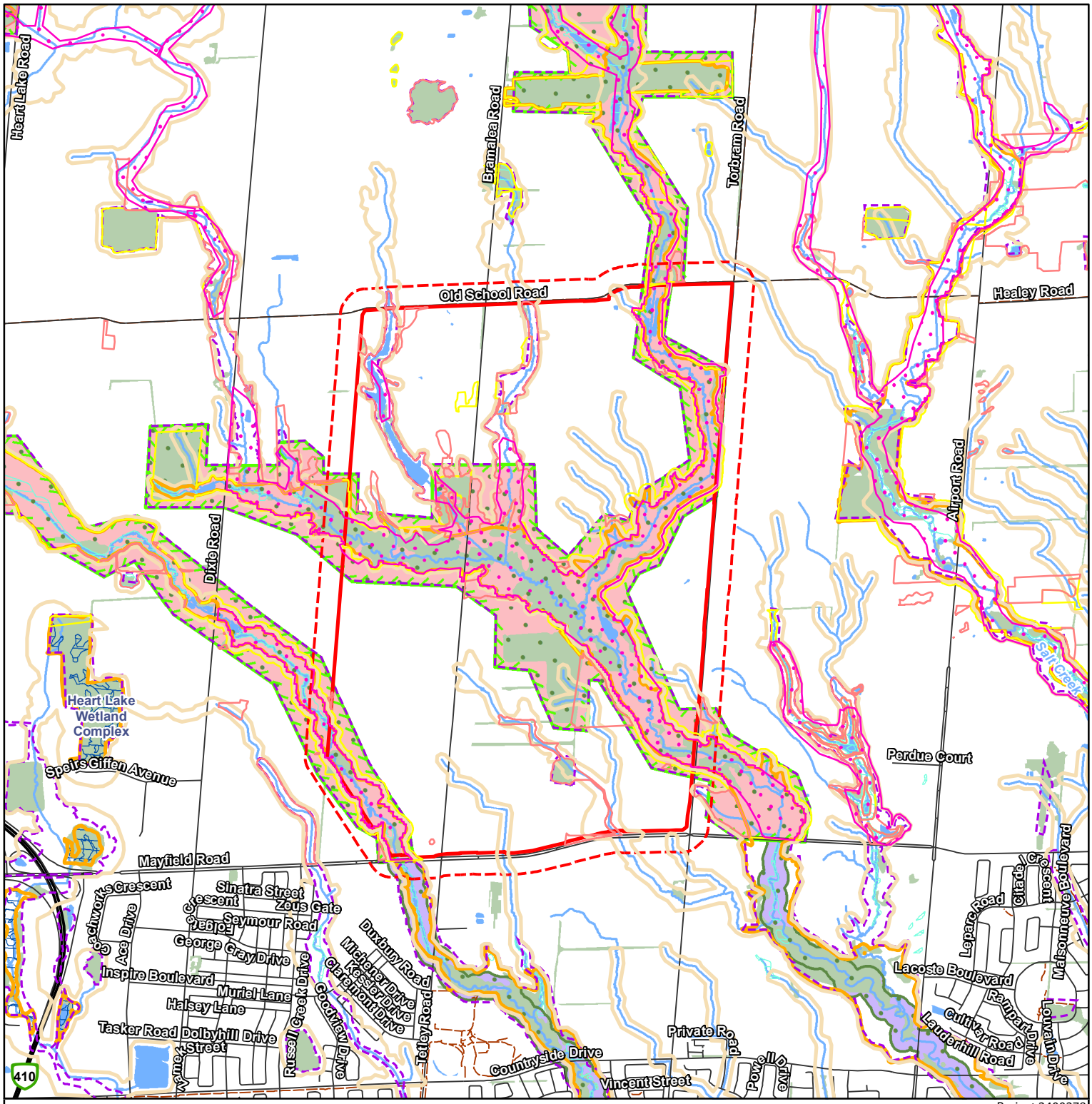
Appendix B1 – Figures

Appendix B2 – Tables

Appendix B3 – Beacon Environmental Natural Heritage Evaluation

Appendix B4 – Feature Staking

Appendix B1 – Figures



Project 2400278

NOTES:

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Legend

- Study Area
- Study Area + 120m

Land Information Ontario

- Highway
- Road
- Trail Segment (OTN)
- Provincially Significant Wetland
- Wetland - Not evaluated per OWES
- Waterbody
- Wooded Area
- Protected Countryside
- Urban River Valley

Greenbelt Planning Area

- Greenbelt NHS
- Greenbelt Boundary

Peel Region Official Plan Schedules C-1 and C-2

- Greenlands Systems (C-1)
- Core Areas of the Greenlands System in Peel (C-2)

Future Caledon Official Plan (Draft, 2024)

Preliminary Natural Environment System - Schedule D1 and D2a

- Natural Features and Areas
- Supporting Features and Areas

Town of Caledon Official Plan (2024 Consolidation) - Schedule A

- Environmental Policy Area

Toronto and Region Conservation Authority (TRCA)

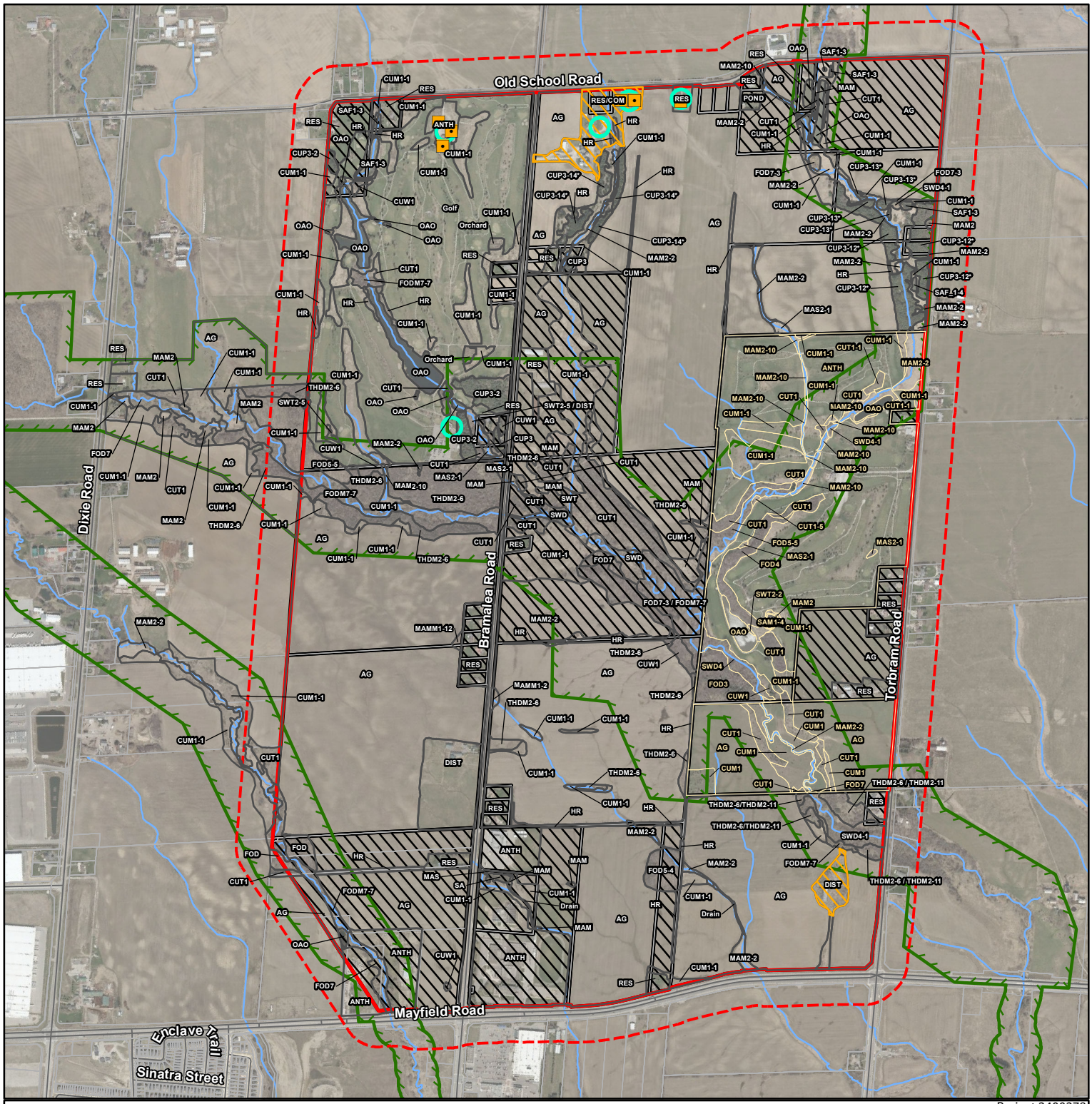
- Toronto and Region Conservation Authority Approximate Regulation Limit
- Watercourse (TRCA)

Mayfield Tullamore Landowner Group
Phase 1 - Subwatershed Characterization and Integration Report
Aquatic and Terrestrial Existing Conditions

Figure 1
Landscape Setting

0 500 m
1:30,000

GEI Consultants



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Legend

- Study Area
- Study Area + 120m
- Watercourse
- Greenbelt Plan Area
- Property Line (Town of Caledon)
- Non-Participating Property
- Participating Property
- Ecological Land Classification (GEI, 2024)
- Ecological Land Classification (Beacon 2022,2023)
- Snake VES Required
- Structures identified for further survey effort prior to removal
- Bat Exit Structure (GEI 2024)

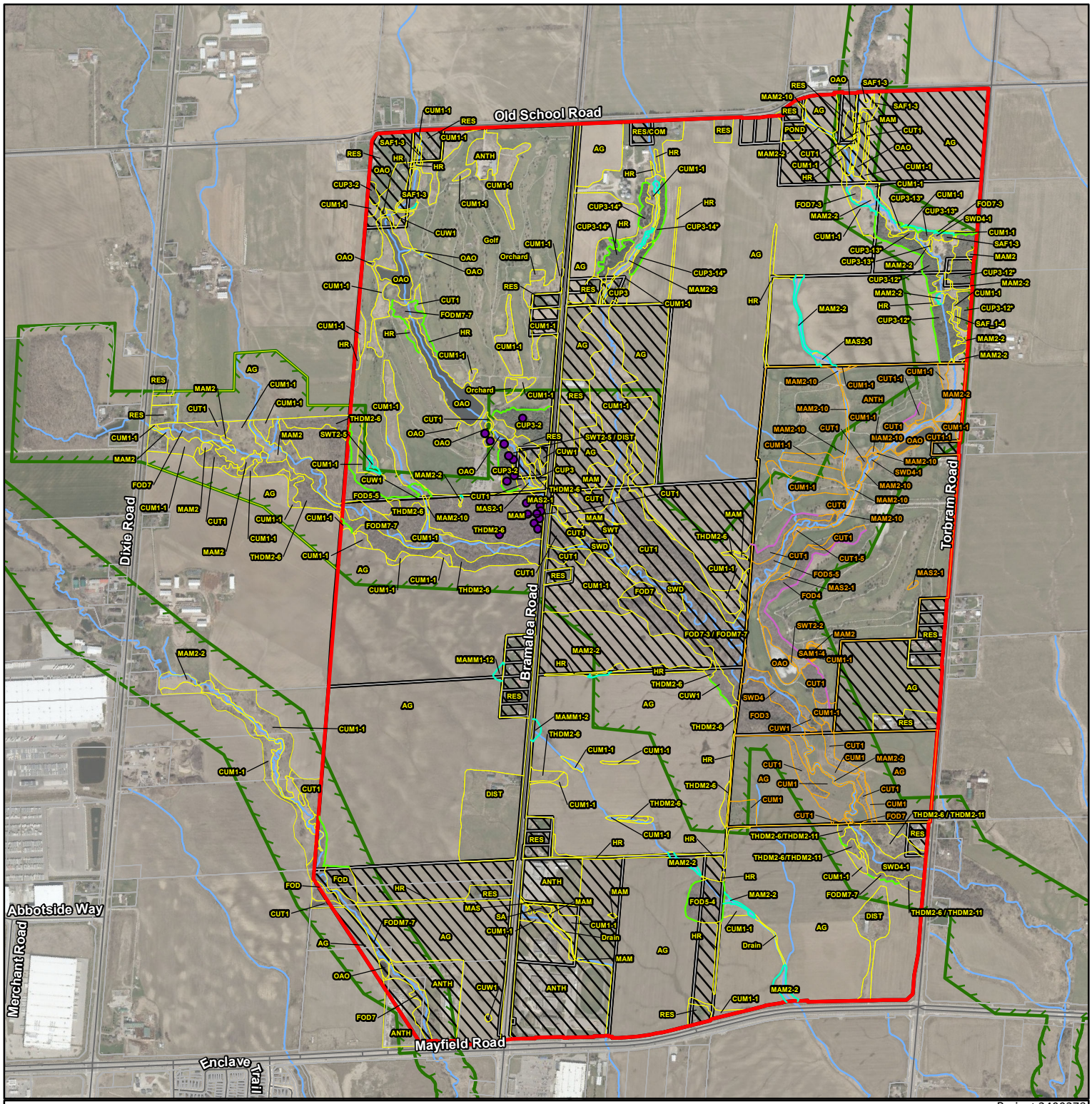
Mayfield Tullamore Landowner Group
Phase 1 - Subwatershed Characterization and Integration Report
Aquatic and Terrestrial Existing Conditions

Figure 2
Structure Screening

0 400 m

1:18,000

GEI Consultants



Project 2400278

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Legend

- Study Area
- Watercourse
- Greenbelt Plan Area
- Property Line (Town of Caledon)
- Non-Participating Property
- Participating Property
- Ecological Land Classification (GEI 2024)
- Ecological Land Classification (Beacon 2022,2023)
- Staked Wetland with TRCA (July 4,5,8, 2024)
- Staked Tree Limit with Town of Caledon (May 30, 31 and June 3, 2024)
- Staked Dripline with TRCA (Beacon 2022)
- Endangered Plant - Butternut (GEI 2024)

Mayfield Tullamore Landowner Group
Phase 1 - Subwatershed Characterization and Integration Report
Aquatic and Terrestrial Existing Conditions

Figure 3
Ecological Land Classification

0 390 m

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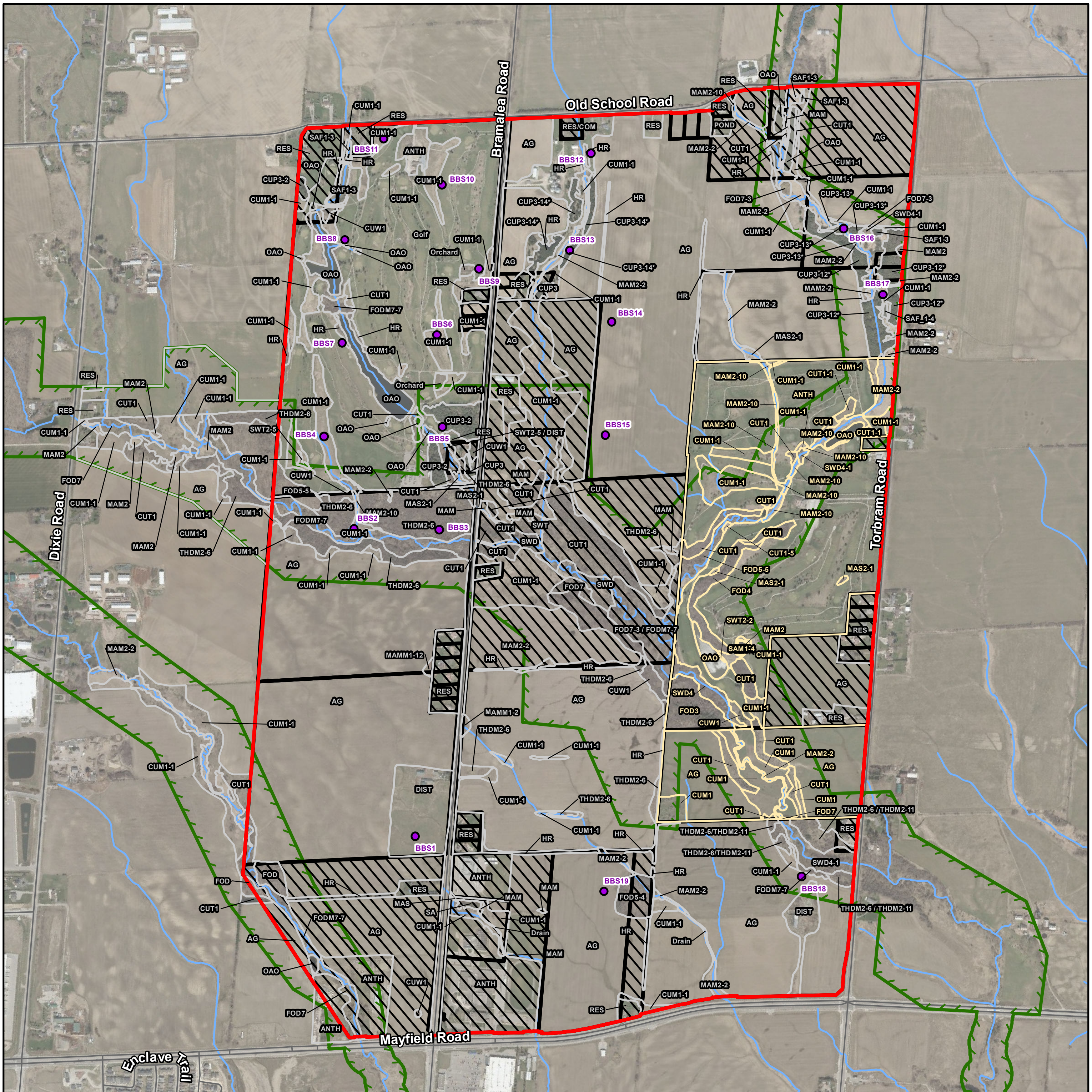
GEI Consultants



Project 2400278

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ELC Legend

AG, Agriculture
ANTH, Anthropogenic
CUM1, Mineral Cultural Meadow
CUM1-1, Dry-Moist Old Field Meadow
CUP3, Coniferous Plantation
CUP3-12*, White Pine - White Spruce Coniferous Plantation
CUP3-13*, White Cedar Coniferous Plantation
CUP3-14*, Norway Spruce Coniferous Plantation
CUP3-2, White Pine Coniferous Plantation
CUT1, Mineral Cultural Thicket
CUT1-1, Sumac Cultural Thicket
CUT1-5, Raspberry Cultural Thicket
CUW1, Mineral Cultural Woodland
DIST, Disturbed
FOD, Deciduous Forest
FOD3, Dry-Fresh Poplar - White Birch Deciduous Forest
FOD4, Dry-Fresh Deciduous Forest
FOD5-4, Dry – Fresh Sugar Maple – Ironwood Deciduous Forest
FOD5-5, Dry – Fresh Sugar Maple – Hickory Deciduous Forest
FOD7, Lowland Deciduous Forest
FOD7-3, Fresh – Moist Willow Lowland Deciduous Forest
FODM7-7, Fresh - Moist Manitoba Maple Lowland Deciduous Forest
HR, Hedgerow
MAM, Meadow Marsh
MAM2, Mineral Meadow Marsh
MAM2-10, Forb Mineral Meadow Marsh
MAM2-2, Reed-canary Grass Mineral Meadow Marsh
MAMM1-12, Common Reed Graminoid Mineral Meadow Marsh
MAMM1-2, Cattail Graminoid Mineral Meadow Marsh
MAS, Shallow Marsh
MAS2-1, Cattail Mineral Shallow Marsh
OAO, Open Aquatic
RES, Residential
SA, Shallow Aquatic
SAF1-3, Duckweed Floating-leaved Shallow Aquatic
SAF_1-4, Pondweed Floating-leaved Shallow Aquatic
SAM1-4, Pondweed Mixed Shallow Aquatic
SWD, Deciduous Swamp
SWD4, Mineral Deciduous Swamp
SWD4-1, Willow Mineral Deciduous Swamp
SWT, Thicket Swamp
SWT2-2, Willow Mineral Thicket Swamp
SWT2-5, Red-osier Dogwood Mineral Thicket Swamp
THDM2-6 / THDM2-11, Buckthorn Deciduous Shrub Thicket / Hawthorn Deciduous Shrub Thicket
THDM2-6, Buckthorn Deciduous Shrub Thicket

Legend

- Study Area
- Watercourse
- Greenbelt Plan Area
- Non-Participating Property
- Participating Property
- Breeding Bird Stations (GEI 2024)
- Ecological Land Classification (GEI 2024)
- Ecological Land Classification (Beacon 2022,2023)

- All participating properties were reviewed for potential suitability for winter raptors. There are no specific stations for this survey type; rather, the entire property was surveyed to review for suitability

- Breeding bird surveys completed by Beacon Environmental (2022,2023) used a roving technique instead of point count locations.

Mayfield Tullamore Landowner Group
Phase 1 - Subwatershed Characterization and Integration Report
Aquatic and Terrestrial Existing Conditions

Figure 4 Breeding Bird Surveying Stations

0 390 m

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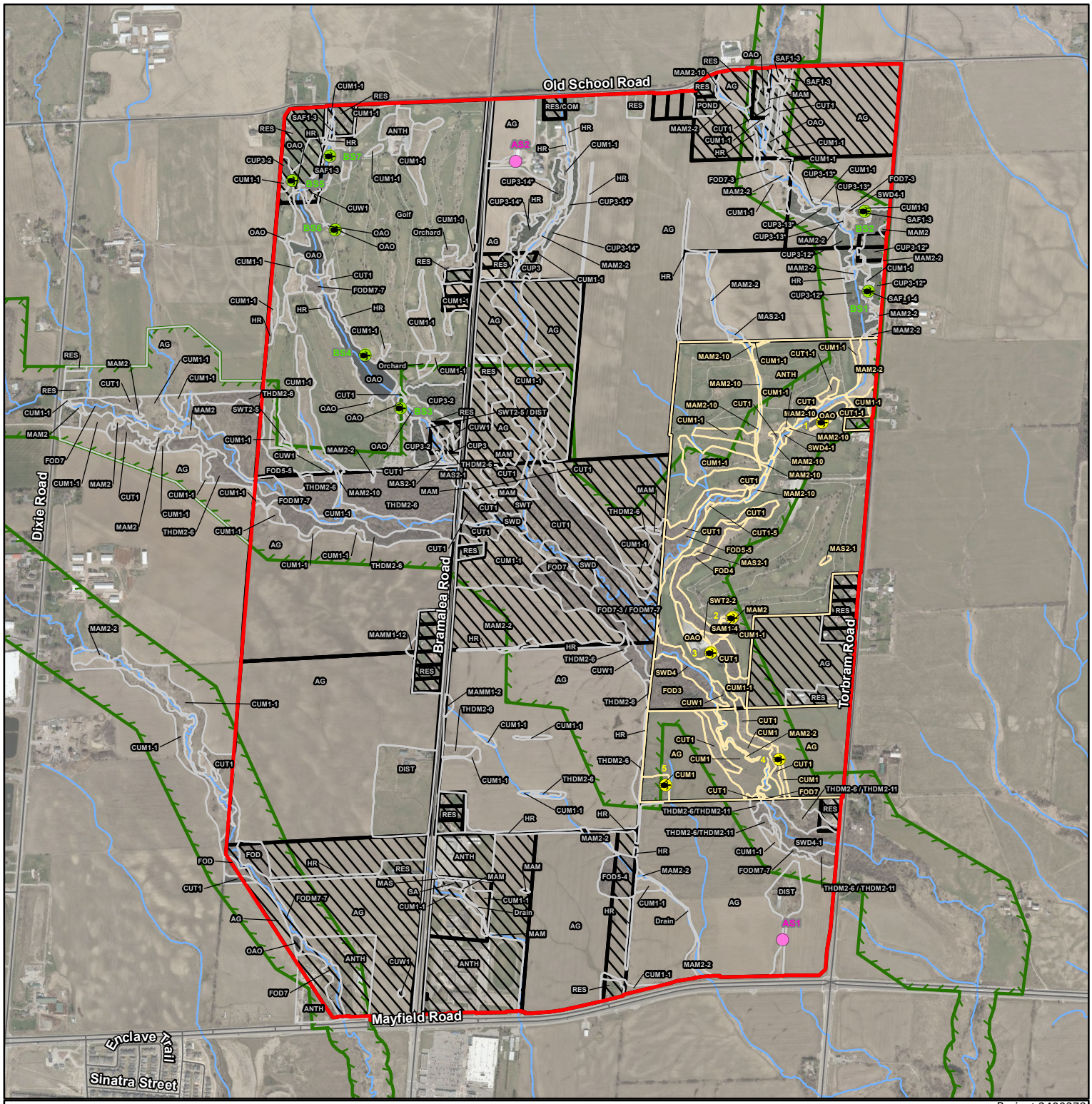
GEI Consultants



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Legend

- Study Area
- Watercourse
- Greenbelt Plan Area
- Non-Participating Property
- Participating Property
- Turtle Basking Surveys* (GEI 2024)
- Turtle Basking Surveys (Beacon 2023)
- Snake Visual Encounter Surveys (GEI 2024)
- Ecological Land Classification (GEI 2024)
- Ecological Land Classification (Beacon 2022,2023)

*General turtle nesting suitability assessments were completed throughout the Study Area

Mayfield Tullamore Landowner Group
Phase 1 - Subwatershed Characterization and Integration Report
Aquatic and Terrestrial Existing Conditions

Figure 5
Reptile Survey Stations

0 390 m

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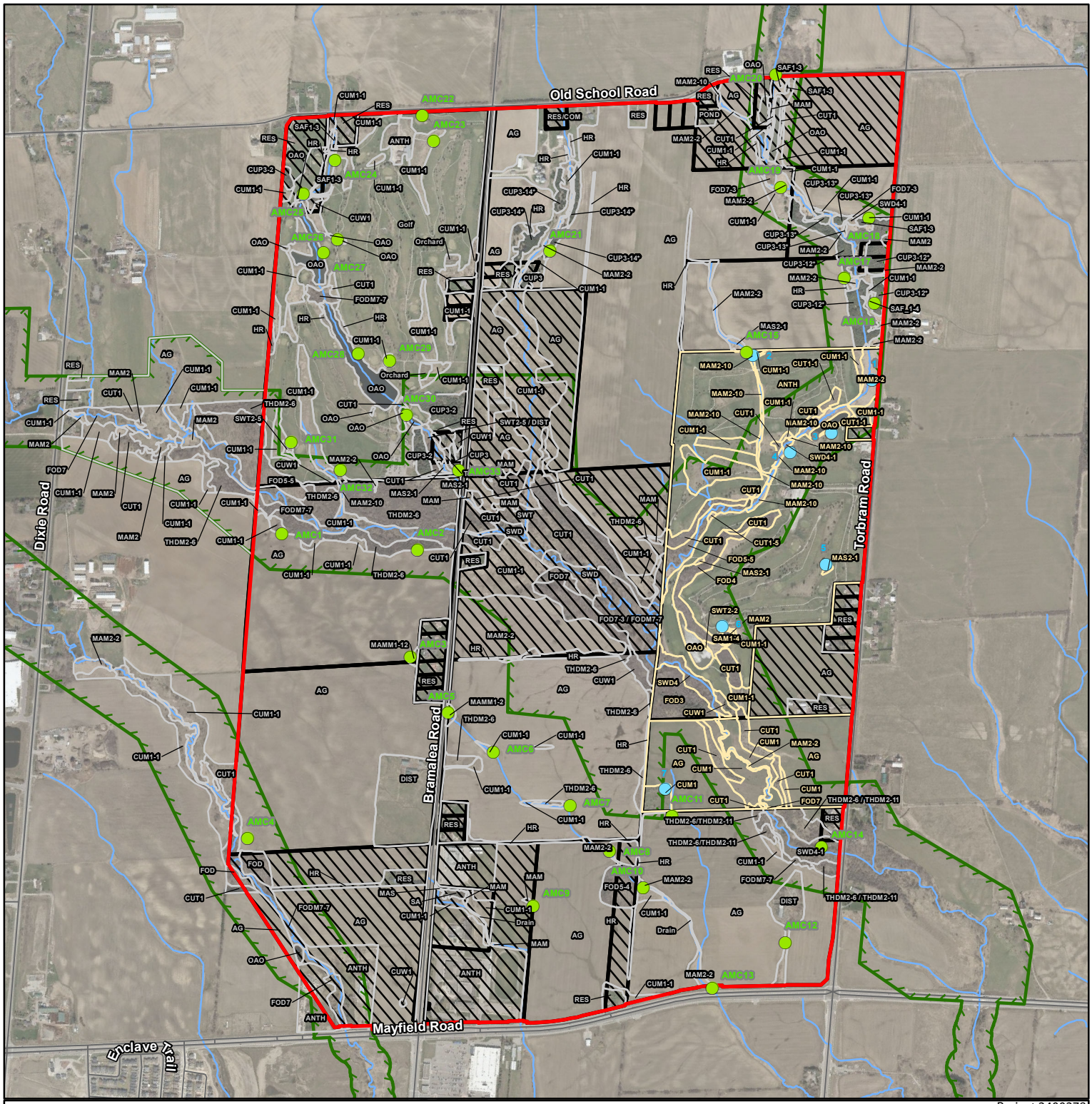

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Legend

- Study Area
- Watercourse
- Greenbelt Plan Area
- Non-Participating Property
- Participating Property
- Amphibian Call Count Stations (GEI 2024)
- Amphibian Call Count Stations (Beacon 2023)
- Ecological Land Classification (GEI 2024)
- Ecological Land Classification (Beacon 2022,2023)

Mayfield Tullamore Landowner Group
Phase 1 - Subwatershed Characterization and Integration Report
Aquatic and Terrestrial Existing Conditions

Figure 6
Amphibian Survey Stations

0 390 m

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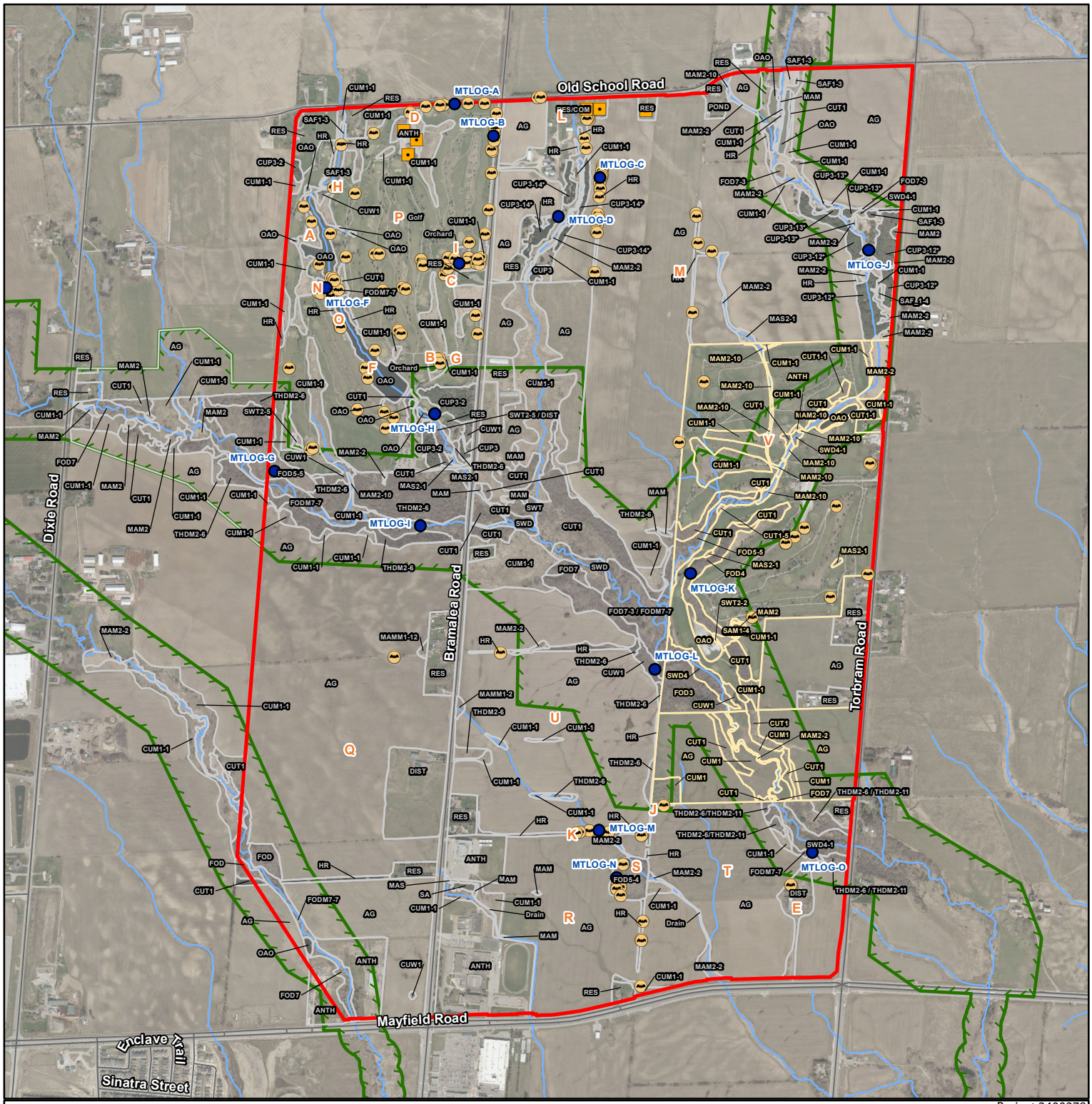

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Legend

- Study Area
- Watercourse
- Greenbelt Plan Area
- Non-Participating Property
- Participating Property
- Bat Snags (GEI 2024)
- Bat Exit Structure (GEI 2024)
- Bat Acoustic Stations (GEI 2024)
- Ecological Land Classification (GEI 2024)
- Ecological Land Classification (Beacon 2022,2023)

Mayfield Tullamore Landowner Group
Phase 1 - Subwatershed Characterization and Integration Report
Aquatic and Terrestrial Existing Conditions

Figure 7
Bat Survey Stations

0 390 m

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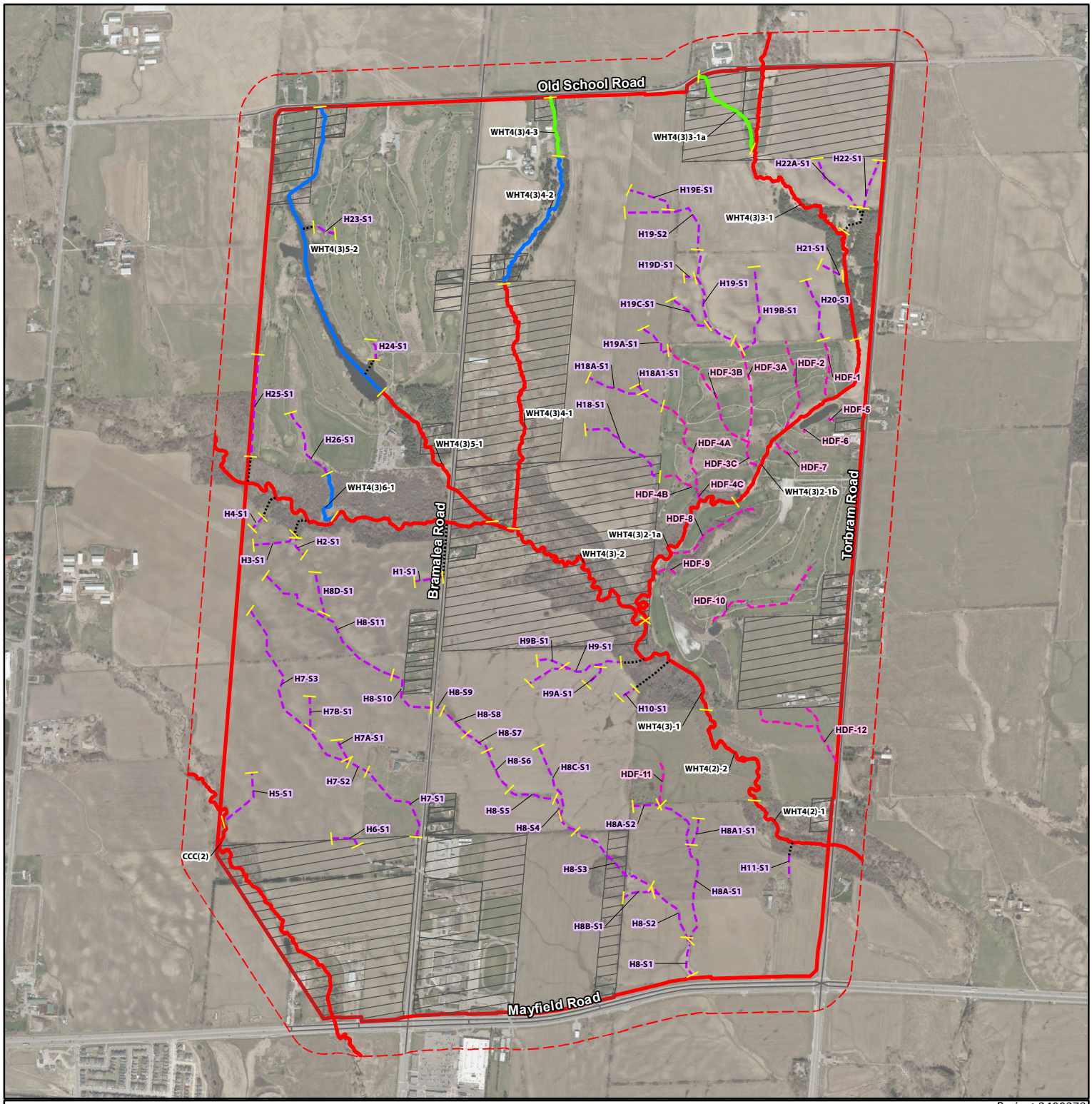

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Legend

- Study Area
- Study Area + 120m
- Non-Participating Property

Stream Constraints (GEI 2024)

- High
- Medium
- Low

Headwater Drainage Feature (GEI 2024)

- Feature within defined valleyland
- Headwater Drainage Feature
- Assumed HDF within Non-Participating Property
- Reach Breaks
- Headwater Drainage Feature (Beacon)

*Features that may be permitted to be removed and replicated within the Natural Heritage System in accordance with environmental permitting

Mayfield Tullamore Landowner Group
Phase 1 - Subwatershed Characterization and Integration Report
Aquatic and Terrestrial Existing Conditions

Figure 8
Watercourses and Headwater Drainage Features

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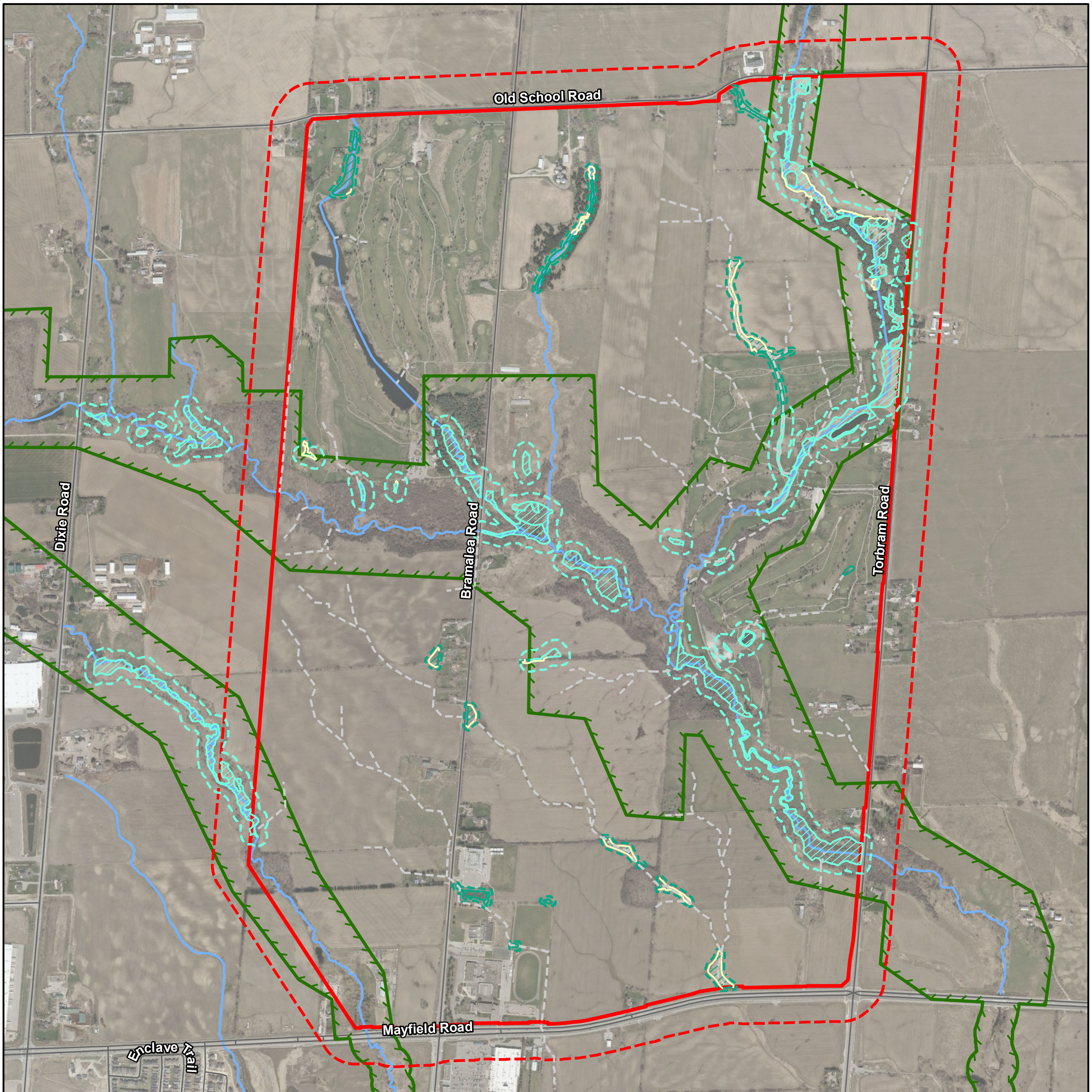

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Legend

- Study Area
- Study Area + 120m
- Greenbelt Plan Area
- Watercourse (GEI 2024)
- Headwater Drainage Feature (GEI, Beacon)
- Staked Wetland with TRCA (July 4,5,8, 2024)
- Candidate Significant Wetlands
- Non-Significant Wetlands
- Non-Significant Wetlands + 10m (GEI 2024)
- Candidate Significant Wetlands + 30m (GEI 2024)

No wetland buffer was provided to the tableland wetland within Property 9 by Beacon Environmental.

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Mayfield Tullamore Landowner Group
Phase 1 - Subwatershed Characterization and Integration Report
Aquatic and Terrestrial Existing Conditions

Figure 9A Preliminary Constraints Analysis - Wetlands

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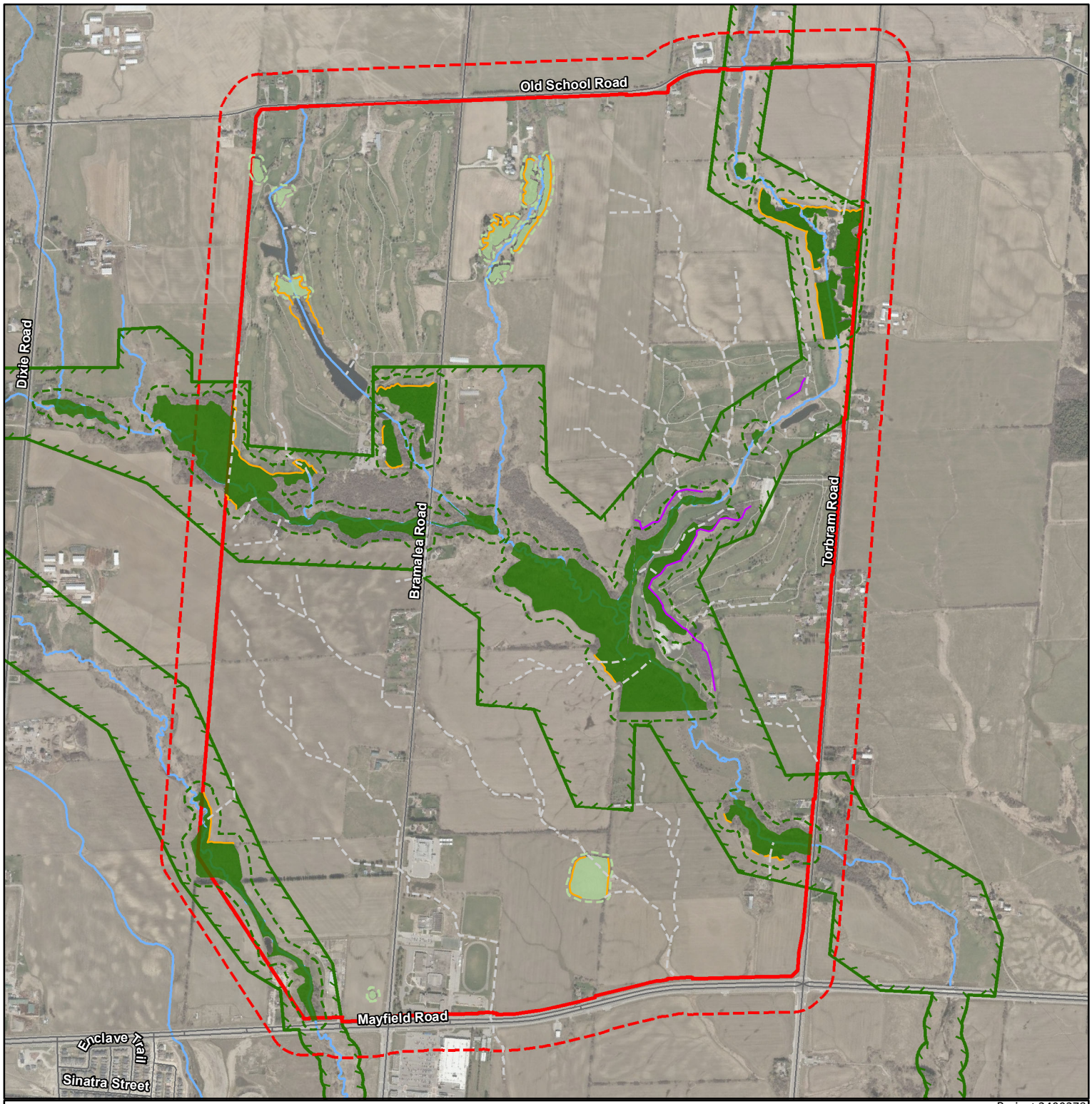

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Legend
- Study Area
- Study Area + 120m
- Greenbelt Plan Area
- Watercourse (GEI 2024)
- Headwater Drainage Feature (GEI, Beacon)
- Staked Dripline with TRCA (Beacon 2022)
- Staked Tree Limit with Town of Caledon (May 30, 31 and June 3, 2024)
- Woodlands (GEI, Beacon 2024)
- Significant Woodlands (GEI, Beacon 2024)
- Woodland + 10m (GEI 2024)
- Significant Woodland + 30m (GEI 2024)

Mayfield Tullamore Landowner Group
Phase 1 - Subwatershed Characterization and Integration Report
Aquatic and Terrestrial Existing Conditions

Figure 9B
Preliminary Constraints Analysis - Woodlands

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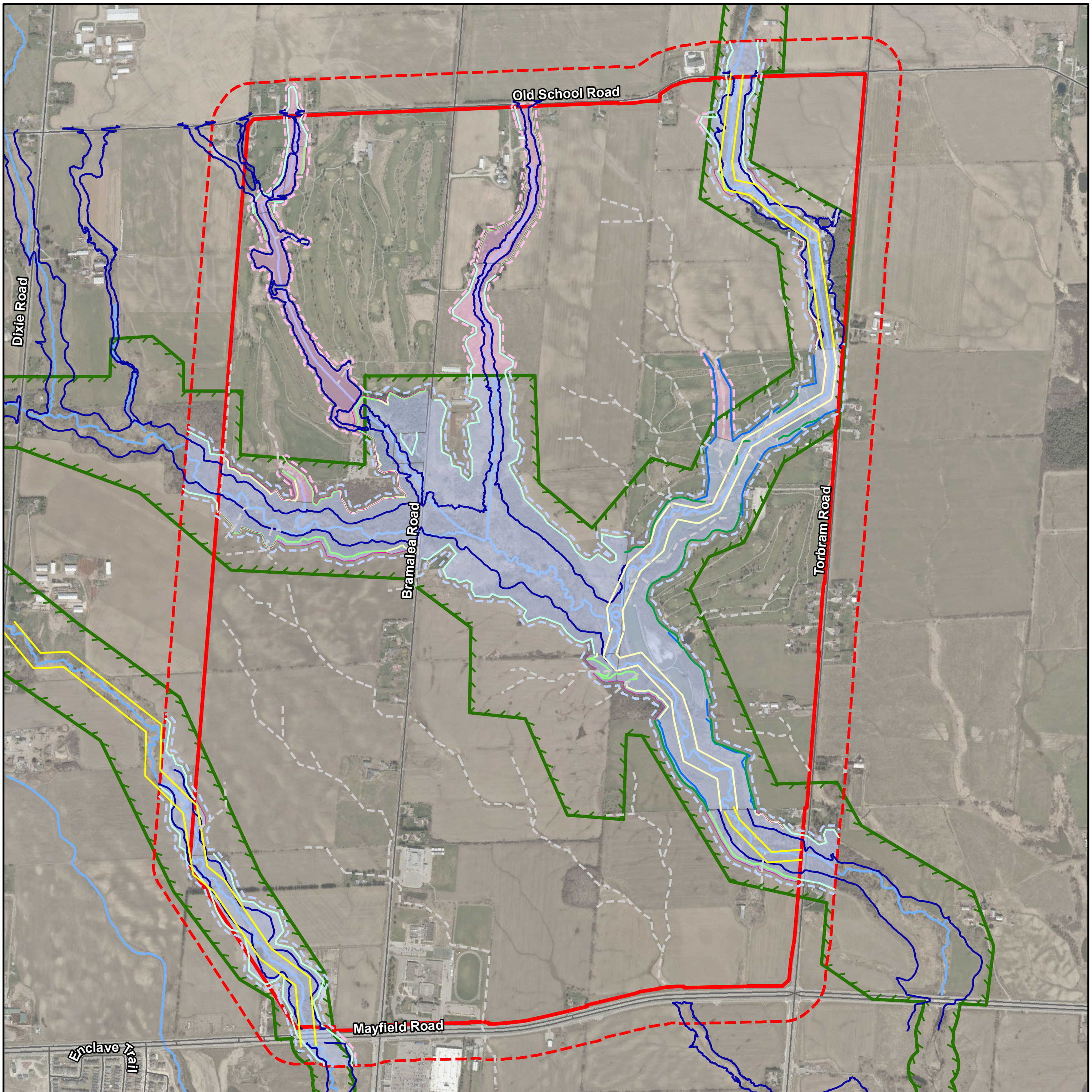

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Mayfield Tullamore Landowner Group
Phase 1 - Subwatershed Characterization and Integration Report
Aquatic and Terrestrial Existing Conditions

Figure 9C Preliminary Constraints Analysis - Valleylands

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Legend
- Study Area
- Study Area + 120m
- Greenbelt Plan Area
- Watercourse (GEI 2024)
- Headwater Drainage Feature (GEI, Beacon)
- Existing Top of Bank - Lidar (GEI 2024)
- Staked Top of Bank with TRCA (Beacon 2022,2023)
- Staked Top of Bank with TRCA (GEI 2024)
- Long Term Stable Top of Slope (GEI 2024)
- Long Term Stable Top of Slope (GEMTEC, June 2024)
- Meander Belt (GEI 2024)
- Meander Belt (Beacon 2024)
- Floodline (TRCA 2024)
- Crest of Slope (TRCA 2022)
- Non-Significant Valleyland (GEI 2024)
- Significant Valleyland (GEI 2024)
- Non-Significant Valleyland + 10m (GEI 2024)
- Significant Valleyland +15m (GEI 2024)

Floodplain hazard has been refined based on discussions with SCS.

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GEI Consultants

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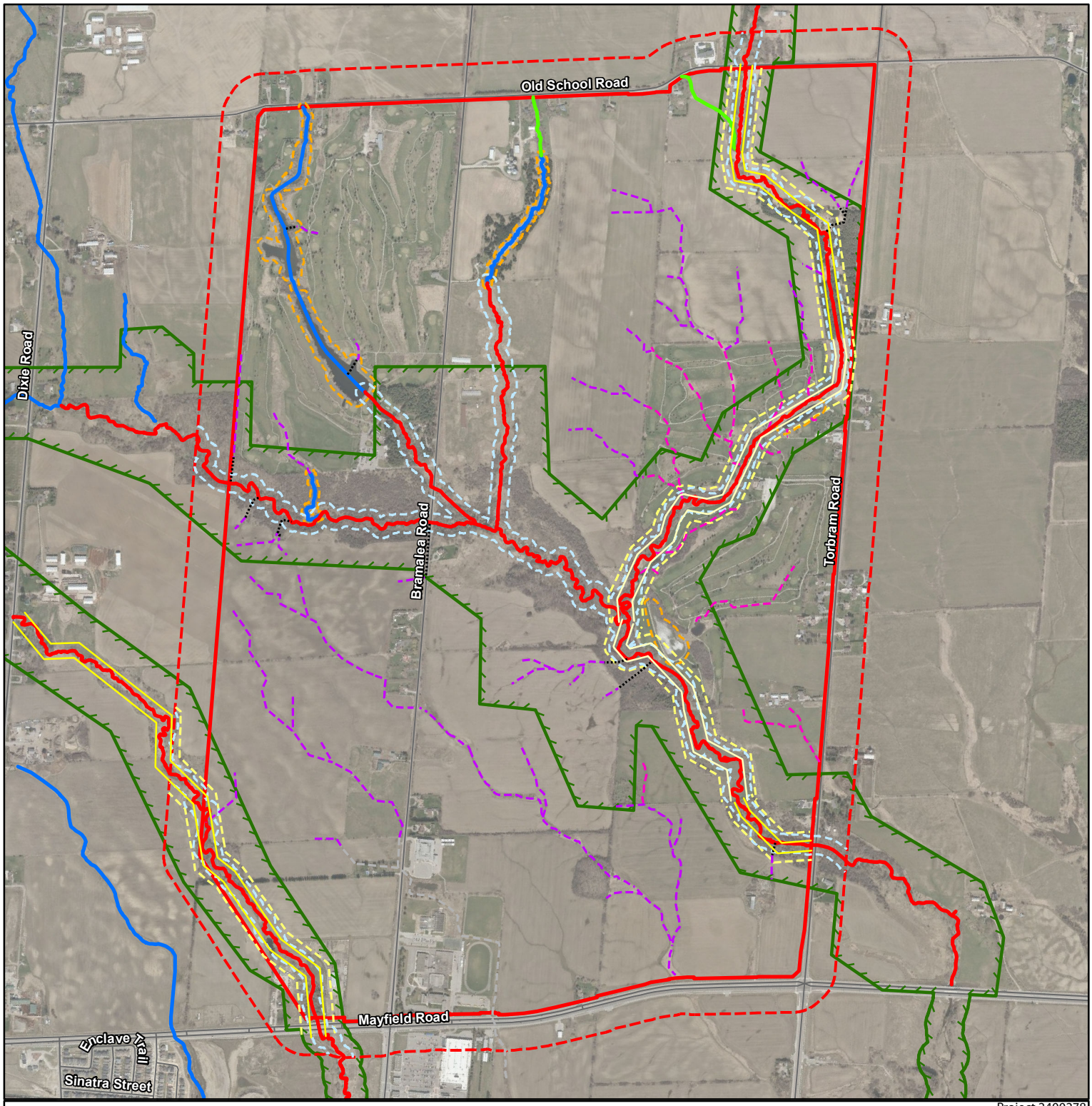

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Legend

- Study Area
- Study Area + 120m
- Greenbelt Plan Area

Stream Constraints (GEI 2024)

- High
- Medium
- Low

Headwater Drainage Feature (GEI 2024)

- Feature within defined valleyland
- Headwater Drainage Feature
- Assumed HDF within Non-Participating Property
- Headwater Drainage Feature (Beacon)

Redside Dace

- Meander Belt (GEI 2024)
- Meander Belt (Beacon 2024)
- Regulated Redside Dace Habitat

Setbacks

- Warmwater Fisheries Setback (15m)
- Cool/Cold Water Fisheries Setback (30m)

HDFs and riparian wetlands may be considered contributing Redside Dace habitat.

Project 2400278

Mayfield Tullamore Landowner Group
Phase 1 - Subwatershed Characterization and Integration Report
Aquatic and Terrestrial Existing Conditions

Figure 9D
Preliminary Constraints Analysis - Fish Habitat

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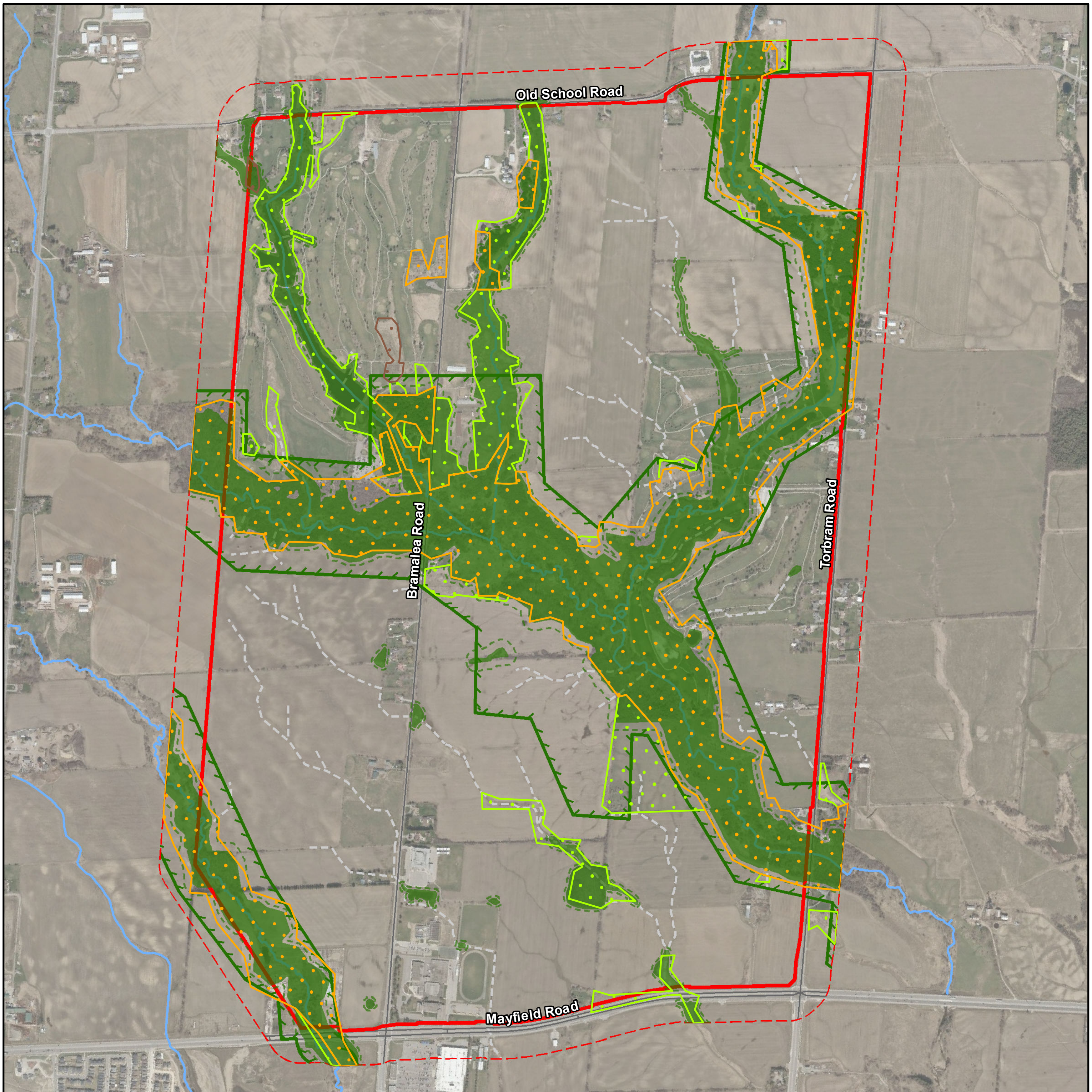

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Legend

- Study Area
- Study Area + 120m
- Greenbelt Plan Area
- Watercourse (GEI 2024)
- Headwater Drainage Feature (GEI, Beacon)

SABE Preliminary NHS*

- Key Features
- Supporting Features
- Other Features

Existing NHS

- Natural Heritage Features and Natural Hazards
- Natural Features and Natural Hazard Setbacks

*SABE Preliminary NHS linework has been drawn using the best approximation from Figure DA2-11b of the SABE

Project 2400278

Mayfield Tullamore Landowner Group
Phase 1 - Subwatershed Characterization and Integration Report
Aquatic and Terrestrial Existing Conditions

Figure 10
Natural Heritage System Comparison

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Appendix B2 – Tables

Table 1: Field Studies and Natural Inventories (2024)

SURVEYORS (SURNAME, INTL)	SURVEY ROUND	SURVEY TYPE	DATE (2024)	TIME		AIR TEMP (C°)	HUMIDITY (%)	CLOUD COVER (%)	BEAUFORT WIND SPEED	PRECIPITATION COMMENTS
				START	END					
Burke, P.	1	Winter Raptor Survey	08-FB	07:15	16:15	6	70	100	0	Freezing Fog
Lee, E. Hunt, N.	1-1	Bat Habitat Assessment & Structure Screening	12-FB	08:40	17:00	0	70	90	2	None
Hunt, N.	1-2	Bat Habitat Assessment & Structure Screening	15-FB	10:05	17:00	-3	70	100	3	None
Kimble, B.	1-1	Headwater Drainage Feature Assessment	18-MR	09:00	15:30	1	65	100	4	None
Kimble, B. Fleming, D.	1-2	Headwater Drainage Feature Assessment	19-MR	09:00	16:00	1	73	90	4	Snow
Kimble, B.	1-3	Headwater Drainage Feature Assessment	22-MR	09:00	16:00	-3	69	100	3	Snow
Kimble, B. Fleming, D.	1-4	Headwater Drainage Feature Assessment	27-MR	09:00	16:00	9	65	75	4	None
Williamson, L. Love, S.	1-1 1-1	Turtle Basking and Nesting Survey & Snake Transect Survey	09-AP	09:30	14:30	13	62	10	1	None
Williamson, L. Love, S.	1-2 1-2	Turtle Basking Survey & Snake Transect Survey	10-AP	10:00	14:40	17	72	10	1	None
Nieroda, M. Fleming, D.	1	Spring Fish Community Sampling	15-AP	09:00	18:30	16	32	70	4	None

Table 1: Field Studies and Natural Inventories (2024)

Williamson, L. Love, S.	2-1 2-1	Snake Transect Survey & Turtle Basking Survey	16-AP	10:00	14:20	15	67	10	1	None
Williamson, L. Love, S.	1-1	Amphibian Call Count Survey	17-AP	20:30	22:00	11	38	10	1	None
Williamson, L. Cartwright, C.	2-2 2-2	Turtle Basking Survey & Snake Transect Survey	26-AP	13:00	16:00	11	29	5	2	None
Leslie, J.	1-1	Spring Ecological Land Classification and Botanical Inventories	2-MA	09:00	16:30	16	61	20	3	None
Williamson, L. Brunelle, P.	3-1 3-1	Snake Transect Survey & Turtle Basking Survey	2-MA	12:40	16:45	15	73	5	2	None
Leslie, J.	1-2	Spring Ecological Land Classification and Botanical Inventories	3-MA	09:00	16:00	16	64	80	3	Rain
Leslie J.	1-3	Spring Ecological Land Classification and Botanical Inventories	6-MA	09:00	15:00	18	45	80	3	None
Williamson, L. Love, S.	3-2 3-2	Snake Transect Survey & Turtle Basking Survey	6-MA	09:15	13:00	14	60	15	2	None
Leslie, J.	1-4	Spring Ecological Land Classification and Botanical Inventories	7-MA	09:00	15:30	20	45	80	3	None
Leslie, J.	1-5	Spring Ecological Land Classification and Botanical Inventories	8-MA	09:00	14:00	20	54	65	4	None

Table 1: Field Studies and Natural Inventories (2024)

Williamson, L. Love, S.	2-1	Amphibian Call Count Survey	16-MA	21:00	23:00	17	73	5	1	None
Williamson, L. Love, S.	2-2	Amphibian Call Count Survey	17-MA	21:00	23:00	15	100	95	2	Rain, Fog
Robinson, O. Leslie, J. Wiginton, R. Huang, F. TRCA, Town of Caledon	1-1	Staked Top of Bank and Treed Limit	30-MA	09:00	16:00	17	36	0	3	None
Stemberger, H. Lohnes, S. Leslie, J. Wiginton, R. Huang, F. TRCA, Town of Caledon	1-2	Staked Top of Bank and Treed Limit	31-MA	09:00	16:00	21	37	5	2	None
Nieroda, M. Brunelle, P.	1-1	Bat Acoustic Survey Set-up	31-MA	08:00	18:00	22	36	5	2	None
Robinson, O. Lohnes, S. Doyle, T. Wiginton, R. Huang, F. TRCA, Town of Caledon	1-3	Staked Top of Bank and Treed Limit	03-JN	09:00	16:00	20	88	85	2	Fog

Table 1: Field Studies and Natural Inventories (2024)

Burke, P.	1-1	Breeding Bird Survey	04-JN	05:25	10:00	17	93	75-50	0	None
Nieroda, M. Fleming, D. Kimble, B.	2	Headwater Drainage Feature Assessment	04-JN	08:30	17:00	24	60	80	3	None
Burke, P.	1-2	Breeding Bird Survey	05-JN	05:25	10:00	19	77	75	1	None
Burke, P.	1-3	Breeding Bird Survey	06-JN	05:15	09:30	19	100	100	2	Fog
Nieroda, M. Brunelle, P.	1-2	Bat Acoustic Survey Pick-up	10-JN	08:30	12:30	13	66	60	3	None
Williamson, L. Brunelle, P.	3-1	Amphibian Call Survey	24-JN	21:30	23:30	23	53	0	3	None
Williamson, L. Brunelle, P.	3-2	Amphibian Call Survey	25-JN	21:30	23:30	23	74	30	3	None
Burke, P.	2-1	Breeding Bird Survey	25-JN	06:30	08:30	19	72	50	3	None
Burke, P.	2-1	Breeding Bird Survey	26-JN	05:35	09:15	18	100	85	4	None
Stemberger, H. Leslie, J. Robinson, O. TRCA	1-1	Staked Wetland Limit	04-JL	09:00	16:00	26	62	80	4	None
Stemberger, H. Leslie, J. TRCA	1-2	Staked Wetland Limit	05-JL	09:00	16:00	26	52	0	1	None
Stemberger, H. Leslie, J. Robinson, O. TRCA	1-3	Staked Wetland Limit	08-JL	09:00	16:00	26	59	75	4	None

Table 1: Field Studies and Natural Inventories (2024)

LEGEND:

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

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

Table 2: Preliminary Ecological Landscape Classification (ELC) Community Descriptions (Excluding Properties 9 and 10)

ELC TYPE	COMMUNITY DESCRIPTION	S Ranks (NHIC 2021)
CULTURAL – communities resulting from, or maintained by, cultural or anthropogenic-based disturbances		
Cultural Plantation		
CUP3	Coniferous Plantation; coniferous tree species comprise more than 75% of canopy.	N/A
CUP3-2	Coniferous Plantation; comprised primarily of White Pine.	N/A
CUP3-12*	Coniferous Plantation; comprised primarily of White Spruce.	N/A
CUP3-13*	Coniferous Plantation; comprised primarily of White Cedar.	N/A
CUP3-14*	Coniferous Plantation; comprised primarily of Norway Spruce.	N/A
Cultural Meadow		
CUM1	Mineral Cultural Meadow Community with less than 25% tree and shrub cover, and more than 25% cover of forbs and/or graminoids.	N/A
Cultural Thicket		
CUT1	Mineral Cultural Thicket Community with less than 25% cover of trees and greater than 25% cover of shrubs.	N/A
CUT1-1	Mineral cultural thicket comprised predominantly of Staghorn Sumac.	N/A
THDM2-6**	• Dry - fresh deciduous shrub thicket, comprised predominantly of European Buckthorn. • THDM codes are the 2008 version of the CUT1 ecosite code.	N/A
THDM2-11**	• Dry - fresh deciduous shrub thicket, comprised predominantly of Hawthorn species. • THDM codes are the 2008 version of the CUT1 ecosite code.	N/A
Cultural Woodland		

Table 2: Preliminary Ecological Landscape Classification (ELC) Community Descriptions (Excluding Properties 9 and 10)

ELC TYPE	COMMUNITY DESCRIPTION	S Ranks (NHIC 2021)
CUW1	Mineral Cultural Woodland Open canopy woodland containing between 35% - 60% tree cover.	N/A
SWAMP – communities with >25% hydrophytic tree or shrub cover, associated with variable flooding regimes.		
Deciduous Swamp		
SWD	Tree cover >25%, of which >75% are deciduous trees.	N/A
SWD4-1	Willow Mineral Deciduous Swamp Flooding duration is typically short, substrate aerated by early to mid-summer.	S4
Thicket Swamp		
SWT	Tree cover <25% and >25% cover of hydrophilic shrubs.	N/A
SWT2-5	Red-osier Mineral Thicket flooding duration is typically short, substrate aerated by early to mid-summer.	S5
FOREST - communities with >60% tree cover		
Deciduous Forest (FOD): Deciduous tree species make up >75% of canopy		
FOD5-4	Dry-fresh deciduous forest comprised predominantly of Sugar Maple and Ironwood. Common on managed or historically grazed sites.	S5
FOD5-5	Dry-fresh deciduous forest comprised predominantly of Sugar Maple and Hickory.	S4
FOD7	Moist lowland deciduous forest. Tree canopy closed or open (may have <60% tree cover); >75% of trees are deciduous.	N/A
FOD7-3	Moist lowland deciduous forest comprised predominantly of Willow trees.	S4S5

Table 2: Preliminary Ecological Landscape Classification (ELC) Community Descriptions (Excluding Properties 9 and 10)

ELC TYPE	COMMUNITY DESCRIPTION	S Ranks (NHIC 2021)
	Often resulting from cultural influences or disturbances; typically associated with riparian zones and terraces, streams, riverbanks, and floodplains.	
FODM7-7**	Moist lowland deciduous forest comprised predominantly of Manitoba Maple.	N/A
MARSH - communities with <25% tree or shrub cover, with variable flooding regimes		
MAM	Often contains species less tolerant to prolonged flooding; soils may flood in spring but be moist-dry by summer.	N/A
MAM2	Mineral Meadow Marsh Grasses or sedges are often dominant; often exposed areas with shoreline energies and/or disturbance.	N/A
MAM2-2	Mineral Meadow Marsh comprised predominantly of Reed-Canary Grass.	S5
MAMM1-12**	Mineral Meadow Marsh comprised predominantly of Common Reed.	N/A
MAMM1-2**	Mineral Meadow Marsh comprised predominantly of Cattails.	N/A
Shallow Marsh		
MAS	Water depth up to 2m with standing or flowing water for much of the growing season. Grasses, sedges, or rushes are usually dominant, hydrophytic emergent macrophyte cover >25%.	N/A
MAS2-1	Mineral Shallow Marsh comprised predominantly of Cattails.	S5
SHALLOW WATER (SA) – communities with no tree or shrub cover and water depth up to 2m		
SAF1-3	• Duckweed Floating-leaved Shallow Aquatic • Dominated (>25%) by floating-leaved macrophytes	S5
SAF_1-4**	• Pondweed Floating-leaved Shallow Aquatic • Dominated (>25%) by floating-leaved macrophytes	N/A

Table 2: Preliminary Ecological Landscape Classification (ELC) Community Descriptions (Excluding Properties 9 and 10)

ELC TYPE	COMMUNITY DESCRIPTION	S Ranks (NHIC 2021)
OPEN AQUATIC (OAO) – communities with no tree or shrub cover and water depth of greater than 2m		

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

**Denotes a vegetation type derived from the 2008 ELC 2nd approximation ecosystem tables.

																										LOCAL / REGIONAL STATUS	
Overall	P1	P2	P3	P4	P5	P6	P7	P8	P11	ORDER	FAMILY	LATIN NAME	COMMON NAME	COEFFICIENT OF CONSERVATISM (NHIC SEP 19 2023)	WETNESS INDEX (NHIC SEP 19 2023)	OWES WETLAND SPECIES	WEEDINESS INDEX	INVASIVE EXOTIC RANK (Urban Forest Associates 2002)	PROVINCIALLY TRACKED (NHIC) (NHIC FEB 6 2024)	PROVINCIAL STATUS (S-RANK) (NHIC FEB 6 2024)	GLOBAL STATUS (G-RANK) (NHIC FEB 6 2024)	SARO (MECP) (NHIC FEB 6 2024)	COSEWIC STATUS (NHIC FEB 6 2024)		PEEL (Varga 2005)	AUTHORITY
X	X								X	DICOTYLEDONS	Anacardiaceae	Rhus typhina	Staghorn Sumac	1	3				N	S5	G5				X	L.
X									X	DICOTYLEDONS	Apiaceae	Aegopodium podagraria	Goutweed		0		-3	1	N	SNA	GNR				X	L.
X						X			X	DICOTYLEDONS	Apiaceae	Daucus carota	Wild Carrot		5		-2		N	SNA	GNR				X	L.
X						x				DICOTYLEDONS	Apocynaceae	Vincetoxicum rossicum	European Swallowwort		5			1	N	SNA	GNR				X	(Kleopow) Barbaricz
X					X					DICOTYLEDONS	Asteraceae	Arctium lappa	Great Burdock		3				N	SNA	GNR				X	L.
X									X	DICOTYLEDONS	Asteraceae	Arctium minus	Common Burdock		3		-2		N	SNA	GNR				X	(Hill) Bernh.
X	X	X							X	DICOTYLEDONS	Asteraceae	Cirsium arvense	Canada Thistle		3		-1	1	N	SNA	G5				X	(L.) Scop.
X		X								DICOTYLEDONS	Asteraceae	Inula helenium	Elecampane		3	T	-2	4	N	SNA	GNR				X	L.
X									X	DICOTYLEDONS	Asteraceae	Pilosella caespitosa	Meadow Hawkweed		5		-2	3	N	SNA	GNR				X	(Dumort.) P.D. Sell & C. West
X	X				X	X				DICOTYLEDONS	Asteraceae	Solidago flexicaulis	Zigzag Goldenrod	6	3				N	S5	G5				X	L.
X					X				X	DICOTYLEDONS	Asteraceae	Symphyotrichum lanceolatum	Panicled Aster	3	-3	I			P	S5	G5				X	(Willd.) G.L. Nesom
X	X	X	X	X	X		X	X	X	DICOTYLEDONS	Asteraceae	Taraxacum officinale	Common Dandelion		3		-2		N	SNA	G5				X	F.H. Wiggers
X	X		X					X		DICOTYLEDONS	Asteraceae	Taraxacum palustre	Marsh Dandelion		-3				N	SNA	GNR				X	(Lyons) Symons
X	X	X							X	DICOTYLEDONS	Asteraceae	Tussilago farfara	Coltsfoot		3	T	-2	4	N	SNA	GNR				X	L.
X	X	X		X			X	X	X	DICOTYLEDONS	Balsaminaceae	Impatiens capensis	Spotted Jewelweed	4	-3	I			N	S5	G5				X	Meerburgh
X	X									DICOTYLEDONS	Berberidaceae	Caulophyllum giganteum	Giant Blue Cohosh	5	5				N	S5	G4G5				X	(Farw.) Loconte & W.H. Blackw.
X						X				DICOTYLEDONS	Berberidaceae	Podophyllum peltatum	May-Apple	5	3				N	S5	G5				X	L.
X	X									DICOTYLEDONS	Betulaceae	Alnus glutinosa	European Black Alder		-3	T	-2	1	N	SNA	GNR				X	(L.) Gaertner
X	X									DICOTYLEDONS	Betulaceae	Betula papyrifera	Paper Birch	2	3	T			N	S5	G5				X	Marshall
X	X				X	X				DICOTYLEDONS	Betulaceae	Ostrya virginiana	Eastern Hop-Hornbeam	4	3				N	S5	G5				X	(Miller) K. Koch
X	X	X	X			X			X	DICOTYLEDONS	Boraginaceae	Hydrophyllum virginianum var. virginianum	Virginia Waterleaf	6	0				N	S5	G5T5				X	L.
X	X	X		X			X	X	X	DICOTYLEDONS	Brassicaceae	Alliaria petiolata	Garlic Mustard		0		-3	1	N	SNA	GNR				X	(M. Bieb.) Cavara & Grande
X	X	X	X				X	X	X	DICOTYLEDONS	Brassicaceae	Barbarea vulgaris	Bitter Wintercress		0		-1	3	N	SNA	GNR				X	W.T. Aiton
X	X		X				X		X	DICOTYLEDONS	Brassicaceae	Capsella bursa-pastoris	Common Shepherd's Purse		3		-1		N	SNA	GNR				X	(L.) Medikus
X	X									DICOTYLEDONS	Brassicaceae	Cardamine concatenata	Cut-Leaved Toothwort	6	3				N	S5	G5				X	(Michx.) O. Schwarz
X	X									DICOTYLEDONS	Brassicaceae	Cardamine diphylla	Two-Leaved Toothwort	7	3				N	S5	G5				X	(Michx.) Alph. Wood
X	X									DICOTYLEDONS	Brassicaceae	Cardamine maxima	Large Toothwort	10	3				Y	S3	G5				X	(Nutt.) Alph. Wood
X	X									DICOTYLEDONS	Brassicaceae	Draba verna	Spring Draba		5		-2		N	SNA	GNR				X	L.
X			X							DICOTYLEDONS	Brassicaceae	Erysimum cheiranthoides	Wormseed Wallflower		3		-1		N	S5?	G5				X	L.
X		X						X	X	DICOTYLEDONS	Brassicaceae	Hesperis matronalis	Dame's Rocket		3		-3	1	N	SNA	G4G5				X	L.
X			X				X			DICOTYLEDONS	Brassicaceae	Thlaspi arvense	Field Pennycress		5		-1		N	SNA	GNR				X	L.
X	X								X	DICOTYLEDONS	Caprifoliaceae	Dipsacus fullonum	Common Teasel		3		-1	3	N	SNA	GNR				X	L.
X	X	X	X	X	X		X	X	X	DICOTYLEDONS	Caprifoliaceae	Lonicera x bella	Showy Fly Honeysuckle		3		-3	1	N	SNA	GNA				X	Zabel
X			X							DICOTYLEDONS	Caprifoliaceae	Valeriana officinalis	Common Valerian		3		-1		N	SNA	GNR				XSR	L.
X				X						DICOTYLEDONS	Caryophyllaceae	Stellaria media	Common Chickweed		3		-1		N	SNA	GNRTNR				X	(L.) Villars
X						X				DICOTYLEDONS	Celastraceae	Euonymus obovatus	Running Strawberry Bush	6	5				N	S4	G5				X	Nutt.
X	X									DICOTYLEDONS	Cornaceae	Cornus alternifolia	Alternate-Leaved Dogwood	6	3				N	S5	G5				X	L. f.
X	X									DICOTYLEDONS	Cornaceae	Cornus obliqua	Silky Dogwood	2	-3	I			N	S5	G5				R5	Rafinesque
X	X	X			X	X	X		X	DICOTYLEDONS	Cornaceae	Cornus sericea	Red-Osier Dogwood	2	-3	I*			N	S5	G5				X	L.
X						X				DICOTYLEDONS	Fabaceae	Lotus corniculatus	Garden Bird's-Foot Trefoil		3		-2	2	N	SNA	GNR				X	L.
X				X						DICOTYLEDONS	Fabaceae	Trifolium pratense	Red Clover		3		-2	4	N	SNA	GNR				X	L.
X				X	X				X	DICOTYLEDONS	Fabaceae	Trifolium repens	White Clover		3		-1	4	N	SNA	GNR				X	L.
X					X					DICOTYLEDONS	Fagaceae	Fagus grandifolia	American Beech	6	3				N	S4	G5				X	Ehrhart
X	X			X						DICOTYLEDONS	Fagaceae	Quercus rubra	Northern Red Oak	6	3				N	S5	G5				X	L.
X		X				X				DICOTYLEDONS	Geraniaceae	Geranium robertianum	Herb-Robert	2	3		-2		N	S5	G5				X	L.
X		X								DICOTYLEDONS	Grossulariaceae	Ribes americanum	Wild Black Currant	4	-3	T			N	S5	G5				X	Miller
X	X									DICOTYLEDONS	Grossulariaceae	Ribes cynosbati	Eastern Prickly Gooseberry	4	3				N	S5	G5				X	L.
X	X	X	X	X						DICOTYLEDONS	Grossulariaceae	Ribes rubrum	European Red Currant		5	T	-2		N	SNA	G4G5				X	L.
X	X					X				DICOTYLEDONS	Juglandaceae	Carya cordiformis	Bitternut Hickory	6	0				N	S5	G5				X	(Wangenh.) K. Koch
X	X									DICOTYLEDONS	Juglandaceae	Carya ovata var. ovata	Shagbark Hickory	6	3	T			N	S5	G5				X	(Miller) K. Koch
X	X	X								DICOTYLEDONS	Juglandaceae	Juglans cinerea	Butternut	6	3				Y	S2?	G3	END	END		X	L.
X	X		X	X					X	DICOTYLEDONS	Juglandaceae	Juglans nigra	Black Walnut	5	3				N	S4?	G5				X	L.
X	X			X						DICOTYLEDONS	Lamiaceae	Glechoma hederacea	Ground-Ivy		3		-2	4	N	SNA	GNR				X	L.
X	X								X	DICOTYLEDONS	Lamiaceae	Lamium purpureum	Purple Dead-Nettle		5		-2		N	SNA	GNR					L.
X	X	X	X	X					X	DICOTYLEDONS	Lamiaceae	Leonurus cardiaca ssp. cardiaca	Common Motherwort		5		-2		N	SNA	GNRTNR				X	L.
X		X								DICOTYLEDONS	Lamiaceae	Mentha x piperita	Peppermint		-5	I	-1	4	N	SNA	GNA				X	L.
X				T				X		DICOTYLEDONS	Lamiaceae	Nepeta cataria	Catnip		3		-2	4	N	SNA	GNR				X	L.
X					X			X	X	DICOTYLEDONS	Lythraceae	Lythrum salicaria	Purple Loosestrife		-5	I	-3	1	N	SNA	G5				X	L.
X	X					X			X	DICOTYLEDONS	Malvaceae	Tilia americana	Basswood	4	3				N	S5	G5				X	L.
X	X									DICOTYLEDONS	Oleaceae	Fraxinus americana	White Ash	4	3				N	S4	G4				X	L.
X	X	X		X						DICOTYLEDONS	Papaveraceae	Chelidonium majus	Greater Celandine		5		-3		N	SNA	GNR				X	L.
X	X									DICOTYLEDONS	Papaveraceae	Dicentra cucullaria	Dutchman's Breeches	6	5				N	S5	G5				U	(L.) Bernhardi
X	X		X	X						DICOTYLEDONS	Plantaginaceae	Plantago major	Common Plantain		3		-1		N	SNA	G5				X	L.
X							X			DICOTYLEDONS	Plantaginaceae	Veronica persica	Bird's-Eye Speedwell		5		-1		N	SNA	GNR				X	Poiret
X									X	DICOTYLEDONS	Primulaceae	Lysimachia ciliata	Fringed Yellow Loosestrife	4	-3	T			N	S5	G5				X	L.
X		X								DICOTYLEDONS	Ranunculaceae	Actaea pachypoda	White Baneberry	6	5				N	S5	G5				X	Elliott
X			X							DICOTYLEDONS	Ranunculaceae	Anemone canadense	Canada Anemone	3	-3	T			N	S5	G5				X	(L.) Mosyakin
X							X			DICOTYLEDONS	Ranunculaceae	Caltha palustris	Yellow Marsh Marigold	5	-5	I			N	S5	G5				X	L.
X									X	DICOTYLEDONS	Ranunculaceae	Ranunculus acris	Common Buttercup		0	T	-2		N	SNA	G5				X	L.
X			X					X		DICOTYLEDONS	Ranunculaceae	Ranunculus sceleratus	Cursed Buttercup	2	-5	I			N	S5	G5				X	L.
X	X									DICOTYLEDONS	Ranunculaceae	Thalictrum dioicum	Early Meadow-Rue	6	3				N	S5	G5				X	L.
X	X	X		X	X	X	X	X	X	DICOTYLEDONS	Rhamnaceae	Rhamnus cathartica	European Buckthorn		0	T	-3	1	N	SNA	GNR				X	L.
X									X	DICOTYLEDONS	Rosaceae	Crataegus monogyna var. monogyna	English Hawthorn		3		-1	3	N	SNA	GSTNR				X	Jacquin
X									X	DICOTYLEDONS	Rosaceae	Crataegus punctata	Dotted Hawthorn	4	5				N	S5	G5				X	Jacquin
X	X	x			X				X	DICOTYLEDONS	Rosaceae	Fragaria virginiana	Wild Strawberry	2	3				N	S5	G5				X	Miller
X	X								X	DICOTYLEDONS	Rosaceae	Malus pumila	Common Apple		5		-1		N	SNA	G5				X	Miller
X						X			X	DICOTYLEDONS	Rosaceae	Prunus serotina var. serotina	Black Cherry	3	3				N	S5	G5T5				X	Ehrhart
X	X	X	X	X	X	X			X	DICOTYLEDONS	Rosaceae	Prunus virginiana var. virginiana	Chokecherry	2	3				N	S5	G5T5				X	L.
X	X	X	X	X					X	DICOTYLEDONS	Rosaceae	Rubus idaeus ssp. strigosus	North American Red Raspberry	2	3				N	S5	G5T5				X	(Michaux) Focke
X	X									DICOTYLEDONS	Rosaceae	Sorbus aucuparia	European Mountain-Ash		5		-2	4	N	SNA	G5				X	L.
X									X	DICOTYLEDONS	Rubiaceae	Galium asprellum	Rough Bedstraw	6	-5	I			N	S5	G5				U	Michaux
X	X	X								DICOTYLEDONS	Salicaceae	Populus tremuloides	Trembling Aspen	2	0	T			N	S5	G5				X	Michaux
X		X								DICOTYLEDONS	Salicaceae	Salix interior	Sandbar Willow	1	-3	T			N	S5	G5				R5	Rowlee
X	X	X			X		X	X	X	DICOTYLEDONS	Salicaceae	Salix x fragilis	Hybrid Crack Willow			T	-3	3	N	SNA	GNA				XSR	L.
X		X							X	DICOTYLEDONS	Salicaceae	Salix x sepulcralis	Golden Weeping Willow						N	SNA	GNA				XSR	Simonkai
X	X	X	X	X					X	DICOTYLEDONS	Sapindaceae	Acer negundo	Manitoba Maple	0	0	T		1	N	S5	G5				X	L.
X	X			X	X				X	DICOTYLEDONS	Sapindaceae	Acer saccharinum	Silver Maple	5	-3	I			N	S5	G5				X	L.
X	X	X			X	X				DICOTYLEDONS	Sapindaceae	Acer saccharum	Sugar Maple	4	3				N	S5	G5				X	Marshall
X		X					X		X	DICOTYLEDONS	Solanaceae	Solanum dulcamara	Bittersweet Nightshade		0	T	-2	3	N	SNA	GNR				X	L.
X	X	X			X			X		DICOTYLEDONS	Ulmaceae	Ulmus americana	White Elm	3	-3	T			N	S5	G4				X	L.
X	X	X	X	X			X			DICOTYLEDONS	Urticaceae	Urtica gracilis ssp. gracilis	Slender Stinging Nettle	2	0	T			N	S5	G5T5				X	
X	X						X			DICOTYLEDONS	Viburnaceae	Sambucus canadensis	Common Elderberry	5	-3	T			N	S5	G5T5				X	L.
X	X									DICOTYLEDONS	Viburnaceae	Sambucus racemosa	Red Elderberry	5	3			P	N	S5	G5				X	L.
X			X							DICOTYLEDONS	Viburnaceae	Viburnum lantana	Wayfaring Viburnum		5		-1		N	SNA	GNR				X	L.
X	X									DICOTYLEDONS	Viburnaceae	Viburnum lentago	Nannyberry	4	0	T			N	S5	G5				X	L.
X				X			X		X	DICOTYLEDONS	Viburnaceae	Viburnum opulus var. opulus	Cranberry Viburnum		-3		-1	4	N	SNA	G5TNR				X	

X	X	X			X				X	DICOTYLEDONS	Violaceae	Viola pubescens	Downy Yellow Violet	5	3				N	S5	G5			X	Aiton
X	X	X	X	X	X				X	DICOTYLEDONS	Violaceae	Viola sororia	Woolly Blue Violet	4	0	T			N	S5	G5			X	Willdenow
X	X			X	X		X			GYMNOSPERMS	Cupressaceae	Thuja occidentalis	Eastern White Cedar	4	-3	T			N	S5	G5			X	L.
X	X						X			GYMNOSPERMS	Pinaceae	Abies balsamea	Balsam Fir	5	-3	T			N	S5	G5			X	(L.) Miller
X	X			X						GYMNOSPERMS	Pinaceae	Picea abies	Norway Spruce		5		-1		N	SNA	G5			X	(L.) Karsten
X	X						X	X		GYMNOSPERMS	Pinaceae	Picea glauca	White Spruce	6	3	T			N	S5	G5			R3	(Moench) Voss
X	X									GYMNOSPERMS	Pinaceae	Picea pungens	Blue Spruce		3				N	SNA	G5				Engelm.
X	X						X	X		GYMNOSPERMS	Pinaceae	Pinus strobus	Eastern White Pine	4	3	T			N	S5	G5			X	L.
X	X									GYMNOSPERMS	Pinaceae	Pinus sylvestris	Scots Pine		3		-3	2	N	SNA	GNR			X	L.
X	X	X				X				MONOCOTYLEDONS	Amaryllidaceae	Allium tricoccum var. tricoccum	Wild Leek	7	3				N	S4	G5			X	Aiton
X									X	MONOCOTYLEDONS	Amaryllidaceae	Narcissus pseudonarcissus	Common Daffodil		5				N	SNA	GNR				L.
X	X					X				MONOCOTYLEDONS	Araceae	Arisaema triphyllum ssp. triphyllum	Jack-In-The-Pulpit	5	-3	T			N	S5	G5T5			X	(L.) Schott
X								X		MONOCOTYLEDONS	Araceae	Lemna minor	Small Duckweed	5	-5	I			N	S5	G5			X	L.
X								X		MONOCOTYLEDONS	Araceae	Lemna trisulca	Star Duckweed	6	-5	I			N	S5	G5			R4	L.
X	X									MONOCOTYLEDONS	Asparagaceae	Maianthemum racemosum	Large False Solomon's Seal	4	3				N	S5	G5T5			X	(L.) Link
X	X	X	X		X	X				MONOCOTYLEDONS	Liliaceae	Erythronium americanum ssp. americanum	Yellow Trout Lily	5	5				N	S5	G5T5			X	Ker Gawler
X	X									MONOCOTYLEDONS	Melanthiaceae	Trillium erectum	Red Trillium	6	3				N	S5	G5			X	L.
X	X					X				MONOCOTYLEDONS	Melanthiaceae	Trillium grandiflorum	White Trillium	5	3				N	S5	G5			X	(Michx.) Salisbury
X	X		X							MONOCOTYLEDONS	Poaceae	Alopecurus pratensis	Meadow Foxtail		-3		-1		N	SNA	GNR			X	L.
X	X	X	X						X	MONOCOTYLEDONS	Poaceae	Bromus inermis	Smooth Brome		5		-3	4	N	SNA	G5T5			X	Leysser
X	X								X	MONOCOTYLEDONS	Poaceae	Dactylis glomerata	Orchard Grass		3		-1	3	N	SNA	GNR			X	L.
X									X	MONOCOTYLEDONS	Poaceae	Elymus repens	Quackgrass		3		-3	3	N	SNA	GNR			X	(L.) Gould
X	X	X	X	X	X	X	X	X	X	MONOCOTYLEDONS	Poaceae	Phalaris arundinacea var. arundinacea	Reed Canary Grass	0	-3	T		P	N	S5	G5TNR			X	L.
X			X							MONOCOTYLEDONS	Poaceae	Phleum pratense ssp. pratense	Common Timothy		3		-1		N	SNA	GNRTNR			X	L.
X	X	X			X				X	MONOCOTYLEDONS	Poaceae	Phragmites australis ssp. australis	European Reed		-3	T		1	N	SNA	G5T5			X	(Cav.) Trinius ex Steudel
X			X	X			X			MONOCOTYLEDONS	Poaceae	Poa annua	Annual Bluegrass		3		-2		N	SNA	GNR			X	L.
X	X								X	MONOCOTYLEDONS	Poaceae	Poa pratensis	Kentucky Bluegrass	0	3			2	P	S5	G5			X	L.
X	X	X			X		X	X		MONOCOTYLEDONS	Typhaceae	Typha angustifolia	Narrow-Leaved Cattail		-5	I		P	N	SNA	G5			X	L.
X			X				X	X	X	PTERIDOPHYTES	Equisetaceae	Equisetum arvense	Field Horsetail	0	0	T			N	S5	G5			X	L.

X
X

	STATISTICS		
X	**Species Diversity**		
X	Total Number of Species:	125	
X	Native Species:	68	54%
X	Exotic Species:	57	46%
X	S1-S3 Species:	2	3%
X	S4 Species:	5	7%
X	S5 Species:	61	90%
X	Provincially Tracked Species:	2	3%
X	**Floristic Quality Assessment (FQA)**		
X	Mean Co-efficient of Conservatism (CC)	4.2	
X	CC 0 - 3 = lowest sensitivity	20	29%
X	CC 4 - 6 = moderate sensitivity	44	65%
X	CC 7 - 8 = high sensitivity	2	3%
X	CC 9 - 10 = highest sensitivity	1	1%
X	Floristic Quality Index (FQI)	34	
X	**Weedy & Invasive Species**		
X	Mean Weediness Index (Oldham et al):	-1.8	
X	-1 = low potential invasiveness	20	35%
X	-2 = moderate potential invasiveness	20	35%
X	-3 = high potential invasiveness	11	19%
X	Mean Exotic Rank (Urban Forest Associates):	3	
X	Category 1	11	19%
X	Category 2	3	5%
X	Category 3	8	14%
X	Category 4	10	18%
X	Potentially Invasive (P)	3	5%
X	**Wetland Species**		
X	Mean Wetness Index	1.5	
X	Upland	22	18%
X	Facultative upland	59	47%
X	Facultative	14	11%
X	Facultative wetland	20	16%
X	Obligate wetland	8	6%

No.	X	Common Name	Species Code	Scientific Name	Provincial Status (S Rank)	Global Status (G Rank)	SARO List	SARA Schedule 1	SWH Indicator Species	Highest Breeding Evidence		Round 1 BBS1	Round 1 BBS2	Round 1 BBS3	Round 1 BBS4	Round 1 BBS5	Round 1 BBS6	Round 1 BBS7	Round 1 BBS8	Round 1 BBS9	Round 1 BBS10	Round 1 BBS11	Round 1 BBS12	Round 1 BBS13	Round 1 BBS14	Round 1 BBS15	Round 1 BBS16	Round 1 BBS17	Round 1 BBS18	Round 1 BBS19	Incidental Round 1	Off Site Round 1	Round 2 BBS1	Round 2 BBS2	Round 2 BBS3	Round 2 BBS4	Round 2 BBS5	Round 2 BBS6	Round 2 BBS7	Round 2 BBS8	Round 2 BBS9	Round 2 BBS10	Round 2 BBS11	Round 2 BBS12	Round 2 BBS13	Round 2 BBS14	Round 2 BBS15	Round 2 BBS16	Round 2 BBS17	Round 2 BBS18	Round 2 BBS19	Incidental Round 2	Off Site Round 2
	X										Date:	6/4/2024	6/4/2024	6/4/2024	6/4/2024	6/4/2024	6/4/2024	6/4/2024	6/4/2024	6/4/2024	6/4/2024	6/4/2024	6/4/2024	6/5/2024	6/5/2024	6/5/2024	6/5/2024	6/6/2024	6/6/2024	6/5/2024	6/5/2024	June 4,5,6 2024	June 4,5,6 2024	6/25/2024	6/25/2024	6/25/2024	6/25/2024	6/25/2024	6/25/2024	6/25/2024	6/25/2024	6/25/2024	6/25/2024	6/25/2024	6/26/2024	6/26/2024	6/26/2024	6/26/2024	6/26/2024	6/26/2024	6/26/2024	6/26/2024	6/26/2024	6/25,26/2024	6/25,26/2024
	X										Time:	928	800	820	729	528	543	702	646	558	613	629	644	700	739	812	633	709	522	558			815	540	517	557	860	741	613	630	723	706	647	535	516	556	615	738	753	819	840		
	X	**Anseriformes**																																														
	X	***Anatidae***																																														
		Canada Goose	CANG	*Branta canadensis*	S5	G5			X	PO-H																					200	87								13									
		Wood Duck	WODU	*Aix sponsa*	S5B, S3N	G5			X	PR-P																														6	1								
		Mallard	MALL	*Anas platyrhynchos*	S5	G5			X	CO-FY							2									2													1	5						1			
	X																																															
	X	**Galliformes**																																														
	X	***Phasianinae***																																														
		Wild Turkey	WITU	*Meleagris gallopavo*	S5	G5			X	PO-H																					1																	
	X																																															
	X	**Columbiformes**																																														
	X	***Columbidae***																																														
		Mourning Dove	MODO	*Zenaida macroura*	S5	G5				PR-T						2			2		1	2									1	1		1							1							1	
	X																																															
	X	**Charadriiformes**																																														
	X	***Charadriidae***																																														
		Killdeer	KILL	*Charadrius vociferus*	S4B	G5				PR-T																			1		1			1															
	X																																															
	X	***Scolopacidae***																																														
		Spotted Sandpiper	SPSA	*Actitis macularius*	S5B	G5			X	PR-A																					1																	
	X																																															
	X	***Laridae***																																														
		Ring-billed Gull	RBGU	*Larus delawarensis*	S5	G5			X	OB-X																					150	39																	
	X																																															
	X	**Pelecaniformes**																																														
	X	***Ardeidae***																																														
		Great Blue Heron	GBHE	*Ardea herodias*	S4	G5			X	OB-X																			1																			
		Green Heron	GRHE	*Butorides virescens*	S4B	G5			X	PR-P							1																						1	1								
	X																																															
	X	**Accipitriformes**																																														
	X	***Accipitridae***																																														
		Northern Harrier	NOHA	*Circus hudsonius*	S5B, S4N	G5	NAR	NAR	X	PO-H																																					1	
		Red-tailed Hawk	RTHA	*Buteo jamaicensis*	S5	G5		NAR	X	PO-H																					1																	
	X																																															
	X	**Piciformes**																																														
	X	***Picidae***																																														
		Red-bellied Woodpecker	RBWO	*Melanerpes carolinus*	S5	G5				PR-T						1																																1
		Downy Woodpecker	DOWO	*Dryobates pubescens*	S5	G5				CO-CF																							1															
		Northern Flicker	NOFL	*Colaptes auratus*	S5	G5				PR-T																			1	1					1	1										1		
	X																																															
	X	**Falconiformes**																																														
	X	***Falconidae***																																														
		American Kestrel	AMKE	*Falco sparverius*	S4	G5			X	PO-S																																							
	X																																															
	X	**Passeriformes**																																														
	X	***Tyrannidae***																																														
		Great Crested Flycatcher	GCFL	*Myiarchus crinitus*	S5B	G5				PR-T						1													1																	1	1
		Eastern Kingbird	EAKI	*Tyrannus tyrannus*	S4B	G5				PR-A						1						1	1						1																		
		Eastern Wood-Pewee	EAWP	*Contopus virens*	S4B	G5	SC	SC	X	PR-T			2			1	1																													1		1
		Willow Flycatcher	WIFL	*Empidonax traillii*	S4B	G5			X	PR-N								1	1																												1	
		Eastern Phoebe	EAPH	*Sayornis phoebe*	S5B	G5				PO-S																																					1		1
	X																																															
	X	***Vireonidae***																																														
		Warbling Vireo	WAVI	*Vireo gilvus*	S5B	G5				PR-T									2			1							1																		
		Red-eyed Vireo	REVI	*Vireo olivaceus*	S5B	G5				PR-T						2	1												2	1			1													1		1
	X																																															
	X	***Corvidae***																																														
		Blue Jay	BLJA	*Cyanocitta cristata*	S5	G5				PR-A			2	1											1							2		1		1										1
		American Crow	AMCR	*Corvus brachyrhynchos*	S5	G5				PO-H															2	1			1																1	2		1
		Common Raven	CORA	*Corvus corax*	S5	G5				PO-H																															1								
	X																																															
	X	***Alaudidae***																																														
		Horned Lark	HOLA	*Eremophila alpestris*	S4	G5				CO-DD								1	1			1		1	1																							
	X																																															
	X	***Hirundinidae***																																														
		Tree Swallow	TRES	*Tachycineta bicolor*	S4S5B	G5				PR-T						1	1															1															1	
		Northern Rough-winged Swallow	NRWS	*Stelgidopteryx serripennis*	S4B	G5			X	PR-T																																					1	
		Barn Swallow	BARS	*Hirundo rustica*	S4B	G5	SC	SC		CO-AE						1															1	6				2	1		1							2	8
	X																																															
	X	***Paridae***																																														
		Black-capped Chickadee	BCCH	*Poecile atricapillus*	S5	G5				PR-P			1			1	1							1	1					2	2	1	1		1		1										1
	X																																															
	X	***Sittidae***																																														
		Red-breasted Nuthatch	RBNU	*Sitta canadensis*	S5	G5			X	PR-T						1																																
	X																																															
	X	***Troglodytidae***																																														
		House Wren	HOWR	*Troglodytes aedon*	S5B	G5				PR-T				1										1							1																1
	X																																															
	X	***Turdidae***																																														
		Eastern Bluebird	EABL	*Sialia sialis*	S5B, S4N	G5		NAR		PO-S																			1																		
		Wood Thrush	WOTH	*Hylocichla mustelina*	S4B	G4	SC	THR	X	PO-S					1																																	
		American Robin	AMRO	*Turdus migratorius*	S5	G5				CO-FY		1	1	2	2	3	3	4	2	3	3	2	1				2			1	1		2	1	2	3	1	2	1	6	6	2	1	1	1			1	1	
	X																																															
	X	***Mimidae***																																														
		Gray Catbird	GRCA	*Dumetella carolinensis*	S5B, S3N	G5				PR-A			1			1							1							2				1		1				2					1		
		Brown Thrasher	BRTH	*Toxostoma rufum*	S4B	G5			X	PR-T																					1															1	
		Northern Mockingbird	NOMO	*Mimus polyglottos*	S4	G5				CO-NY							2																						2								
	X																																															
	X	***Sturnidae***																																														
		European Starling	EUST	*Sturnus vulgaris*	SNA	G5				PO-H							1		1	1											2									1					4			
	X																																															
	X	***Bombycillidae***																																														
		Cedar Waxwing	CEDW	*Bombycilla cedrorum*	S5	G5				PR-P								2			2			2															1		4	1		1				2	
	X																																															
	X	***Passeridae***																																														
		House Sparrow	HOSP	*Passer domesticus*	SNA	G5				PR-T							1		1																													
	X																																															
	X	***Fringillidae***																																														
		House Finch	HOFI	*Haemorhous mexicanus*	SNA	G5				PR-T									1	1	1																											
		American Goldfinch	AMGO	*Spinus tristis*	S5	G5				PR-P		1		1						1		3			1	5		1	1			1		1	2		2	1	1				2		2			2
	X																																															
	X	***Passerellidae***																																														
		Chipping Sparrow	CHSP	*Spizella passerina*	S5B, S3N	G5				CO-CF							1	1		1	2	1		1					1	1									2	1	1	2				1			
		Vesper Sparrow	VESP	*Pooecetes gramineus*	S4B	G5			X	PR-T										1							2																				
		Savannah Sparrow	SAVS	*Passerculus sandwichensis*	S5B, S3N	G5			X	PR-T							2								2	2			2	1		3															2
		Song Sparrow	SOSP	*Melospiza melodia*	S5	G5				CO-CF		1	1		2	1		4	1	2		1	1	3	2	4	3	2	5	1		1		2		3		3	3	1	1	1	1	4		2	1	4	2		2
	X																																				1											
	X	***Icteridae***																																														
		Bobolink	BOBO	*Dolichonyx oryzivorus*	S4B	G5	THR	THR		PR-P		7																			4	3																
		Eastern Meadowlark	EAME	*Sturnella magna*	S4B, S3N	G5	THR	THR		CO-CF							1														1	2																1
		Orchard Oriole	OROR	*Icterus spurius*	S4B	G5				PR-T							1	1	1						1																						
		Baltimore Oriole	BAOR	*Icterus galbula*	S4B	G5				CO-CF				1			1		1											1					1											1	
		Red-winged Blackbird	RWBL	*Agelaius phoeniceus*	S5	G5				CO-NY		6				2		2	1	2		2	2			2	2			1					11			3	4	1	5	1	1			4			1
		Brown-headed Cowbird	BHCO	*Molothrus ater*	S5	G5				PR-P						2		1	1					2					1		1		1												10			
		Common Grackle	COGR	*Quiscalus quiscula*	S5	G5				CO-FY						2			1	1	1	4	1							1					4		4		3	2	2							
	X																																															
	X	***Parulidae***																																														
		Common Yellowthroat	COYE	*Geothlypis trichas*	S5B, S3N	G5				PR-T										1	1			1																						2		
		American Redstart	AMRE	*Setophaga ruticilla*	S5B	G5				CO-CF					1		2					1							1								3										
		Yellow Warbler	YWAR	*Setophaga petechia*	S5B	G5				PR-A								2	2			2				1										2		1	2			1				
		Pine Warbler	PIWA	*Setophaga pinus*	S5B, S3N	G5				PR-T							1																			1										
	X																																														
	X	***Cardinalidae***																																														
		Northern Cardinal	NOCA	*Cardinalis cardinalis*	S5	G5				CO-FY					1	1	1		2				1						1	1					1	1							1	1	1		
		Rose-breasted Grosbeak	RBGR	*Pheucticus ludovicianus*	S5B	G5				PR-T				1											1																					1		
		Indigo Bunting	INBU	*Passerina cyanea*	S5B	G5				PR-T								1	1			1	1	1	1																			1	1			
	X																																															

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

Species Code: Consistent with the American Ornithologists' Union. 2024. Species 4-Letter-Codes. Available online: http://www.birdsontario.org/atlas/codes.jsp?lang=en&pg=species

Highest Breeding Evidence: Codes assigned for breeding evidence are consistent with the Ontario Breeding Bird Atlas (OBBA). 2024. Breeding Evidence Codes. Available online: http://www.birdsontario.org/atlas/codes.jsp?lang=en&pg=breeding&sortorder=aou

S ranks: Provincial ranks are from the Natural Heritage Information Centre; S1 (critically imperiled), S2 (imperiled), S3 (vulnerable), S4 (apparently secure), S5 (secure); ranks were updated using NHIC species list 2024. Available to download from: https://www.ontario.ca/page/get-natural-heritage-information

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 2024. Available to download from: https://www.ontario.ca/page/get-natural-heritage-information

SARO (MECP): 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: https://wildlife-species.canada.ca/species-risk-registry/sar/index/default_e.cfm); END - Endangered, THR - Threatened, SC - Special Concern, NAR - Not at Risk

SWH Indicator Species: SWH refers to Significant Wildlife Habitat as defined by the MNRF (2015) Significant Wildlife Habitat Criteria Schedules for Ecoregions 7E and 6E (as appropriate for the Subject Lands). SWH indicator species are identified in this table and any potential SWH is discussed in the text of this report. Available online: http://www.townofnemi.on.ca/wp-content/uploads/2016/02/NEMI-OP-App-C-schedule-6e-jan-2015-access-ver-final-s.pdf

Table 5: Turtle Basking and Nesting Survey Results

DATE SURVEYED	SURVEY ROUND	STATION NUMBER	SPECIES CODE								
			NOTU	MPTU	SNTU	MATU	BLTU	SSTU	WOTU	STIN	SPTU
09-AP-24	1	BS1	X								
16-AP-24	2	BS1	X								
06-MA-24	3	BS1	X								
09-AP-24	1	BS2	X								
16-AP-24	2	BS2	X								
06-MA-24	3	BS2	X								
10-AP-24	1	BS3	X								
30-AP-24	2	BS3	X								
06-MA-24	3	BS3	X								
10-AP-24	1	BS4		13	1						
30-AP-24	2	BS4		4							
06-MA-24	3	BS4		13	1						
10-AP-24	1	BS5			1						
30-AP-24	2	BS5			1						
06-MA-24	3	BS5		15	1						
10-AP-24	1	BS6	X								
30-AP-24	2	BS6	X								
06-MA-24	3	BS6	X								
10-AP-24	1	BS7		65	4						
30-AP-24	2	BS7		66	2						
06-MA-24	3	BS7		53	4						

Turtle Survey Results – Nesting

BS3 – BS7 are located on active golf course lands (Property 1), therefore, suitable nesting habitat opportunities (sandtraps) for turtle nesting.

Table 5: Turtle Basking and Nesting Survey Results

LEGEND:

SPECIES CODE	COMMON NAME	SCIENTIFIC NAME
NOTU	No turtles observed despite survey effort	
MPTU	Midland Painted Turtle	*Chrysemys picta marginata*
SNTU	Snapping Turtle	*Chelydra serpentina*
MATU	Northern Map Turtle	*Graptemys geographica*
BLTU	Blanding's Turtle	*Emydoidea blandingii*
SSTU	Spiny Soft-shelled Turtle	*Apalone spinifera*
WOTU	Wood Turtle	*Glyptemys insculpta*
STIN	Stinkpot Turtle	*Stemotherus odoratus*
SPTU	Spotted Turtle	*Clemmys guttata*

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 6: Amphibian Call Count Survey Station Results

SURVEY ROUND	STATION NUMBER	SPECIES CODE												Water Presence
		NOAM	AMTO	FOTO	GRTR	SPPE	CHFR	WOFR	NLFR	PIFR	GRFR	BULL	MIFR	
1	AMC1	X												Unknown
2	AMC1	X												Unknown
3	AMC1	X												Unknown
1	AMC2	X												Unknown
2	AMC2	X												Unknown
3	AMC2	X												Unknown
1	AMC3	X												Yes
2	AMC3	DRY												No
1	AMC4		1(1)											No Access
2	AMC4	X												No Access
3	AMC4		1(1)		1(1)									No Access
1	AMC5	X												Yes
2	AMC5	X												Yes
3	AMC5	DRY												No
1	AMC6	X												Yes
2	AMC6	X												Yes
3	AMC6	DRY												No
1	AMC7	X												Yes
2	AMC7	DRY												No
1	AMC8	X												Yes
2	AMC8	X												Yes
3	AMC8	DRY												No
1	AMC9	X												Yes
2	AMC9	X												Yes

Table 6: Amphibian Call Count Survey Station Results

SURVEY ROUND	STATION NUMBER	SPECIES CODE												Water Presence
		NOAM	AMTO	FOTO	GRTR	SPPE	CHFR	WOFR	NLFR	PIFR	GRFR	BULL	MIFR	
3	AMC9	X												Yes
1	AMC10	X												Yes
2	AMC10	X												Yes
3	AMC10	DRY												No
1	AMC11		1(1)					1(2)						Yes
2	AMC11		1(2)		1(5)									Yes
3	AMC11		1(1)		1(2)									Yes
1	AMC12	X												Yes
2	AMC12	X												Yes
3	AMC12	X												Yes
1	AMC13	X												No
2	AMC13	X												Yes
3	AMC13	DRY												No
1	AMC14	X												Unknown
2	AMC14	X												Unknown
3	AMC14	X												Unknown
1	AMC15	X												Yes
2	AMC15	DRY												No
1	AMC16	X												Yes
2	AMC16		1(1)		1(3)						1(1)			Yes
3	AMC16										2(12)			Yes
1	AMC17	DRY												No
1	AMC18	X												Yes
2	AMC18										1(1)			Yes
3	AMC18										1(8)			Yes

Table 6: Amphibian Call Count Survey Station Results

SURVEY ROUND	STATION NUMBER	SPECIES CODE												Water Presence
		NOAM	AMTO	FOTO	GRTR	SPPE	CHFR	WOFR	NLFR	PIFR	GRFR	BULL	MIFR	
1	AMC19	DRY												No
1	AMC20	X												Yes
2	AMC20	X												Yes
3	AMC20										2(12)			Yes
1	AMC21		1(1)											Yes
2	AMC21	X												Yes
3	AMC21				1(1)									Yes
1	AMC22	X												Yes
2	AMC22	X												Yes
3	AMC22	DRY												No
1	AMC23	DRY												No
1	AMC24	X												Yes
2	AMC24		1(1)											Yes
3	AMC24										1(5)			Yes
1	AMC25	X												Yes
2	AMC25		1(3)											Yes
3	AMC25										1(2)			Yes
1	AMC26	X												Yes
2	AMC26	X												Yes
3	AMC26										1(3)			Yes
1	AMC27	X												Yes
2	AMC27	X												Yes
3	AMC27										2(16)			Yes
1	AMC28	X												Yes
2	AMC28	X												Yes

Table 6: Amphibian Call Count Survey Station Results

SURVEY ROUND	STATION NUMBER	SPECIES CODE												Water Presence
		NOAM	AMTO	FOTO	GRTR	SPPE	CHFR	WOFR	NLFR	PIFR	GRFR	BULL	MIFR	
3	AMC28							1(3)			3(27)			Yes
1	AMC29	X												Yes
2	AMC29	DRY												No
1	AMC30	X												Yes
2	AMC30		1(2)		1(1)									Yes
3	AMC30										1(7)			Yes
1	AMC31	X												Unknown
2	AMC31	X												Unknown
3	AMC31	X												Unknown
1	AMC32	X												Unknown
2	AMC32		1(2)											Unknown
3	AMC32	X												Unknown
1	AMC33	X												No Access
2	AMC33		1(2)		1(3)									No Access
3	AMC33										1(2)			No Access

LEGEND:

SPECIES CODE	COMMON NAME	SCIENTIFIC NAME
NOAM	No Amphibians	No amphibians despite survey effort
AMTO	American Toad	*Anaxyrus americanus*
FOTO	Fowler's Toad	*Anaxyrus fowleri*
GRTR	Gray Treefrog	*Hyla versicolor*
SPPE	Spring Peeper	*Pseudacris crucifer*
CHFR	Western Chorus Frog	*Pseudacris triseriata*
WOFR	Wood Frog	*Lithobates sylvaticus*

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

Table 6: Amphibian Call Count Survey Station Results

NLRF	Northern Leopard Frog	*Lithobates pipiens*
PIFR	Pickerel Frog	*Lithobates palustris*
GRFR	Green Frog	*Lithobates clamitans*
BULL	American Bullfrog	*Lithobates catesbeianus*
MIFR	Mink Frog	*Lithobates septentrionalis*

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 7: Suitable Bat Roosting Tree Density Survey Results

Polygon	Community Type	Approx. Area Size (ha)	# of snag trees observed at ≥25 cm DBH	# of snag trees observed at ≥10 cm DBH	SWH Density (# of snag trees/ha at ≥25 cm DBH)
A	CUM1-1	1.84	2	2	1.09
B	Orchard	0.18	2	2	10.85
C	CUM1-1	0.78	7	7	8.92
D	ANTH	1.21	1	1	0.82
E	DIST	1.88	2	2	1.06
F	Golf	2.13	1	1	0.47
G	CUM1-1	0.33	1	1	3.01
H	HR	0.26	1	1	3.90
I	Orchard	0.17	1	1	5.91
J	HR	0.40	2	2	5.05
K	HR	0.41	2	2	4.84
L	RES	4.34	4	4	0.92
M	HR	82.66	22	22	0.27
N	FODM7-7	0.45	5	5	11.19
O	HR	0.15	3	3	19.97
P	Golf	55.95	50	50	0.89
Q	AG	72.08	1	1	0.01
R	AG	27.884	4	4	0.14
S	FOD5-4	1.61	77	77	4.35
T	AG	26.25	2	2	0.08
U	AG	46.02	2	2	0.04
V	ANTH	51.25	12	12	0.23

Acoustic Monitoring Station	ELC Community	Low Frequency					High Frequency Calls								Total
		Hoary Bat	Big Brown Bat	Silver-haired Bat	Unknown Low Freqency	Total Low Frequency Calls	Eastern Red Bat	Eastern Small-footed Myotis	Northern Myotis	Little Brown Myotis	Tri-colored Bat	Unknown Myotis (40K Myotis Characteristics)	Unknown High Frequency	Total High Frequency Calls	
MTLOG-A	HR	0	0	0	2	2	0	2	0	0	0	9	0	11	13
MTLOG-B	HR	8	5	86	8	107	0	0	0	0	0	2	0	2	109
MTLOG-C	HR	282	181	96	52	611	4	0	0	0	0	2	1	7	618
MTLOG-D	CUP13-14	273	78	95	63	509	13	22	0	7	0	145	0	187	696
MTLOG-E	Orchard	80	71	59	31	241	1	2	0	0	0	5	0	8	249
MTLOG-F	FODM7-7	156	87	68	59	370	2	23	0	2	0	602	21	650	1020
MTLOG-G	FOD5-5	76	86	105	83	350	1	0	0	0	0	4	0	5	355
MTLOG-H	CUP3-2	71	109	55	33	268	11	0	0	0	0	7	4	22	290
MTLOG-I	FODM7-7	3	1	7	2	13	0	0	0	0	0	0	0	0	13
MTLOG-J	CUP3-12	357	225	141	110	833	17	16	0	4	0	85	59	181	1014
MTLOG-K	FOD4	49	150	78	69	346	0	0	0	0	0	35	6	41	387
MTLOG-L	CUW1	7	0	16	8	31	0	0	0	0	0	0	0	0	31
MTLOG-M	HR	0	0	0	0	0	0	0	0	0	0	0	0	0	0
MTLOG-N	FOD5-4	16	8	53	12	89	0	0	0	0	0	0	0	0	89
MTLOG-O	FOD7-3	30	20	49	15	114	0	0	0	0	0	1	0	1	115
Total		1408	1021	908	547	3884	49	65	0	13	0	897	91	1115	4999

Inside Study Area	Outside Study Area	COMMON NAME	SCIENTIFIC NAME	Provincial Status (S RANK)	Global Status (G RANK)	SARO List (MECP)	SARA Schedule 1 (Federal)	Local Status TRCA	SWH Indicator Species 6E
		ODONATA							
X		Familiar Bluet	*Enallagma civile*	S5	G5				
X		Eastern Forktail	*Ischnura verticalis*	S5	G5				
X		Black Saddlebags	*Tramea lacerata*	S4	G5				
		BUTTERFLIES							
X		Black Swallowtail	*Papilio polyxenes*	S5	G5				
X		Appalachian Brown	*Satyrodes appalachia*	S4	G4				
X		**CRAYFISH**							
X		Digger Crayfish	*Creaserinus fodiens*	S3	G5			L2	X
		AMPHIBIANS							
X	X	American Toad	*Anaxyrus americanus*	S5	G5			L4	X
X	X	Gray Treefrog	*Hyla versicolor*	S5	G5			L2	X
X		Northern Green Frog	*Lithobates clamitans*	S5	G5			L4	X
X		Wood Frog	*Lithobates sylvatica*	S5	G5			L2	X
		REPTILES							
X		Snapping Turtle	*Chelydra serpentina*	S4	G5	SC	SC	L3	X
X	X	Midland Painted Turtle	*Chrysemys picta marginat*	S4	G5T5		SC	L3	X
X		Eastern Gartersnake	*Thamnophis sirtalis*	S5	G5			L4	X
		BIRDS							
X		Canada Goose	*Branta canadensis*	S5	G5			L5	X
X	X	Wood Duck	*Aix sponsa*	S5B, S3N	G5			L4	X
X	X	Mallard	*Anas platyrhynchos*	S5	G5			L5	X
X		Wild Turkey	*Meleagris gallopavo*	S5	G5			L3	X
X		Mourning Dove	*Zenaida macroura*	S5	G5			L5	
X		Killdeer	*Charadrius vociferus*	S4B	G5			L4	
X		Spotted Sandpiper	*Actitus macularius*	S5B	G5				
	X	Ring-billed Gull	*Larus delawarensis*	S5	G5			L4	X
X		Great Blue Heron	*Ardea herodias*	S4	G5			L3	X
X		Green Heron	*Butorides virescens*	S4B	G5			L4	X
X		Northern Harrier	*Circus cyaneus*	S5B, S4N	G5			L2	X
X		Red-tailed Hawk	*Buteo jamaicensis*	S5	G5			L5	X
	X	Red-bellied Woodpecker	*Melanerpes carolinus*	S5	G5			L4	
X		Downy Woodpecker	*Dryobates pubescens*	S5	G5			L5	
X		Northern Flicker	*Colaptes auratus*	S5	G5			L4	
X		American Kestrel	*Falco sparverius*	S4	G5			L4	X
	X	Great Crested Flycatcher	*Myiarchus crinitus*	S5B	G5			L4	
X		Eastern Kingbird	*Tyrannus tyrannus*	S4B	G5			L4	
X		Eastern Wood-Pewee	*Contopus virens*	S4B	G5	SC	SC	L4	X
X		Willow Flycatcher	*Empidonax traillii*	S4B	G5			L4	X
X		Eastern Phoebe	*Sayornis phoebe*	S5B	G5			L5	
X		Warbling Vireo	*Vireo gilvus*	S5B	G5			L5	
	X	Red-eyed Vireo	*Vireo olivaceus*	S5B	G5			L4	
X	X	Blue Jay	*Cyanocitta cristata*	S5	G5			L5	
X		American Crow	*Corvus brachyrhynchos*	S5	G5			L5	
X		Common Raven	*Corvus corax*	S5	G5			L4	
X		Horned Lark	*Eremophila alpestris*	S4	G5			L3	
X		Tree Swallow	*Tachycineta bicolor*	S4S5B	G5			L4	
X		Northern Rough-winged Swallow	*Stelgidopteryx serripennis*	S4B	G5			L4	X
X	X	Barn Swallow	*Hirundo rustica*	S4B	G5	THR	SC	L4	
X	X	Black-capped Chickadee	*Poecile atricapillus*	S5	G5			L5	
X		Red-breasted Nuthatch	*Sitta canadensis*	S5	G5			L4	X
X		House Wren	*Troglodytes aedon*	S5B	G5			L5	
X		Eastern Bluebird	*Sialia sialis*	S5B, S4N	G5			L4	
X	X	Wood Thrush	*Hylocichla mustelina*	S4B	G4	SC	THR	L3	X
X	X	American Robin	*Turdus migratorius*	S5	G5			L5	
X		Gray Catbird	*Dumetella carolinensis*	S5B, S3N	G5			L4	
	X	Brown Thrasher	*Toxostoma rufum*	S4B	G5			L3	X
X		Northern Mockingbird	*Mimus polyglottos*	S4	G5			L5	

Inside Study Area	Outside Study Area	COMMON NAME	SCIENTIFIC NAME	Provincial Status (S RANK)	Global Status (G RANK)	SARO List (MECP)	SARA Schedule 1 (Federal)	Local Status TRCA	SWH Indicator Species 6E
X		European Starling	*Sturnus vulgaris*	SNA	G5			L+	
X		Cedar Waxwing	*Bombycilla cedrorum*	S5	G5			L5	
X		House Sparrow	*Passer domesticus*	SNA	G5			L+	
X		House Finch	*Carpodacus mexicanus*	SNA	G5			L+	
X		American Goldfinch	*Spinus tristis*	S5	G5			L5	
X	X	Chipping Sparrow	*Spizella passerina*	S5B, S3N	G5			L5	
X		Vesper Sparrow	*Pooecetes gramineus*	S4B	G5			L3	X
X	X	Savannah Sparrow	*Passerculus sandwichensis*	S5B, S3N	G5			L4	X
X	X	Song Sparrow	*Melospiza melodia*	S5	G5			L5	
X		Eastern Towhee	*Pipilo erythrophthalmus*	S4B, S3N	G5			L3	X
X	X	Bobolink	*Dolichonyx oryzivorus*	S4B	G5	THR	THR	L2	
X	X	Eastern Meadowlark	*Sturnella magna*	S4B, S3N	G5	THR	THR	L3	
X	X	Orchard Oriole	*Icterus spurius*	S4B	G5			L5	
X	X	Baltimore Oriole	*Icterus galbula*	S4B	G5			L5	
X	X	Red-winged Blackbird	*Agelaius phoeniceus*	S5	G5			L5	
X		Brown-headed Cowbird	*Molothrus ater*	S5	G5			L5	
X	X	Common Grackle	*Quiscalus quiscula*	S5	G5			L5	
X	X	Common Yellowthroat	*Geothlypis trichas*	S5B, S3N	G5			L4	
X		American Redstart	*Setophaga ruticilla*	S5B	G5			L3	
X		Yellow Warbler	*Setophaga petechia*	S5B	G5			L5	
X		Pine Warbler	*Setophaga pinus*	S5B, S3N	G5			L4	
X		Northern Cardinal	*Cardinalis cardinalis*	S5	G5			L5	
X		Rose-breasted Grosbeak	*Pheucticus ludovicianus*	S5B	G5			L4	
X		Indigo Bunting	*Passerina cyanea*	S5B	G5			L4	
X		**MAMMALS**							
X		Eastern Small-footed Myotis	*Myotis leibii*	S2S3	G4	END			
X		Little Brown Myotis	*Myotis lucifugus*	S3	G3	END	END	L4	
X		Silver-haired Bat	*Lasionycteris noctivagans*	S4	G3G4				X
X		Eastern Red Bat	*Lasiurus borealis*	S4	G3G4			LX	
X		Big Brown Bat	*Eptesicus fuscus*	S4	G5			L4	X
X		Hoary Bat	*Lasiurus cinereus*	S4	G3G4			LX	
X	X	Eastern Cottontail	*Sylvilagus floridanus*	S5	G5			L4	
X		Eastern Chipmunk	*Tamias striatus*	S5	G5			L4	
X		Eastern Gray Squirrel	*Sciurus carolinensis*	S5	G5			L5	
X		Red Squirrel	*Tamiasciurus hudsonicus*	S5	G5			L4	
X		Beaver	*Castor canadensis*	S5	G5			L4	
X		Muskrat	*Ondatra zibethicus*	S5	G5			L4	
X		Meadow Vole	*Microtus pennsylvanicus*	S5	G5			L4	
X	X	Coyote	*Canis latrans*	S5	G5			L4	
X		Red Fox	*Vulpes vulpes*	S5	G5			L4	
X	X	Northern Raccoon	*Procyon lotor*	S5	G5			L5	
X		American Mink	*Mustela vison*	S4	G5			L4	
X		Striped Skunk	*Mephitis mephitis*	S5	G5			L5	
X	X	White-tailed Deer	*Odocoileus virginianus*	S5	G5			L4	X
		SUMMARY							
		Total Odonata:	*3*						
		Total Butterflies:	*2*						
		Total Other Arthropods	*1*						
		Total Amphibians:	*4*						
		Total Reptiles:	*3*						
		Total Birds:	*63*						
		Total Mammals:	*20*						
		SIGNIFICANT SPECIES							
		Global:	*4*						
		National:	*8*						
		Provincial:	*8*						
		Regional:	*8*						
		Local:	*16*						

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		Explanation of Status and Acronyms							
		S1: Critically Imperiled—Critically imperiled in the province (often 5 or fewer occurrences)							
		S2: Imperiled—Imperiled in the province, very few populations (often 20 or fewer),							
		S3: Vulnerable—Vulnerable in the province, relatively few populations (often 80 or fewer)							
		S4: Apparently Secure—Uncommon but not rare							
		S5: Secure—Common, widespread, and abundant in the province							
		SX: Presumed extirpated							
		SH: Possibly Extirpated (Historical)							
		SNR: Unranked							
		SU: Unrankable—Currently unrankable due to lack of information							
		SNA: Not applicable—A conservation status rank is not applicable because the species is not a suitable target for conservation activities.							
		S#S#: Range Rank—A numeric range rank (e.g., S2S3) is used to indicate any range of uncertainty about the status of the species							
		S#B- Breeding status rank							
		S#N- Non Breeding status rank							
		?: Indicates uncertainty in the assigned rank							
		G1: Extremely rare globally; usually fewer than 5 occurrences in the overall range							
		G1G2: Extremely rare to very rare globally							
		G2: Very rare globally; usually between 5-10 occurrences in the overall range							
		G2G3: Very rare to uncommon globally							
		G3: Rare to uncommon globally; usually between 20-100 occurrences							
		G3G4: Rare to common globally							
		G4: Common globally; usually more than 100 occurrences in the overall range							
		G4G5: Common to very common globally							
		G5: Very common globally; demonstrably secure							
		GU: Status uncertain, often because of low search effort or cryptic nature of the species; more data needed.							
		T: Denotes that the rank applies to a subspecies or variety							
		Q: Denotes that the taxonomic status of the species, subspecies, or variety is questionable.							
		END: Endangered							
		THR: Threatened							
		SC: Special Concern							
		NAR: Not At Risk							
		IND: Indeterminant, insufficient information to assign status							
		DD: Data Deficient							
		6: Rare in Site Region 6							
		7: Rare in Site Region 7							
		Area: Minimum patch size for area-sensitive species (ha)							
		H- highly significant in Hamilton Region (i.e. rare)							
		m- moderately significant in Hamilton Region (i.e. uncommon)							
		L1- extremely rare locally (Toronto Region)							
		L2- very rare locally (Toronto Region)							
		L3- rare to uncommon locally (Toronto Region)							
		HR- rare in Halton Region, highly significant							
		HU- uncommon in Halton Region, moderately significant							
		REFERENCES							
		COSSARO Status							
		Endangered Species Act, 2007 (Bill 184). Species at Risk in Ontario List (O. Reg. 230/08). Accessed July 4, 2024.							
		COSEWIC Status							
		COSEWIC. 2024. Canadian Species at Risk. Committee on the Status of Endangered Wildlife in Canada.							
		Local Status							
		Toronto and Region Conservation Authority (TRCA). 2023. Revised Fauna Scores and Ranks.							
		Significant Wildlife Habitat (SWH) Indicator Species							
		Ministry of Natural Resources and Forestry (MNRF). 2015. Significant wildlife habitat criteria schedules for ecoregion 6E. Available at: https://dr6j45jk9xcmk.cloudfront.net/documents/4775/schedule-6e-jan-2015-access-ver-final-s.pdf.							
		Natural Heritage Information Center (NHIC). 2024. Ontario Species List: All Species.							

Table 10: Headwater Drainage Feature Classification and Management Recommendations

DRAINAGE FEATURE SEGMENT	STEP 1. HYDROLOGY		STEP 2. RIPARIAN	STEP 3. FISH HABITAT	STEP 4. TERRESTRIAL HABITAT	MANAGEMENT RECOMMENDATION (PER HDFA GUIDELINES)	GEI'S MANAGEMENT RECOMMENDATION
	FUNCTION	MODIFIERS					
H1-S1	FT-7 FC-4 (Round 1) FC-1 (Round 2) **Contributing**-Reach was flowing during early spring and was dry upon late spring assessment	Feature appears to be a dug swale to facilitate agricultural drainage.	**Limited-**Riparian area dominated by agricultural lands.	**Valued** – Reach may be contributing Redside Dace habitat. Reach identified as indirect fish habitat.	**Limited-** As per Table 7 of the HDFA guidelines, swales provide limited terrestrial functions	**Conservation** – Reach assigned a "Conservation" management recommendation since the feature is identified as contributing Redside Dace habitat.	**Mitigation** – The reduction of the management recommendation to "Mitigation" is in line with the typical management of seasonally flowing agricultural swales. Discussion on the management of contributing Redside Dace habitat will occur with MECP during the site-specific stage.
H2-S1	FT-7 FC-4 (Round 1) FC-1 (Round 2) **Contributing**-Reach was flowing during early spring and was dry upon late spring assessment	Feature appears to be a dug swale to facilitate agricultural drainage. .	**Limited-**Riparian area dominated by agricultural lands.	**Valued** – Reach may be contributing Redside Dace habitat. Reach identified as indirect fish habitat.	**Limited-** As per Table 7 of the HDFA guidelines, swales provide limited terrestrial functions	**Conservation** – Reach assigned a "Conservation" management recommendation since the feature is identified as contributing Redside Dace habitat.	**Mitigation** – The reduction of the management recommendation to "Mitigation" is in line with the typical management of seasonally flowing agricultural swales. Discussion on the management of contributing Redside Dace habitat will occur with MECP during the site-specific stage.

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	FUNCTION	MODIFIERS					
H3-S1	FT-7 FC-4 (Round 1) FC-1 (Round 2) **Contributing**-Reach was flowing during early spring and was dry upon late spring assessment	Feature appears to be a dug swale to facilitate agricultural drainage. .	**Limited-**Riparian area dominated by agricultural lands.	**Valued** – Reach may be contributing Redside Dace habitat. Reach identified as indirect fish habitat.	**Limited-** As per Table 7 of the HDFA guidelines, swales provide limited terrestrial functions	**Conservation** – Reach assigned a "Conservation" management recommendation since the feature is identified as contributing Redside Dace habitat.	**Mitigation** – The reduction of the management recommendation to "Mitigation" is in line with the typical management of seasonally flowing agricultural swales. Discussion on the management of contributing Redside Dace habitat will occur with MECP during the site-specific stage.
H4-S1	FT-7 FC-4 (Round 1) FC-1 (Round 2) **Contributing**-Reach was flowing during early spring and was dry upon late spring assessment	Feature appears to be a dug swale to facilitate agricultural drainage.	**Limited-**Riparian area dominated by agricultural lands.	**Valued** – Reach may be contributing Redside Dace habitat. Reach identified as indirect fish habitat.	**Limited-** As per Table 7 of the HDFA guidelines, swales provide limited terrestrial functions	**Conservation** – Reach assigned a "Conservation" management recommendation since the feature is identified as contributing Redside Dace habitat.	**Mitigation** – The reduction of the management recommendation to "Mitigation" is in line with the typical management of seasonally flowing agricultural swales. Discussion on the management of contributing Redside Dace habitat will occur with MECP during the site-specific stage.

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DRAINAGE FEATURE SEGMENT	STEP 1. HYDROLOGY		STEP 2. RIPARIAN	STEP 3. FISH HABITAT	STEP 4. TERRESTRIAL HABITAT	MANAGEMENT RECOMMENDATION (PER HDFA GUIDELINES)	GEI'S MANAGEMENT RECOMMENDATION
	FUNCTION	MODIFIERS					
H5-S1	FT-7 FC-4 (Round 1) FC-1 (Round 2) **Contributing**-Reach was flowing during early spring and was dry upon late spring assessment	Feature appears to be a dug swale to facilitate agricultural drainage.	**Limited-**Riparian area dominated by agricultural lands.	**Valued** – Reach may be contributing Redside Dace habitat. Reach identified as indirect fish habitat.	**Limited-** As per Table 7 of the HDFA guidelines, swales provide limited terrestrial functions	**Conservation** – Reach assigned a "Conservation" management recommendation since the feature is identified as contributing Redside Dace habitat.	**Mitigation** – The reduction of the management recommendation to "Mitigation" is in line with the typical management of seasonally flowing agricultural swales. Discussion on the management of contributing Redside Dace habitat will occur with MECP during the site-specific stage.
H6-S1	FT-7 FC-4 (Round 1) FC-1 (Round 2) **Contributing**-Reach was flowing during early spring and was dry upon late spring assessment	Agricultural land uses surrounding this feature are expected to influence its hydrology.	**Limited-**Riparian area dominated by agricultural lands.	**Valued** – Reach may be contributing Redside Dace habitat. Reach identified as indirect fish habitat.	**Limited-** As per Table 7 of the HDFA guidelines, swales provide limited terrestrial functions	**Conservation** – Reach assigned a "Conservation" management recommendation since the feature is identified as contributing Redside Dace habitat.	**Mitigation** – The reduction of the management recommendation to "Mitigation" is in line with the typical management of seasonally flowing agricultural swales. Discussion on the management of contributing Redside Dace habitat will occur with MECP during the site-specific stage.

Table 10: Headwater Drainage Feature Classification and Management Recommendations

DRAINAGE FEATURE SEGMENT	STEP 1. HYDROLOGY		STEP 2. RIPARIAN	STEP 3. FISH HABITAT	STEP 4. TERRESTRIAL HABITAT	MANAGEMENT RECOMMENDATION (PER HDFA GUIDELINES)	GEI'S MANAGEMENT RECOMMENDATION
	FUNCTION	MODIFIERS					
H7-S1	FT-7 FC-4 (Round 1) FC-1 (Round 2) **Contributing**-Reach was flowing during early spring and was dry upon late spring assessment	Agricultural land uses surrounding this feature are expected to influence its hydrology.	**Valued-** Meadow lands surround this feature.	**Valued** – Reach may be contributing Redside Dace habitat. Reach identified as indirect fish habitat.	**Limited-** As per Table 7 of the HDFA guidelines, swales provide limited terrestrial function.	**Conservation** – Reach assigned a "Conservation" management recommendation since the feature is identified as contributing Redside Dace habitat.	**Mitigation** – The reduction of the management recommendation to "Mitigation" is in line with the typical management of seasonally flowing agricultural swales. Discussion on the management of contributing Redside Dace habitat will occur with MECP during the site-specific stage.
H7A-S1	FT-7 FC-4 (Round 1) FC-1 (Round 2) **Contributing**-Reach was flowing during early spring and was dry upon late spring assessment	Agricultural land uses surrounding this feature are expected to influence its hydrology.	**Limited-**Riparian area dominated by agricultural lands.	**Valued** – Reach may be contributing Redside Dace habitat. Reach identified as indirect fish habitat.	**Limited-** As per Table 7 of the HDFA guidelines, swales provide limited terrestrial functions	**Conservation** – Reach assigned a "Conservation" management recommendation since the feature is identified as contributing Redside Dace habitat.	**Mitigation** – The reduction of the management recommendation to "Mitigation" is in line with the typical management of seasonally flowing agricultural swales. Discussion on the management of contributing Redside Dace habitat will occur with MECP during the site-specific stage.

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DRAINAGE FEATURE SEGMENT	STEP 1. HYDROLOGY		STEP 2. RIPARIAN	STEP 3. FISH HABITAT	STEP 4. TERRESTRIAL HABITAT	MANAGEMENT RECOMMENDATION (PER HDFA GUIDELINES)	GEI'S MANAGEMENT RECOMMENDATION
	FUNCTION	MODIFIERS					
H7B-S1	FT-7 FC-4 (Round 1) FC-1 (Round 2) **Contributing**-Reach was flowing during early spring and was dry upon late spring assessment	Agricultural land uses surrounding this feature are expected to influence its hydrology.	**Limited-**Riparian area dominated by agricultural lands.	**Valued** – Reach may be contributing Redside Dace habitat. Reach identified as indirect fish habitat.	**Limited-** As per Table 7 of the HDFA guidelines, swales provide limited terrestrial functions	**Conservation** – Reach assigned a "Conservation" management recommendation since the feature is identified as contributing Redside Dace habitat.	**Mitigation** – The reduction of the management recommendation to "Mitigation" is in line with the typical management of seasonally flowing agricultural swales. Discussion on the management of contributing Redside Dace habitat will occur with MECP during the site-specific stage.
H7-S2	FT-4 FC-4 (Round 1) FC-1 (Round 2) **Contributing**-Reach was flowing during early spring and was dry upon late spring assessment	Agricultural land uses surrounding this feature are expected to influence its hydrology.	**Limited-**Riparian area dominated by agricultural lands.	**Valued** – Reach may be contributing Redside Dace habitat. Reach identified as indirect fish habitat.	**Limited-** As per Table 7 of the HDFA guidelines, undefined features provide limited terrestrial functions	**Conservation** – Reach assigned a "Conservation" management recommendation since the feature is identified as contributing Redside Dace habitat.	**Mitigation** – The reduction of the management recommendation to "Mitigation" is in line with the typical management of seasonally flowing agricultural swales. Discussion on the management of contributing Redside Dace habitat will occur with MECP during the site-specific stage.

Table 10: Headwater Drainage Feature Classification and Management Recommendations

DRAINAGE FEATURE SEGMENT	STEP 1. HYDROLOGY		STEP 2. RIPARIAN	STEP 3. FISH HABITAT	STEP 4. TERRESTRIAL HABITAT	MANAGEMENT RECOMMENDATION (PER HDFA GUIDELINES)	GEI'S MANAGEMENT RECOMMENDATION
	FUNCTION	MODIFIERS					
H7-S3	FT-7 FC-4 (Round 1) FC-1 (Round 2) **Contributing**-Reach was flowing during early spring and was dry upon late spring assessment	Agricultural land uses surrounding this feature are expected to influence its hydrology.	**Limited-**Riparian area dominated by agricultural lands.	**Valued** – Reach may be contributing Redside Dace habitat. Reach identified as indirect fish habitat.	**Limited-** As per Table 7 of the HDFA guidelines, swales provide limited terrestrial functions	**Conservation** – Reach assigned a "Conservation" management recommendation since the feature is identified as contributing Redside Dace habitat.	**Mitigation** – The reduction of the management recommendation to "Mitigation" is in line with the typical management of seasonally flowing agricultural swales. Discussion on the management of contributing Redside Dace habitat will occur with MECP during the site-specific stage.
H8-S1	FT-6 FC-4 (Round 1) FC-2 (Round 2) **Contributing**-Reach was flowing during early spring and had standing water upon late spring assessment Third round assessment required to	Agricultural land uses surrounding this feature are expected to influence its hydrology.	**Important-**Reach is a wetland.	**Valued** – Reach may be contributing Redside Dace habitat. Reach identified as indirect fish habitat.	**Valued** – Feature is a wetland. No calling amphibians were recorded within the feature during targeted call count assessments.	**Protection –** Reach assigned a "Protection" management recommendation since the feature is identified as contributing Redside Dace habitat. Reach is a wetland which leads to a higher management recommendation.	**Mitigation** – The reduction of the management recommendation to "Mitigation" is in line with the typical management of a non-significant wetland community that can be replicated and/or enhanced elsewhere. A Mitigation management recommendation will ensure wetland

Table 10: Headwater Drainage Feature Classification and Management Recommendations

DRAINAGE FEATURE SEGMENT	STEP 1. HYDROLOGY		STEP 2. RIPARIAN	STEP 3. FISH HABITAT	STEP 4. TERRESTRIAL HABITAT	MANAGEMENT RECOMMENDATION (PER HDFA GUIDELINES)	GEI'S MANAGEMENT RECOMMENDATION
	FUNCTION	MODIFIERS					
	confirm hydrology; however, based on GEI's experience with these types of wetlands it is likely that it will be dry by summer.						mitigation occurs and any flows are maintained to downstream receiving habitats.
H8A-S1	FT-7 FC-4 (Round 1) FC-2 (Round 2) **Contributing**-Reach was flowing during early spring. Third round assessment required to confirm hydrology; however, based on GEI's experience these types of swales are typically dry by summer.	Agricultural land uses surrounding this feature are expected to influence its hydrology.	**Limited-**Riparian area dominated by agricultural lands.	**Valued** – Reach may be contributing Redside Dace habitat. Reach identified as indirect fish habitat.	**Limited-** As per Table 7 of the HDFA guidelines, swales provide limited terrestrial functions	**Conservation** – Reach assigned a "Conservation" management recommendation since the feature is identified as contributing Redside Dace habitat.	**Mitigation** – The reduction of the management recommendation to "Mitigation" is in line with the typical management of seasonally flowing agricultural swales. Discussion on the management of contributing Redside Dace habitat will occur with MECP during the site-specific stage.

Table 10: Headwater Drainage Feature Classification and Management Recommendations

DRAINAGE FEATURE SEGMENT	STEP 1. HYDROLOGY		STEP 2. RIPARIAN	STEP 3. FISH HABITAT	STEP 4. TERRESTRIAL HABITAT	MANAGEMENT RECOMMENDATION (PER HDFA GUIDELINES)	GEI'S MANAGEMENT RECOMMENDATION
	FUNCTION	MODIFIERS					
H8A1-S1	FT-7 FC-4 (Round 1) FC-1 (Round 2) **Contributing**-Reach was flowing during early spring and was dry upon late spring assessment	Agricultural land uses surrounding this feature are expected to influence its hydrology.	**Limited-**Riparian area dominated by agricultural lands.	**Valued** – Reach may be contributing Redside Dace habitat. Reach identified as indirect fish habitat.	**Limited-** As per Table 7 of the HDFA guidelines, swales provide limited terrestrial functions	**Conservation** – Reach assigned a "Conservation" management recommendation since the feature is identified as contributing Redside Dace habitat.	**Mitigation** – The reduction of the management recommendation to "Mitigation" is in line with the typical management of seasonally flowing agricultural swales. Discussion on the management of contributing Redside Dace habitat will occur with MECP during the site-specific stage.
H8B-S1	FT-7 FC-4 (Round 1) FC- 2 (Round 2) **Contributing**-Reach was flowing during early spring and had standing water upon late spring assessment Third round assessment required to confirm	Agricultural land uses surrounding this feature are expected to influence its hydrology.	**Valued-**Riparian area dominated by meadow community.	**Valued** – Reach may be contributing Redside Dace habitat. Reach identified as indirect fish habitat.	**Limited-** As per Table 7 of the HDFA guidelines, swales provide limited terrestrial function.	**Conservation** – Reach assigned a "Conservation" management recommendation since the feature is identified as contributing Redside Dace habitat.	**Mitigation** – The reduction of the management recommendation to "Mitigation" is in line with the typical management of seasonally flowing agricultural swales. Discussion on the management of contributing Redside Dace habitat will occur with MECP during the site-specific stage.

Table 10: Headwater Drainage Feature Classification and Management Recommendations

DRAINAGE FEATURE SEGMENT	STEP 1. HYDROLOGY		STEP 2. RIPARIAN	STEP 3. FISH HABITAT	STEP 4. TERRESTRIAL HABITAT	MANAGEMENT RECOMMENDATION (PER HDFA GUIDELINES)	GEI'S MANAGEMENT RECOMMENDATION
	FUNCTION	MODIFIERS					
	hydrology; however, based on GEI's experience with these types of swales it is likely that it will be dry by summer.						
H8C-S1	FT-7 FC-4 (Round 1) FC-1 (Round 2) **Contributing**-Reach was flowing during early spring and was dry upon late spring assessment	Agricultural land uses surrounding this feature are expected to influence its hydrology.	**Limited-**Riparian area dominated by agricultural lands.	**Valued** – Reach may be contributing Redside Dace habitat. Reach identified as indirect fish habitat.	**Limited-** As per Table 7 of the HDFA guidelines, swales provide limited terrestrial functions.	**Conservation** – Reach assigned a "Conservation" management recommendation since the feature is identified as contributing Redside Dace habitat.	**Mitigation** – The reduction of the management recommendation to "Mitigation" is in line with the typical management of seasonally flowing agricultural swales. Discussion on the management of contributing Redside Dace habitat will occur with MECP during the site-specific stage.
H8-S2	FT-6 FC-4 (Round 1) FC-2 (Round 2) **Contributing**-Reach was flowing during	Agricultural land uses surrounding this feature are expected to influence its hydrology.	**Important-**Reach is a wetland.	**Valued** – Reach may be contributing Redside Dace habitat. Reach identified as	**Valued** – Feature is a wetland. No calling amphibians were recorded within the	**Protection –** Reach assigned a "Protection" management recommendation since the feature is identified as	**Mitigation** – The reduction of the management recommendation to "Mitigation" is in line with the typical management of a

Table 10: Headwater Drainage Feature Classification and Management Recommendations

DRAINAGE FEATURE SEGMENT	STEP 1. HYDROLOGY		STEP 2. RIPARIAN	STEP 3. FISH HABITAT	STEP 4. TERRESTRIAL HABITAT	MANAGEMENT RECOMMENDATION (PER HDFA GUIDELINES)	GEI'S MANAGEMENT RECOMMENDATION
	FUNCTION	MODIFIERS					
	early spring and had standing water upon late spring assessment Third round assessment required to confirm hydrology; however, based on GEI's experience with these types of wetlands it is likely that it will be dry by summer.			indirect fish habitat.	feature during targeted call count assessments.	contributing Redside Dace habitat. Reach is a wetland which leads to a higher management recommendation.	non-significant wetland community that can be replicated and/or enhanced elsewhere. A Mitigation management recommendation will ensure wetland mitigation occurs and any flows are maintained to downstream receiving habitats.
H8A-S2	FT-7 FC-4 (Round 1) FC-1 (Round 2) **Contributing**- Reach was flowing during early spring and was dry upon late	Agricultural land uses surrounding this feature are expected to influence its hydrology.	**Valued**- Meadow lands adjacent to this feature.	**Valued** – Reach may be contributing Redside Dace habitat. Reach identified as indirect fish habitat.	**Limited**- As per Table 7 of the HDFA guidelines, swales provide limited terrestrial functions	**Conservation** – Reach assigned a "Conservation" management recommendation since the feature is identified as contributing Redside Dace habitat.	**Mitigation** – The reduction of the management recommendation to "Mitigation" is in line with the typical management of seasonally flowing agricultural swales. Discussion on the management of

Table 10: Headwater Drainage Feature Classification and Management Recommendations

DRAINAGE FEATURE SEGMENT	STEP 1. HYDROLOGY		STEP 2. RIPARIAN	STEP 3. FISH HABITAT	STEP 4. TERRESTRIAL HABITAT	MANAGEMENT RECOMMENDATION (PER HDFA GUIDELINES)	GEI'S MANAGEMENT RECOMMENDATION
	FUNCTION	MODIFIERS					
	spring assessment						contributing Redside Dace habitat will occur with MECP during the site-specific stage.
H8-S3	FT-7 FC-4 (Round 1) FC-2 (Round 2) **Contributing**- Reach was flowing during early spring and had standing water upon late spring assessment Third round assessment required to confirm hydrology; however, based on GEI's experience with these types of swales it is likely that it will be dry by summer.	Agricultural land uses surrounding this feature are expected to influence its hydrology. Likely tile drain inlets causing localized increased definition.	**Important-** Riparian area dominated by forest and flows through a wetland.	**Valued** – Reach may be contributing Redside Dace habitat. Reach identified as indirect fish habitat.	**Limited-** As per Table 7 of the HDFA guidelines, swales provide limited terrestrial function.	**Protection –** Reach assigned a "Protection" management recommendation since the feature is identified as contributing Redside Dace habitat and flows through a forested unit.	**Mitigation** - The reduction of the management recommendation to "Mitigation" is recommended since the woodland will be evaluated separately. The HDF does not appear to hydrologically support the woodland (FOD5-4) since the woodland is a classified as a "Dry Deciduous Forest" ecosite. The drainage feature itself does not warrant a Protection management recommendation.

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DRAINAGE FEATURE SEGMENT	STEP 1. HYDROLOGY		STEP 2. RIPARIAN	STEP 3. FISH HABITAT	STEP 4. TERRESTRIAL HABITAT	MANAGEMENT RECOMMENDATION (PER HDFA GUIDELINES)	GEI'S MANAGEMENT RECOMMENDATION
	FUNCTION	MODIFIERS					
H8-S4	FT-7 FC-4 (Round 1) FC-2 (Round 2) **Contributing**- Reach was flowing during early spring and had standing water upon late spring assessment Third round assessment required to confirm hydrology; however, based on GEI's experience with these types of swales it is likely that it will be dry by summer.	Agricultural land uses surrounding this feature are expected to influence its hydrology.	**Limited-**Riparian area dominated by agricultural lands.	**Valued** – Reach may be contributing Redside Dace habitat. Reach identified as indirect fish habitat.	**Limited-** As per Table 7 of the HDFA guidelines, swales provide limited terrestrial functions.	**Protection** – Reach assigned a "Conservation" management recommendation since the feature is identified as contributing Redside Dace habitat; however, since it is located downstream of HDF H8-S9 and HDF H8-S7 (wetlands) it is assigned a "Protection" management recommendation.	**Mitigation** – The reduction of the management recommendation to "Mitigation" is in line with the typical management of seasonally flowing agricultural features. Discussion on the management of contributing Redside Dace habitat will occur with MECP during the site-specific stage. As discussed within HDF H8-S9 and H8-S7, a Mitigation management recommendation for the upstream wetlands is warranted as it permits the removal and replication of the wetland functions elsewhere, while still maintaining the downstream flow conveyance.

Table 10: Headwater Drainage Feature Classification and Management Recommendations

DRAINAGE FEATURE SEGMENT	STEP 1. HYDROLOGY		STEP 2. RIPARIAN	STEP 3. FISH HABITAT	STEP 4. TERRESTRIAL HABITAT	MANAGEMENT RECOMMENDATION (PER HDFA GUIDELINES)	GEI'S MANAGEMENT RECOMMENDATION
	FUNCTION	MODIFIERS					
H8-S5	FT-4 FC-4 (Round 1) FC-2 (Round 2) **Contributing**- Reach was flowing during early spring and had standing water upon late spring assessment Third round assessment required to confirm hydrology; however, based on GEI's experience with these types of undefined feature types it is likely that it will be dry by summer.	Agricultural land uses surrounding this feature are expected to influence its hydrology.	**Valued -** Riparian area dominated by meadow.	**Valued** – Reach may be contributing Redside Dace habitat. Reach identified as indirect fish habitat.	**Limited-** As per Table 7 of the HDFA guidelines, undefined features provide limited terrestrial functions.	**Protection** – Reach assigned a "Conservation" management recommendation since the feature is identified as contributing Redside Dace habitat; however, since it is located downstream of HDF H8-S9 and HDF H8-S7 (wetlands) it is assigned a "Protection" management recommendation.	**Mitigation** – The reduction of the management recommendation to "Mitigation" is in line with the typical management of seasonally flowing agricultural features. Discussion on the management of contributing Redside Dace habitat will occur with MECP during the site-specific stage. As discussed within HDF H8-S9 and H8-S7, a Mitigation management recommendation for the upstream wetlands is warranted as it permits the removal and replication of the wetland functions elsewhere, while still maintaining the downstream flow conveyance.

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DRAINAGE FEATURE SEGMENT	STEP 1. HYDROLOGY		STEP 2. RIPARIAN	STEP 3. FISH HABITAT	STEP 4. TERRESTRIAL HABITAT	MANAGEMENT RECOMMENDATION (PER HDFA GUIDELINES)	GEI'S MANAGEMENT RECOMMENDATION
	FUNCTION	MODIFIERS					
H8-S6	FT-7 FC-4 (Round 1) FC-2 (Round 2) **Contributing**-Reach was flowing during early spring and had standing water upon late spring assessment Third round assessment required to confirm hydrology; however, based on GEI's experience with these types of swales it is likely that it will be dry by summer.	Agricultural land uses surrounding this feature are expected to influence its hydrology.	**Limited-**Riparian area dominated by agricultural lands.	**Valued** – Reach may be contributing Redside Dace habitat. Reach identified as indirect fish habitat.	**Limited-** As per Table 7 of the HDFA guidelines, swales provide limited terrestrial functions.	**Protection** – Reach assigned a "Conservation" management recommendation since the feature is identified as contributing Redside Dace habitat; however, since it is located downstream of HDF H8-S9 and HDF H8-S7 (wetlands) it is assigned a "Protection" management recommendation.	**Mitigation** – The reduction of the management recommendation to "Mitigation" is in line with the typical management of seasonally flowing agricultural swales. Discussion on the management of contributing Redside Dace habitat will occur with MECP during the site-specific stage. As discussed within HDF H8-S9 and H8-S7, a Mitigation management recommendation for the upstream wetlands is warranted as it permits the removal and replication of the wetland functions elsewhere, while still maintaining the downstream flow conveyance.

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DRAINAGE FEATURE SEGMENT	STEP 1. HYDROLOGY		STEP 2. RIPARIAN	STEP 3. FISH HABITAT	STEP 4. TERRESTRIAL HABITAT	MANAGEMENT RECOMMENDATION (PER HDFA GUIDELINES)	GEI'S MANAGEMENT RECOMMENDATION
	FUNCTION	MODIFIERS					
H8-S7	FT-6 FC-4 (Round 1) FC-2 (Round 2) **Contributing**-Reach was flowing during early spring and had standing water upon late spring assessment Third round assessment required to confirm hydrology; however, based on GEI's experience with these types of wetlands it is likely that it will be dry by summer.	Agricultural land uses surrounding this feature are expected to influence its hydrology.	**Important**-Reach is a wetland.	**Valued** – Reach may be contributing Redside Dace habitat. Reach identified as indirect fish habitat.	**Valued** – Feature is a wetland. No calling amphibians were recorded within the feature during targeted call count assessments.	**Protection –** Reach assigned a "Protection" management recommendation since the feature is identified as contributing Redside Dace habitat. Reach is a wetland which leads to a higher management recommendation.	**Mitigation** – The reduction of the management recommendation to "Mitigation" is in line with the typical management of a non-significant wetland community that can be replicated and/or enhanced elsewhere. A Mitigation management recommendation will ensure wetland mitigation occurs and any flows are maintained to downstream receiving habitats.
H8-S8	FT-7 FC-4 (Round 1) FC-2 (Round 2)	Agricultural land uses surrounding this feature are	**Limited**-Riparian area dominated by agricultural lands.	**Valued** – Reach may be contributing Redside Dace	**Limited-** As per Table 7 of the HDFA guidelines,	**Protection** – Reach assigned a "Conservation" management	**Mitigation** – The reduction of the management recommendation to

Table 10: Headwater Drainage Feature Classification and Management Recommendations

DRAINAGE FEATURE SEGMENT	STEP 1. HYDROLOGY		STEP 2. RIPARIAN	STEP 3. FISH HABITAT	STEP 4. TERRESTRIAL HABITAT	MANAGEMENT RECOMMENDATION (PER HDFA GUIDELINES)	GEI'S MANAGEMENT RECOMMENDATION
	FUNCTION	MODIFIERS					
	Contributing-Reach was flowing during early spring and had standing water upon late spring assessment Third round assessment required to confirm hydrology; however, based on GEI's experience with these types of swales it is likely that it will be dry by summer.	expected to influence its hydrology.		habitat. Reach identified as indirect fish habitat.	swales provide limited terrestrial functions	recommendation since the feature is identified as contributing Redside Dace habitat; however, since it is located downstream of HDF H8-S9 (wetland) it is assigned a "Protection" management recommendation.	"Mitigation" is in line with the typical management of seasonally flowing agricultural swales. Discussion on the management of contributing Redside Dace habitat will occur with MECP during the site-specific stage. As discussed within HDF H8-S9, a Mitigation management recommendation for the upstream wetland is warranted as it permits the removal and replication of the wetland functions elsewhere, while still maintaining the downstream flow conveyance.
H8-S9	FT-6 FC-4 (Round 1) FC-2 (Round 2) **Contributing**-Reach was flowing during	Agricultural land uses surrounding this feature are expected to influence its hydrology.	**Important-**Reach is a wetland.	**Valued** – Reach may be contributing Redside Dace habitat. Reach identified as	**Valued** – Feature is a wetland. No calling amphibians were recorded within the	**Protection –** Reach assigned a "Protection" management recommendation since the feature is identified as	**Mitigation** – The reduction of the management recommendation to "Mitigation" is in line with the typical management of a

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DRAINAGE FEATURE SEGMENT	STEP 1. HYDROLOGY		STEP 2. RIPARIAN	STEP 3. FISH HABITAT	STEP 4. TERRESTRIAL HABITAT	MANAGEMENT RECOMMENDATION (PER HDFA GUIDELINES)	GEI'S MANAGEMENT RECOMMENDATION
	FUNCTION	MODIFIERS					
	early spring and had standing water upon late spring assessment Third round assessment required to confirm hydrology; however, based on GEI's experience with these types of wetlands it is likely that it will be dry by summer..			indirect fish habitat.	feature during targeted call count assessments.	contributing Redside Dace habitat. Reach is a wetland which leads to a higher management recommendation.	non-significant wetland community that can be replicated and/or enhanced elsewhere. A Mitigation management recommendation will ensure wetland mitigation occurs and any flows are maintained to downstream receiving habitats.
H8-S10	FT-7 FC-4 (Round 1) FC-2 (Round 2) **Contributing**-Reach was flowing during early spring and had standing water upon late	Agricultural land uses surrounding this feature are expected to influence its hydrology.	**Limited-**Riparian area dominated by agricultural lands.	**Valued** – Reach may be contributing Redside Dace habitat. Reach identified as indirect fish habitat.	**Limited-** As per Table 7 of the HDFA guidelines, swales provide limited terrestrial functions	**Conservation** – Reach assigned a "Conservation" management recommendation since the feature is identified as contributing Redside Dace habitat.	**Mitigation** – The reduction of the management recommendation to "Mitigation" is in line with the typical management of seasonally flowing agricultural swales. Discussion on the management of

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DRAINAGE FEATURE SEGMENT	STEP 1. HYDROLOGY		STEP 2. RIPARIAN	STEP 3. FISH HABITAT	STEP 4. TERRESTRIAL HABITAT	MANAGEMENT RECOMMENDATION (PER HDFA GUIDELINES)	GEI'S MANAGEMENT RECOMMENDATION
	FUNCTION	MODIFIERS					
	spring assessment Third round assessment required to confirm hydrology; however, based on GEI's experience with these types of swales it is likely that it will be dry by summer.						contributing Redside Dace habitat will occur with MECP during the site-specific stage.
H8-S11	FT-7 FC-4 (Round 1) FC-1 (Round 2) **Contributing**-Reach was flowing during early spring and was dry upon late spring assessment	Agricultural land uses surrounding this feature are expected to influence its hydrology.	**Limited-**Riparian area dominated by agricultural lands.	**Valued** – Reach may be contributing Redside Dace habitat. Reach identified as indirect fish habitat.	**Limited-** As per Table 7 of the HDFA guidelines, swale provide limited terrestrial functions	**Conservation** – Reach assigned a "Conservation" management recommendation since the feature is identified as contributing Redside Dace habitat.	**Mitigation** – The reduction of the management recommendation to "Mitigation" is in line with the typical management of seasonally flowing agricultural swales. Discussion on the management of contributing Redside Dace habitat will occur with MECP during the site-specific stage.

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DRAINAGE FEATURE SEGMENT	STEP 1. HYDROLOGY		STEP 2. RIPARIAN	STEP 3. FISH HABITAT	STEP 4. TERRESTRIAL HABITAT	MANAGEMENT RECOMMENDATION (PER HDFA GUIDELINES)	GEI'S MANAGEMENT RECOMMENDATION
	FUNCTION	MODIFIERS					
H9-S1	FT-7 FC-4 (Round 1) FC-2 (Round 2) **Contributing**-Reach was flowing during early spring and had standing water upon late spring assessment Third round assessment required to confirm hydrology; however, based on GEI's experience with these types of swales it is likely that it will be dry by summer.	Agricultural land uses surrounding this feature are expected to influence its hydrology.	**Limited-**Riparian area dominated by agricultural lands.	**Valued** – Reach may be contributing Redside Dace habitat. Reach identified as indirect fish habitat.	**Limited-** As per Table 7 of the HDFA guidelines, swales provide limited terrestrial functions	**Conservation** – Reach assigned a "Conservation" management recommendation since the feature is identified as contributing Redside Dace habitat.	**Mitigation** – The reduction of the management recommendation to "Mitigation" is in line with the typical management of seasonally flowing agricultural swales. Discussion on the management of contributing Redside Dace habitat will occur with MECP during the site-specific stage.
H9A-S1	FT-7 FC-4 (Round 1) FC-1 (Round 2)	Agricultural land uses surrounding this feature are expected to	**Limited-**Riparian area dominated by agricultural lands.	**Valued** – Reach may be contributing Redside Dace habitat. Reach	**Limited-** As per Table 7 of the HDFA guidelines, swales provide	**Conservation** – Reach assigned a "Conservation" management recommendation	**Mitigation** – The reduction of the management recommendation to "Mitigation" is in line

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DRAINAGE FEATURE SEGMENT	STEP 1. HYDROLOGY		STEP 2. RIPARIAN	STEP 3. FISH HABITAT	STEP 4. TERRESTRIAL HABITAT	MANAGEMENT RECOMMENDATION (PER HDFA GUIDELINES)	GEI'S MANAGEMENT RECOMMENDATION
	FUNCTION	MODIFIERS					
	Contributing- Reach was flowing during early spring and was dry upon late spring assessment	influence its hydrology.		identified as indirect fish habitat.	limited terrestrial functions	since the feature is identified as contributing Redside Dace habitat.	with the typical management of seasonally flowing agricultural swales. Discussion on the management of contributing Redside Dace habitat will occur with MECP during the site-specific stage.
H9B-S1	FT-7 FC-4 (Round 1) FC-1 (Round 2) **Contributing**- Reach was flowing during early spring and was dry upon late spring assessment	Agricultural land uses surrounding this feature are expected to influence its hydrology.	**Limited-**Riparian area dominated by agricultural lands.	**Valued** – Reach may be contributing Redside Dace habitat. Reach identified as indirect fish habitat.	**Limited-** As per Table 7 of the HDFA guidelines, swales provide limited terrestrial functions	**Conservation** – Reach assigned a "Conservation" management recommendation since the feature is identified as contributing Redside Dace habitat.	**Mitigation** – The reduction of the management recommendation to "Mitigation" is in line with the typical management of seasonally flowing agricultural swales. Discussion on the management of contributing Redside Dace habitat will occur with MECP during the site-specific stage.
H10-S1	FT-7 FC-4 (Round 1) FC-1 (Round 2) **Contributing**- Reach was	Agricultural land uses surrounding this feature are expected to	**Limited-**Riparian area dominated by agricultural lands.	**Valued** – Reach may be contributing Redside Dace habitat. Reach identified as	**Limited-** As per Table 7 of the HDFA guidelines, swales provide limited	**Conservation** – Reach assigned a "Conservation" management recommendation since the feature is	**Mitigation** – The reduction of the management recommendation to "Mitigation" is in line with the typical

Table 10: Headwater Drainage Feature Classification and Management Recommendations

DRAINAGE FEATURE SEGMENT	STEP 1. HYDROLOGY		STEP 2. RIPARIAN	STEP 3. FISH HABITAT	STEP 4. TERRESTRIAL HABITAT	MANAGEMENT RECOMMENDATION (PER HDFA GUIDELINES)	GEI'S MANAGEMENT RECOMMENDATION
	FUNCTION	MODIFIERS					
	flowing during early spring and was dry upon late spring assessment	influence its hydrology.		indirect fish habitat.	terrestrial functions	identified as contributing Redside Dace habitat.	management of seasonally flowing agricultural swales. Discussion on the management of contributing Redside Dace habitat will occur with MECP during the site-specific stage.
H11-S1	FT-7 FC-4 (Round 1) FC-1 (Round 2) **Contributing**-Reach was flowing during early spring and was dry upon late spring assessment	Agricultural land uses surrounding this feature are expected to influence its hydrology.	**Limited-** Riparian area composed of agriculture and anthropogenic disturbance.	**Valued** – Reach may be contributing Redside Dace habitat. Reach identified as indirect fish habitat.	**Limited-** As per Table 7 of the HDFA guidelines, swales provide limited terrestrial function.	**Conservation** – Reach assigned a "Conservation" management recommendation since the feature is identified as contributing Redside Dace habitat.	**Mitigation** – The reduction of the management recommendation to "Mitigation" is in line with the typical management of seasonally flowing agricultural swales. Discussion on the management of contributing Redside Dace habitat will occur with MECP during the site-specific stage.
H18-S1 (upstream of HDF-4B within Property 9)	FT-7 FC-4 (Round 1) FC-1 (Round 2) **Contributing**-Reach was flowing during	Agricultural land uses surrounding this feature are expected to influence its hydrology.	**Limited-**Riparian area dominated by agricultural lands.	**Valued** – Reach may be contributing Redside Dace habitat. Reach identified as	**Limited-** As per Table 7 of the HDFA guidelines, swales provide limited	**Conservation** – Reach assigned a "Conservation" management recommendation since the feature is identified as	**Mitigation** – The reduction of the management recommendation to "Mitigation" is in line with the typical management of

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DRAINAGE FEATURE SEGMENT	STEP 1. HYDROLOGY		STEP 2. RIPARIAN	STEP 3. FISH HABITAT	STEP 4. TERRESTRIAL HABITAT	MANAGEMENT RECOMMENDATION (PER HDFA GUIDELINES)	GEI'S MANAGEMENT RECOMMENDATION
	FUNCTION	MODIFIERS					
	early spring and was dry upon late spring assessment			indirect fish habitat.	terrestrial functions	contributing Redside Dace habitat.	seasonally flowing agricultural swales. Discussion on the management of contributing Redside Dace habitat will occur with MECP during the site-specific stage.
H18A-S1 (upstream of HDF-4A within Property 9)	FT-7 FC-4 (Round 1) FC-1 (Round 2) **Contributing**-Reach was flowing during early spring and was dry upon late spring assessment	Agricultural land uses surrounding this feature are expected to influence its hydrology.	**Limited**-Riparian area dominated by agricultural lands.	**Valued** – Reach may be contributing Redside Dace habitat. Reach identified as indirect fish habitat.	**Limited**- As per Table 7 of the HDFA guidelines, swales provide limited terrestrial functions	**Conservation** – Reach assigned a "Conservation" management recommendation since the feature is identified as contributing Redside Dace habitat.	**Mitigation** – The reduction of the management recommendation to "Mitigation" is in line with the typical management of seasonally flowing agricultural swales. Discussion on the management of contributing Redside Dace habitat will occur with MECP during the site-specific stage.
H18A1-S1 (upstream of HDF-4A within Property 9)	FT-7 FC-4 (Round 1) FC-1 (Round 2) **Contributing**-Reach was flowing during early spring	Agricultural land uses surrounding this feature are expected to influence its hydrology.	**Limited**-Riparian area dominated by agricultural lands.	**Valued** – Reach may be contributing Redside Dace habitat. Reach identified as indirect fish habitat.	**Limited**- As per Table 7 of the HDFA guidelines, swales provide limited terrestrial functions	**Conservation** – Reach assigned a "Conservation" management recommendation since the feature is identified as	**Mitigation** – The reduction of the management recommendation to "Mitigation" is in line with the typical management of seasonally flowing

Table 10: Headwater Drainage Feature Classification and Management Recommendations

DRAINAGE FEATURE SEGMENT	STEP 1. HYDROLOGY		STEP 2. RIPARIAN	STEP 3. FISH HABITAT	STEP 4. TERRESTRIAL HABITAT	MANAGEMENT RECOMMENDATION (PER HDFA GUIDELINES)	GEI'S MANAGEMENT RECOMMENDATION
	FUNCTION	MODIFIERS					
	and was dry upon late spring assessment					contributing Redside Dace habitat.	agricultural swales. Discussion on the management of contributing Redside Dace habitat will occur with MECP during the site-specific stage.
H19-S1 (upstream of HDF-3A within Property 9)	FT- 6 FC-4 (Round 1) FC-4 (Round 2) **Contributing**- Reach was flowing during early spring and had standing water upon late spring assessment Third round assessment required to confirm hydrology; however, based on GEI's experience with these types of swales it is likely that it will be dry by summer.	Agricultural land uses surrounding this feature are expected to influence its hydrology.	**Important**- Feature is a wetland.	**Valued** – Reach may be contributing Redside Dace habitat. Reach identified as indirect fish habitat.	**Valued** – Feature is a wetland. No calling amphibians were recorded within the feature during targeted call count assessments.	**Protection –** Reach assigned a "Protection" management recommendation since the feature is identified as contributing Redside Dace habitat. Reach is a wetland which leads to a higher management recommendation.	**Mitigation** – The reduction of the management recommendation to "Mitigation" is in line with the typical management of a non-significant wetland community that can be replicated and/or enhanced elsewhere. A Mitigation management recommendation will ensure wetland mitigation occurs and any flows are maintained to downstream receiving habitats.

Table 10: Headwater Drainage Feature Classification and Management Recommendations

DRAINAGE FEATURE SEGMENT	STEP 1. HYDROLOGY		STEP 2. RIPARIAN	STEP 3. FISH HABITAT	STEP 4. TERRESTRIAL HABITAT	MANAGEMENT RECOMMENDATION (PER HDFA GUIDELINES)	GEI'S MANAGEMENT RECOMMENDATION
	FUNCTION	MODIFIERS					
H19A-S1 (upstream of HDF-3B within Property 9)	FT-7 FC-4 (Round 1) FC-1 (Round 2) **Contributing**-Reach was flowing during early spring and was dry upon late spring assessment	Agricultural land uses surrounding this feature are expected to influence its hydrology.	**Limited-**Riparian area dominated by agricultural lands.	**Valued** – Reach may be contributing Redside Dace habitat. Reach identified as indirect fish habitat.	**Limited-** As per Table 7 of the HDFA guidelines, swales provide limited terrestrial functions.	**Conservation** – Reach assigned a "Conservation" management recommendation since the feature is identified as contributing Redside Dace habitat.	**Mitigation** – The reduction of the management recommendation to "Mitigation" is in line with the typical management of seasonally flowing agricultural swales. Discussion on the management of contributing Redside Dace habitat will occur with MECP during the site-specific stage.
H19B-S1 (upstream of HDF-3A within Property 9)	FT-7 FC-4 (Round 1) FC-1 (Round 2) **Contributing**-Reach was flowing during early spring and was dry upon late spring assessment	Agricultural land uses surrounding this feature are expected to influence its hydrology.	**Limited-**Riparian area dominated by agricultural lands.	**Valued** – Reach may be contributing Redside Dace habitat. Reach identified as indirect fish habitat.	**Limited-** As per Table 7 of the HDFA guidelines, swales provide limited terrestrial functions	**Conservation** – Reach assigned a "Conservation" management recommendation since the feature is identified as contributing Redside Dace habitat.	**Mitigation** – The reduction of the management recommendation to "Mitigation" is in line with the typical management of seasonally flowing agricultural swales. Discussion on the management of contributing Redside Dace habitat will occur with MECP during the site-specific stage.

Table 10: Headwater Drainage Feature Classification and Management Recommendations

DRAINAGE FEATURE SEGMENT	STEP 1. HYDROLOGY		STEP 2. RIPARIAN	STEP 3. FISH HABITAT	STEP 4. TERRESTRIAL HABITAT	MANAGEMENT RECOMMENDATION (PER HDFA GUIDELINES)	GEI'S MANAGEMENT RECOMMENDATION
	FUNCTION	MODIFIERS					
H19C-S1 (upstream of HDF-3A within Property 9)	FT-7 FC-4 (Round 1) FC-2 (Round 2) **Contributing**-Reach was flowing during early spring and had standing water upon late spring assessment Third round assessment required to confirm hydrology; however, based on GEI's experience with these types of swales it is likely that it will be dry by summer.	Agricultural land uses surrounding this feature are expected to influence its hydrology.	**Limited-**Riparian area dominated by agricultural lands.	**Valued** – Reach may be contributing Redside Dace habitat. Reach identified as indirect fish habitat.	**Limited-** As per Table 7 of the HDFA guidelines, swales provide limited terrestrial functions	**Conservation** – Reach assigned a "Conservation" management recommendation since the feature is identified as contributing Redside Dace habitat.	**Mitigation** – The reduction of the management recommendation to "Mitigation" is in line with the typical management of seasonally flowing agricultural swales. Discussion on the management of contributing Redside Dace habitat will occur with MECP during the site-specific stage.
H19D-S1 (upstream of HDF-3A within Property 9)	FT-7 FC-4 (Round 1) FC-1 (Round 2)	Agricultural land uses surrounding this feature are expected to	**Limited-**Riparian area dominated by agricultural lands.	**Valued** – Reach may be contributing Redside Dace habitat. Reach	**Limited-** As per Table 7 of the HDFA guidelines, swales provide	**Conservation** – Reach assigned a "Conservation" management recommendation	**Mitigation** – The reduction of the management recommendation to "Mitigation" is in line

Table 10: Headwater Drainage Feature Classification and Management Recommendations

DRAINAGE FEATURE SEGMENT	STEP 1. HYDROLOGY		STEP 2. RIPARIAN	STEP 3. FISH HABITAT	STEP 4. TERRESTRIAL HABITAT	MANAGEMENT RECOMMENDATION (PER HDFA GUIDELINES)	GEI'S MANAGEMENT RECOMMENDATION
	FUNCTION	MODIFIERS					
	Contributing- Reach was flowing during early spring and was dry upon late spring assessment	influence its hydrology.		identified as indirect fish habitat.	limited terrestrial functions	since the feature is identified as contributing Redside Dace habitat.	with the typical management of seasonally flowing agricultural swales. Discussion on the management of contributing Redside Dace habitat will occur with MECP during the site-specific stage.
H19-S2 (upstream of HDF-3A within Property 9)	FT-7 FC-4 (Round 1) FC-2 (Round 2) **Contributing**- Reach was flowing during early spring and had standing water upon late spring assessment Third round assessment required to confirm hydrology; however, based on GEI's experience	Agricultural land uses surrounding this feature are expected to influence its hydrology.	**Limited-**Riparian area dominated by agricultural lands.	**Valued** – Reach may be contributing Redside Dace habitat. Reach identified as indirect fish habitat.	**Limited-** As per Table 7 of the HDFA guidelines, swales provide limited terrestrial functions	**Conservation** – Reach assigned a "Conservation" management recommendation since the feature is identified as contributing Redside Dace habitat.	**Mitigation** – The reduction of the management recommendation to "Mitigation" is in line with the typical management of seasonally flowing agricultural swales. Discussion on the management of contributing Redside Dace habitat will occur with MECP during the site-specific stage.

Table 10: Headwater Drainage Feature Classification and Management Recommendations

DRAINAGE FEATURE SEGMENT	STEP 1. HYDROLOGY		STEP 2. RIPARIAN	STEP 3. FISH HABITAT	STEP 4. TERRESTRIAL HABITAT	MANAGEMENT RECOMMENDATION (PER HDFA GUIDELINES)	GEI'S MANAGEMENT RECOMMENDATION
	FUNCTION	MODIFIERS					
	with these types of wetlands it is likely that it will be dry by summer.						
H19A-S2 (upstream of HDF-3A within Property 9)	FT-7 FC-4 (Round 1) FC-2 (Round 2) **Contributing**- Reach was flowing during early spring and had standing water upon late spring assessment Third round assessment required to confirm hydrology; however, based on GEI's experience with these types of wetlands it is likely that it will be dry by summer.	Agricultural land uses surrounding this feature are expected to influence its hydrology.	**Limited-**Riparian area dominated by agricultural lands.	**Valued** – Reach may be contributing Redside Dace habitat. Reach identified as indirect fish habitat.	**Limited-** As per Table 7 of the HDFA guidelines, swales provide limited terrestrial functions	**Conservation** – Reach assigned a "Conservation" management recommendation since the feature is identified as contributing Redside Dace habitat.	**Mitigation** – The reduction of the management recommendation to "Mitigation" is in line with the typical management of seasonally flowing agricultural swales. Discussion on the management of contributing Redside Dace habitat will occur with MECP during the site-specific stage.

Table 10: Headwater Drainage Feature Classification and Management Recommendations

DRAINAGE FEATURE SEGMENT	STEP 1. HYDROLOGY		STEP 2. RIPARIAN	STEP 3. FISH HABITAT	STEP 4. TERRESTRIAL HABITAT	MANAGEMENT RECOMMENDATION (PER HDFA GUIDELINES)	GEI'S MANAGEMENT RECOMMENDATION
	FUNCTION	MODIFIERS					
H20-S1 (upstream of HDF-1 within Property 9)	FT-7 FC-4 (Round 1) FC-1 (Round 2) **Contributing**-Reach was flowing during early spring and was dry upon late spring assessment	Agricultural land uses surrounding this feature are expected to influence its hydrology.	**Limited-**Riparian area dominated by agricultural lands.	**Valued** – Reach may be contributing Redside Dace habitat. Reach identified as indirect fish habitat.	**Limited-** As per Table 7 of the HDFA guidelines, swales provide limited terrestrial functions	**Conservation** – Reach assigned a "Conservation" management recommendation since the feature is identified as contributing Redside Dace habitat.	**Mitigation** – The reduction of the management recommendation to "Mitigation" is in line with the typical management of seasonally flowing agricultural swales. Discussion on the management of contributing Redside Dace habitat will occur with MECP during the site-specific stage.
H21-S1	FT-7 FC-4 (Round 1) FC-1 (Round 2) **Contributing**-Reach was flowing during early spring and was dry upon late spring assessment	Agricultural land uses surrounding this feature are expected to influence its hydrology.	**Limited-**Riparian area dominated by agricultural lands.	**Valued** – Reach may be contributing Redside Dace habitat. Reach identified as indirect fish habitat.	**Limited-** As per Table 7 of the HDFA guidelines, swales provide limited terrestrial functions	**Conservation** – Reach assigned a "Conservation" management recommendation since the feature is identified as contributing Redside Dace habitat.	**Mitigation** – The reduction of the management recommendation to "Mitigation" is in line with the typical management of seasonally flowing agricultural swales. Discussion on the management of contributing Redside Dace habitat will occur with MECP during the site-specific stage.

Table 10: Headwater Drainage Feature Classification and Management Recommendations

DRAINAGE FEATURE SEGMENT	STEP 1. HYDROLOGY		STEP 2. RIPARIAN	STEP 3. FISH HABITAT	STEP 4. TERRESTRIAL HABITAT	MANAGEMENT RECOMMENDATION (PER HDFA GUIDELINES)	GEI'S MANAGEMENT RECOMMENDATION
	FUNCTION	MODIFIERS					
H22-S1	FT-7 FC-4 (Round 1) FC-1 (Round 2) **Contributing**-Reach was flowing during early spring and was dry upon late spring assessment	Agricultural land uses surrounding this feature are expected to influence its hydrology.	**Limited-**Riparian area dominated by agricultural lands.	**Valued** – Reach may be contributing Redside Dace habitat. Reach identified as indirect fish habitat.	**Limited-** As per Table 7 of the HDFA guidelines, swales provide limited terrestrial functions	**Conservation** – Reach assigned a "Conservation" management recommendation since the feature is identified as contributing Redside Dace habitat.	**Mitigation** – The reduction of the management recommendation to "Mitigation" is in line with the typical management of seasonally flowing agricultural swales. Discussion on the management of contributing Redside Dace habitat will occur with MECP during the site-specific stage.
H22A-S1	FT-7 FC-4 (Round 1) FC-1 (Round 2) **Contributing**-Reach was flowing during early spring and was dry upon late spring assessment	Agricultural land uses surrounding this feature are expected to influence its hydrology.	**Limited-**Riparian area dominated by agricultural lands.	**Valued** – Reach may be contributing Redside Dace habitat. Reach identified as indirect fish habitat.	**Limited-** As per Table 7 of the HDFA guidelines, swales provide limited terrestrial functions	**Conservation** – Reach assigned a "Conservation" management recommendation since the feature is identified as contributing Redside Dace habitat.	**Mitigation** – The reduction of the management recommendation to "Mitigation" is in line with the typical management of seasonally flowing agricultural swales. Discussion on the management of contributing Redside Dace habitat will occur with MECP during the site-specific stage.

Table 10: Headwater Drainage Feature Classification and Management Recommendations

DRAINAGE FEATURE SEGMENT	STEP 1. HYDROLOGY		STEP 2. RIPARIAN	STEP 3. FISH HABITAT	STEP 4. TERRESTRIAL HABITAT	MANAGEMENT RECOMMENDATION (PER HDFA GUIDELINES)	GEI'S MANAGEMENT RECOMMENDATION
	FUNCTION	MODIFIERS					
H23-S1	FT- 4 FC-2 (Round 1) FC-2 (Round 2) **Important-** Feature held water during both spring assessments and is likely to continue to host water in the summer. There is no exact feature type within the HDFA Guideline that matches to a pond type.	Feature is artificially created for golf course purposes.	**Limited** – Feature is surrounded by manicured golf course.	**Valued** – Reach may be contributing Redside Dace habitat. Reach identified as indirect fish habitat.	**Important** – While this is not a wetland feature, this is a created pond where calling amphibians were recorded within the feature during targeted call count assessments.	**Protection** - Reach assigned a "Protection" management recommendation since the created feature is assumed to hold water year round (important hydrology).	**Mitigation** – The reduction of the management recommendation to "Mitigation" is warranted given this is a constructed feature that has been designed to host water for the golf course. Discussion on the management of contributing Redside Dace habitat will occur with MECP during the site-specific stage.
H24-S1	FT-7 FC-4 (Round 1) FC-2 (Round 2) **Contributing-** Reach was flowing during early spring and had standing water upon late	Feature is designed to facilitate golf course drainage.	**Limited** – Feature is surrounded by manicured golf course and Common Reed. Common Reed patch was not mapped as a wetland by TRCA.	**Valued** – Reach may be contributing Redside Dace habitat. Reach identified as indirect fish habitat.	**Limited-** As per Table 7 of the HDFA guidelines, swales provide limited terrestrial function.	**Conservation** – Reach assigned a "Conservation" management recommendation since the feature is identified as contributing Redside Dace habitat.	**Mitigation** – The reduction of the management recommendation to "Mitigation" is in line with the typical management of seasonally flowing golf course swales. Discussion on the management of

Table 10: Headwater Drainage Feature Classification and Management Recommendations

DRAINAGE FEATURE SEGMENT	STEP 1. HYDROLOGY		STEP 2. RIPARIAN	STEP 3. FISH HABITAT	STEP 4. TERRESTRIAL HABITAT	MANAGEMENT RECOMMENDATION (PER HDFA GUIDELINES)	GEI'S MANAGEMENT RECOMMENDATION
	FUNCTION	MODIFIERS					
	spring assessment Third round assessment required to confirm hydrology; however, based on GEI's experience with these types of swale it is likely that it will be dry by summer.						contributing Redside Dace habitat will occur with MECP during the site-specific stage.
H25-S1	FT-7 FC-4 (Round 1) FC-2 (Round 2) **Contributing**- Reach was flowing during early spring and had standing water upon late spring assessment Third round assessment required to	Feature appears artificially dug to facilitate golf course drainage.	**Important-** Riparian area on left bank dominated by forest.	**Valued** – Reach may be contributing Redside Dace habitat. Reach identified as indirect fish habitat.	**Contributing-** As per Table 7 of the HDFA guidelines, reaches with forest riparian provide terrestrial functions (i.e. movement corridors)	**Protection** - Reach assigned a "Protection" management recommendation since the feature is identified as contributing Redside Dace habitat and has forest riparian vegetation.	**Mitigation** – The reduction of the management recommendation to "Mitigation" is in line with the typical management of seasonally flowing golf swales. Discussion on the management of contributing Redside Dace habitat will occur with MECP during the site-specific stage.

Table 10: Headwater Drainage Feature Classification and Management Recommendations

DRAINAGE FEATURE SEGMENT	STEP 1. HYDROLOGY		STEP 2. RIPARIAN	STEP 3. FISH HABITAT	STEP 4. TERRESTRIAL HABITAT	MANAGEMENT RECOMMENDATION (PER HDFA GUIDELINES)	GEI'S MANAGEMENT RECOMMENDATION
	FUNCTION	MODIFIERS					
	confirm hydrology; however, based on GEI's experience with these types of swale it is likely that it will be dry by summer.						
H26-S1	FT- 5 FC-4 (Round 1) FC-2 (Round 2) **Contributing**- Reach was flowing during early spring and had standing water upon late spring assessment Third round assessment required to confirm hydrology; however, based on GEI's experience	Feature is piped with a riprap stone Inlet which is expected to influence hydrology.	**Valued**- Meadow lands surround this feature.	**Valued** – Reach may be contributing Redside Dace habitat. Reach identified as indirect fish habitat.	**Limited -** As per Table 7 of the HDFA guidelines, piped reaches provide limited terrestrial function.	**Conservation** – Reach assigned a "Conservation" management recommendation since the feature is identified as contributing Redside Dace habitat.	**Mitigation** – The reduction of the management recommendation to "Mitigation" is in line with the typical management of seasonally flowing golf course swales, especially since a portion of the feature is already piped. Discussion on the management of contributing Redside Dace habitat will occur with MECP during the site-specific stage.

Table 10: Headwater Drainage Feature Classification and Management Recommendations

DRAINAGE FEATURE SEGMENT	STEP 1. HYDROLOGY		STEP 2. RIPARIAN	STEP 3. FISH HABITAT	STEP 4. TERRESTRIAL HABITAT	MANAGEMENT RECOMMENDATION (PER HDFA GUIDELINES)	GEI'S MANAGEMENT RECOMMENDATION
	FUNCTION	MODIFIERS					
	with these types of wetlands it is likely that it will be dry by summer.						

LEGEND:

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

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

Table 11: Ecoregion 6E Significant Wildlife Habitat Assessment

SIGNIFICANT WILDLIFE HABITAT (SWH) TYPE	ELC ECOSITE(S) PRESENT	HABITAT CRITERIA MET	TARGETED FIELD STUDIES REQUIRED	DEFINING CRITERIA MET (MINIMUM ABUNDANCES AND/OR DIVERSITY REQUIRED TO CONFIRM SWH)	SWH TYPE PRESENT
1. SEASONAL CONCENTRATION AREAS OF ANIMALS					
Waterfowl Stopover and Staging Areas (terrestrial)	Yes – CUM1 and CUT1 vegetation communities are present within the Study Area.	No – No evidence of significant sheet water during spring surveys was recorded. This area is not known to have historical waterfowl stopover use and is not an area known for sheet water presence.	No	N/A	Not Present
Waterfowl Stopover and Staging Areas (aquatic)	Yes – MAS, SAF and SWD vegetation communities are present within the Study Area.	No – These features are small with some (SWD, MAS) not containing open water; they are not expected to attract or support significant numbers of waterfowl.	No	N/A	Not Present
Shorebird Migratory Stopover Areas	Yes – MAM vegetation communities are present within the Study Area.	No – Muddy, unvegetated shorelines are not present. This area is not known to support large congregations of shorebirds.	No	N/A	Not Present
Raptor Wintering Areas	Yes – FOD, SWD, SWC, CUM, CUT, and CUW vegetation communities are present within the Study Area.	Yes – Habitat provides a combination of fields and woodlands that provide roosting, foraging and resting habitats for winter raptors within the Greenbelt Plan Area. Potential wintering Sites are > 20 ha with a combination of forest and uplands. Habitat within the tableland did not meet the minimum size criteria (<20 ha).	No - Candidate habitat is assumed within the Greenbelt Plan Area	N/A	Candidate - within the Greenbelt NHS.
Bat Hibernacula	No – Cave ecosites are absent from the Study Area.	No	No	N/A	Not Present

Table 11: Ecoregion 6E Significant Wildlife Habitat Assessment

SIGNIFICANT WILDLIFE HABITAT (SWH) TYPE	ELC ECOSITE(S) PRESENT	HABITAT CRITERIA MET	TARGETED FIELD STUDIES REQUIRED	DEFINING CRITERIA MET (MINIMUM ABUNDANCES AND/OR DIVERSITY REQUIRED TO CONFIRM SWH)	SWH TYPE PRESENT
Bat Maternity Colonies	Yes – FOD and SWD vegetation communities are present within the Study Area.	Yes – Snag abundance (>25cm dbh; >10 stems/ha) was met within the FODM7-7 community. No other suitable communities within the tableland met the snag abundance (see **Table 7**, **Appendix B2)**. Snag abundance is also expected to be met within the Greenbelt Plan Area.	Yes	Passive bat detectors were deployed over ten consecutive evenings (see **Figure 7**, **Appendix B1** for station locations). Two SWH Indicator species were documented within the FODM7-7 community (acoustic monitoring location MTLOG-F); however, abundance criteria were not met. Average nightly calls for Big Brown Bat were recorded at 8.7 calls per night and Silver-haired Bat was recorded at 6.8 calls per night (see **Table 8**, **Appendix B2** for survey results). This low abundance of calls is likely associated with foraging activity not roosting.	Candidate - within the Greenbelt NHS
Turtle Wintering Areas	Yes – SW, MA, SA and OA vegetation communities are present within the Study Area. Permanent watercourses are also present.	Yes – Permanent watercourses (the West Humber River and its associated tributaries) may support overwintering turtles. The SAF and OA vegetation communities are anthropogenic pond features and are not considered SWH habitat. MA and SW communities are not expected to provide sufficient hydroperiods and/or water depth to provide ice-free overwintering conditions for turtles.	Yes	Three rounds of turtle basking surveys were completed within the participating properties (see **Figure 5**, **Appendix B1** for turtle basking station locations). Two indicator species were documented (see **Table 5**, **Appendix B2** for survey result); however, these indicator species were observed within anthropogenic pond features which are not considered SWH. One incidental observation of Snapping Turtle was documented near BS1 during wetland pre-staking.	Confirmed – within Property 8. Candidate - within the Greenbelt NHS and Non-Participating Properties.
Reptile Hibernacula	Yes – Required ecosites are present within the Study Area.	Yes – Two anthropogenic areas (within Property 4 and Property 11) were identified within the Study Area may provide subsurface access below the frost line. No other anthropogenic or natural features were documented that could provide subsurface access below the frost line.	Yes	Three rounds of snake visual encounter surveys were completed within Properties 4 and 11 where candidate habitat had been identified (see **Figure 5**, **Appendix B1** for snake visual encounter station locations). No snakes were observed at the formal stations. Incidental snake occurrences were not noted near suitable habitat.	Not Present

Table 11: Ecoregion 6E Significant Wildlife Habitat Assessment

SIGNIFICANT WILDLIFE HABITAT (SWH) TYPE	ELC ECOSITE(S) PRESENT	HABITAT CRITERIA MET	TARGETED FIELD STUDIES REQUIRED	DEFINING CRITERIA MET (MINIMUM ABUNDANCES AND/OR DIVERSITY REQUIRED TO CONFIRM SWH)	SWH TYPE PRESENT
Colonially-Nesting Bird Breeding Habitat (Bank and Cliff)	Yes – CUM and CUT vegetation communities are present within the Study Area.	No – Presence of exposed or eroding banks, hills, steep slopes and sand piles were not recorded within the Study Area.	No	N/A	Not Present
Colonially-Nesting Bird Breeding Habitat (Tree and Shrub)	Yes – SWD vegetation communities are present within the Study Area.	Yes – Live and dead standing trees are present near permanent watercourses. Mixed Wader Nesting Colony was identified in NHIC search for area.	Yes	Two rounds of breeding bird surveys were conducted within the participating properties (see **Figure 4**, **Appendix B1** for survey locations), of which one SWD community is present within the participating properties (within Property 6 at BBS16). The other two SWD communities are located well within the Greenbelt of non-participating properties. No SWH indicator species were documented at BBS16 (see **Table 4**, **Appendix B2**). It is acknowledged that one Great Blue Heron (*Ardea Herodias)* was observed during round 1 at Property 11 and a pair of Green Herons (*Butorides virescens*) were observed during round 1 and 2 at Property 1; however, these observations were located outside of suitable habitat. In addition, the recorded abundance does not meet SWH criteria of at least 5 pairs.	Candidate - within the Greenbelt and Non-Participating Properties.
Colonially-Nesting Bird Breeding Habitat (Ground)	No – No rocky islands or peninsulas are present within the Study Area.	N/A	No	N/A	Not Present
Migratory Butterfly Stopover Areas	Yes – CUM, CUT, FOD, and CUP vegetation communities are present within the Study Area.	No – The Study Area is greater than 5 km from Lake Ontario.	No	N/A	Not Present
Landbird Migratory Stopover Areas	Yes – FOD, SWC, and SWD vegetation communities are present on the Study Area.	No - The Study Area are greater the 5 km away from Lake Ontario.	No	N/A	Not Present

Table 11: Ecoregion 6E Significant Wildlife Habitat Assessment

SIGNIFICANT WILDLIFE HABITAT (SWH) TYPE	ELC ECOSITE(S) PRESENT	HABITAT CRITERIA MET	TARGETED FIELD STUDIES REQUIRED	DEFINING CRITERIA MET (MINIMUM ABUNDANCES AND/OR DIVERSITY REQUIRED TO CONFIRM SWH)	SWH TYPE PRESENT
Deer Yarding Area	No – Mapping from the MNRF LIO database did not depict any deer yarding areas on or adjacent to the Study Area.	N/A	No	N/A	Not Present
Deer Winter Congregation Areas	No – Mapping from the MNRF LIO database did not depict any deer wintering areas on or adjacent to the Study Area. No woodlots of >100 ha in size were present on the Study Area.	N/A	No	N/A	Not Present
2. RARE VEGETATION COMMUNITIES OR SPECIALIZED HABITAT FOR WILDLIFE					
2a. Rare Vegetation Communities					
Rare Vegetation Types (cliffs, talus slopes, sand barrens, alvars, old-growth forests, savannahs, and tallgrass prairies)	No – Rare vegetation types are not present within the Phase 1 Lands	No	No	N/A	Not Present
Other Rare Vegetation Types (S1 to S3 communities)	No – All vegetation communities identified within the Study Area are culturally influenced or commonly occurring natural communities (**Table 2, Appendix B2**).	No	No	N/A	Not Present
2b. Specialized Wildlife Habitat					
Waterfowl Nesting Areas	Yes – MAS, MAM, SA, SWT, and SWD vegetation communities are present within the Study Area.	Yes –suitable upland area is present adjacent to wetland communities within Greenbelt Plan Area. Upland areas within the tablelands are actively managed (golf course or agricultural) and would not be suitable.	Yes	Two rounds of breeding bird surveys were conducted within the Study Area (see **Figure 4**, **Appendix B1** for station locations). Two SWH indicator species were documented within the Study Area: Mallard and Wood Duck (see **Table 4**, **Appendix B2** for survey results). These observations were documented within actively managed areas (Properties 1 and 11) that would be unsuitable habitat. Abundance criteria was also not met.	Candidate - within the Greenbelt and Non-Participating Properties.
Bald Eagle and Osprey Nesting, Foraging and Perching Habitat	Yes - FOD, SWD and SWC vegetation communities are present within the Study Area.	Yes – Vegetation communities are located near the tributaries of the West Humber River corridors.	No - These areas are located within the Greenbelt NHS and will be protected from future development.	N/A	Candidate - within the Greenbelt and Non-Participating Properties.

Table 11: Ecoregion 6E Significant Wildlife Habitat Assessment

SIGNIFICANT WILDLIFE HABITAT (SWH) TYPE	ELC ECOSITE(S) PRESENT	HABITAT CRITERIA MET	TARGETED FIELD STUDIES REQUIRED	DEFINING CRITERIA MET (MINIMUM ABUNDANCES AND/OR DIVERSITY REQUIRED TO CONFIRM SWH)	SWH TYPE PRESENT
Woodland Raptor Nesting Habitat	Yes – Forested vegetation communities are present within the Study Area.	No – The forested vegetation communities do not meet the minimum size criteria (>30 ha with >4 ha interior habitat that is greater than 200 m from the woodland edge).	No	N/A	Not Present
Turtle Nesting Areas	Yes – MAS and SA vegetation communities are present within the Study Area.	Yes – Potential nesting habitat may be present within non-participating properties or located within the Greenbelt NHS and will be protected from future development. No suitable turtle nesting areas were identified within the Study Area. Sand traps are anthropogenic and are not considered significant wildlife habitat.	No - These areas are located within the Greenbelt NHS and will be protected from future development.	N/A	Candidate - within the Greenbelt and Non-Participating Properties.
Seeps and Springs	Yes – Forested vegetation communities are present within the Study Area.	Yes – Drainage features are documented within and adjacent to forested communities.	Yes – Data will be collected incidentally during ecological surveys.	Yes – Groundwater seeps were recorded by hydrogeology team within the Greenbelt at Properties 2, 10 and 11.	Confirmed – within the Greenbelt Plan Area at Properties 2, 10 and 11. Candidate - Potential SWH within Non-Participating Properties.
Amphibian Breeding Habitat (Woodland)	Yes – FOD, SWC, and SWD vegetation communities are present within the Study Area.	Yes – presence of wetland communities adjacent to and with FO and SW vegetation communities. Size criteria (>25 m diameter) was met for several FOD, SWC and SWD communities within the Study Area.	Yes	Three rounds of amphibian call count surveys were completed within participating properties (see **Figure 6**, **Appendix B1** for station locations). None of the amphibian stations on the Study Area met the SWH criteria for species diversity and abundance (see **Table 6**, **Appendix B2** for survey results).	Candidate - within the Greenbelt and Non-Participating Properties.
Amphibian Breeding Habitat (Wetland)	Yes – SW, MA, OA, and SA vegetation communities are present within the Study Area.	Yes – Minimum size criteria (>25 m diameter) was met for several vegetation communities within the Study Area.	Yes	Three rounds of amphibian call count surveys were completed within the participating properties (see **Figure 6**, **Appendix B1** for station locations). None of the amphibian stations on the Study Area met the SWH criteria for species diversity and abundance (see **Table 6**, **Appendix B2** for survey results).	Candidate - within the Greenbelt and Non-Participating Properties.

Table 11: Ecoregion 6E Significant Wildlife Habitat Assessment

SIGNIFICANT WILDLIFE HABITAT (SWH) TYPE	ELC ECOSITE(S) PRESENT	HABITAT CRITERIA MET	TARGETED FIELD STUDIES REQUIRED	DEFINING CRITERIA MET (MINIMUM ABUNDANCES AND/OR DIVERSITY REQUIRED TO CONFIRM SWH)	SWH TYPE PRESENT
Woodland Area-Sensitive Bird Breeding Habitat	Yes – FO and SW vegetation communities are present within the Study Area.	No – Vegetation communities do not meet the minimum size criteria (>30 ha with interior habitat >200 m from the woodland edge).	No	N/A	Not Present
3. SPECIES OF CONSERVATION CONCERN					
Marsh Bird Breeding Habitat	Yes – MA, SA and SW vegetation communities are present within the Study Area.	Yes – All wetlands contain shallow water with emergent aquatic vegetation.	Yes	Two rounds of breeding bird surveys were conducted within the participating properties (see **Figure 4**, **Appendix B1** for survey locations). One SWH indicator species was identified: Green Heron. This species was documented along an OA man-made pond and within a CUM in Property 1 (see **Table 4**, **Appendix B2** for survey results), which are not candidate SWH ecosites.	Candidate - within the Greenbelt and Non-Participating Properties.
Open Country Bird Breeding Habitat	Yes – CUM vegetation communities are present within the Study Area.	No - Vegetation communities do not meet the minimum size criteria (no habitat >30 ha).	No	N/A	Not Present
Shrub/Early Successional Bird Breeding Habitat	Yes – CUT, and CUW vegetation communities are present within the Study Area.	No - Vegetation communities do not meet the minimum size criteria (no habitat >10 ha).	No	N/A	Not Present
Terrestrial Crayfish	Yes – MAM, MAS, SWD, and SWT, vegetation communities are present on the Study Area.	Yes – No minimum size requirement.	Yes – observations of crayfish chimneys will be documented, if present, during all ecological surveys.	Terrestrial crayfish chimneys were incidentally identified during ecological inventories. These chimneys were located within the MAM communities on Properties 2 and 8 within the Greenbelt near the watercourses. Terrestrial Crayfish chimneys were noted within Property 5; however, these were located within actively managed agricultural fields and are not considered significant wildlife habitat.	Present – within Participating Properties 2 and 8. Candidate - Potential SWH within the Greenbelt and Non-Participating Properties.

Table 11: Ecoregion 6E Significant Wildlife Habitat Assessment

SIGNIFICANT WILDLIFE HABITAT (SWH) TYPE	ELC ECOSITE(S) PRESENT	HABITAT CRITERIA MET	TARGETED FIELD STUDIES REQUIRED	DEFINING CRITERIA MET (MINIMUM ABUNDANCES AND/OR DIVERSITY REQUIRED TO CONFIRM SWH)	SWH TYPE PRESENT
Special Concern and Rare Wildlife Species					
ii) Barn Swallow (*Hirundo rustica)*	N/A	Yes – Suitable breeding habitat (e.g., anthropogenic structures) are present within the Study Area.	Yes	Two rounds of breeding bird surveys were conducted within participating properties (see **Figure 4**, **Appendix B1** for survey locations). Nesting Barn Swallows were documented during survey efforts on Property 1 within two shipping containers (see **Table 4**, **Appendix B2** for survey results). No other Barn Swallow nesting was observed on suitable structures within participating properties.	Present – with participating Properties 1. Candidate - Potential SWH on Non-Participating Properties.
iii) Eastern Wood-Pewee (*Contopus virens*)	N/A	Yes – Forested habitats are present within the Study Area.	Yes	Two rounds of breeding bird surveys were conducted within the participating properties (see **Figure 4**, **Appendix B1** for survey locations). Eastern Wood-Pewee were documented on Property 2 only during round one survey efforts; they were documented on Properties 1 and 6 during both survey efforts (see **Table 4**, **Appendix B2** for survey results).	Present - within Participating Property 1 and 6. Candidate - Potential SWH within the Greenbelt and Non-Participating Properties.
iv) Wood Thrush (*Hylocichla mustelina*)	N/A	Yes – Forested habitats are present within the Study Area.	Yes	Two rounds of breeding bird surveys were conducted within the participating property (see **Figure 4**, **Appendix B1** for survey locations). This species was recorded during first round at Property 1 near the CUW this species was not recorded again during second round surveys.	Candidate - Potential SWH within the Greenbelt and Non-Participating Properties
Common Nighthawk (*Chordeiles minor*)	N/A	Yes – Forested habitats are present within the Study Area.	Yes	Two rounds of breeding bird surveys were conducted within the participating properties (see **Figure 4**, **Appendix B1** for survey locations). No Common Nighthawk were documented despite survey efforts (see **Table 4**, **Appendix B2** for survey results).	Candidate - Potential SWH within the Greenbelt and Non-Participating Properties.

Table 11: Ecoregion 6E Significant Wildlife Habitat Assessment

SIGNIFICANT WILDLIFE HABITAT (SWH) TYPE	ELC ECOSITE(S) PRESENT	HABITAT CRITERIA MET	TARGETED FIELD STUDIES REQUIRED	DEFINING CRITERIA MET (MINIMUM ABUNDANCES AND/OR DIVERSITY REQUIRED TO CONFIRM SWH)	SWH TYPE PRESENT
Golden-winged Warbler (*Vermivora chrysoptera*)	N/A	Yes – Woodland communities and forested habitats are present within the Study Area.	Yes	Two rounds of breeding bird surveys were conducted within the participating properties (see **Figure 4**, **Appendix B2** for survey locations). No Golden-winged Warblers were documented despite survey efforts (see **Table 4**, **Appendix B2** for survey results).	Candidate - Potential SWH within the Greenbelt and Non-Participating Properties.
v) Grasshopper Sparrow (*Ammodramus savannarum*)	N/A	Yes – Cultural meadow communities are present within the Study Area.	Yes	Two rounds of breeding bird surveys were conducted within the participating properties (see **Figure 4**, **Appendix B1** for survey locations). No Grasshopper Sparrows were documented despite survey efforts (see **Table 4**, **Appendix B2** for survey results).	Candidate - Potential SWH within the Greenbelt and Non-Participating Properties.
vi) Ruddy Duck (*Oxyura jamaicensis)*	N/A	Yes – Marsh communities are present within the Study Area.	Yes	Two rounds of breeding bird surveys were conducted within the participating properties (see **Figure 4**, **Appendix B1** for survey locations). No Ruddy Ducks were documented despite survey efforts (see **Table 4**, **Appendix B2** for survey results).	Candidate - Potential SWH within the Greenbelt and Non-Participating Properties.
vii) Eastern Musk Turtle (*Sternotherus odoratus*)	N/A	Yes – Anthropogenic OA features SA, and SAF communities may provide suitable overwintering habitat.	Yes	Three rounds of turtle basking surveys were completed within the participating properties (see **Figure 5**, **Appendix B1** for turtle basking station locations). No Eastern Musk Turtles were recorded during these surveys (see **Table 5**, **Appendix B2** for survey result)	Candidate - Potential SWH within the Greenbelt and Non-Participating Properties.

Table 11: Ecoregion 6E Significant Wildlife Habitat Assessment

SIGNIFICANT WILDLIFE HABITAT (SWH) TYPE	ELC ECOSITE(S) PRESENT	HABITAT CRITERIA MET	TARGETED FIELD STUDIES REQUIRED	DEFINING CRITERIA MET (MINIMUM ABUNDANCES AND/OR DIVERSITY REQUIRED TO CONFIRM SWH)	SWH TYPE PRESENT
viii) Northern Map Turtle (*Graptemys geographica*)	N/A	Yes – Anthropogenic OA features, SA, and SAF communities may provide suitable overwintering habitat.	Yes	Three rounds of turtle basking surveys were completed within the participating properties (see **Figure 5**, **Appendix B1** for turtle basking station locations). No Northen Map Turtles were recorded during these surveys (see **Table 5**, **Appendix B2** for survey result)	Candidate - Potential SWH within the Greenbelt and Non-Participating Properties.
ix) Snapping Turtle (*Chelydra serpentina*)	N/A	Yes – Anthropogenic OA features, SA, and SAF communities may provide suitable overwintering habitat.	Yes	Three rounds of turtle basking surveys were completed within the participating properties (see **Figure 5**, **Appendix B1** for turtle basking station locations). Snapping Turtles were recorded on Property 1 during these surveys (see **Table 5**, **Appendix B2** for survey result) within anthropogenic ponds. One Snapping Turtle was also documented within Property 8 during wetland pre-staking within the watercourse. Nesting was incidentally observed during top of bank and treed limit staking within a sand trap near Basking Station (BS) 5. Sand traps are anthropogenic features and are not considered SWH.	Present – within the anthropogenic ponds within Participating Property 1 and within the Tributary of the West Humber River on Property 8. Candidate - Potential SWH within the Greenbelt and Non-Participating Properties.
x) Black Dash (*Euphyes conspicua*)	N/A	Yes – marsh communities are present within the Study Area.	Occurrences will be documented during other targeted field investigations	No incidental occurrences recorded to-date.	Candidate - Potential SWH within the Greenbelt and Non-Participating Properties.
xi) Monarch (*Danaus plexippus*)	N/A	Yes – Cultural meadows with abundance of Common Milkweed (*Asclepias syriaca*; host plant) were present.	Yes	No occurrences observed to date; however, larger abundances of Milkweed were incidentally recorded. Targeted field investigations to occur in late July/early August.	Candidate within the Study Area

Table 11: Ecoregion 6E Significant Wildlife Habitat Assessment

SIGNIFICANT WILDLIFE HABITAT (SWH) TYPE	ELC ECOSITE(S) PRESENT	HABITAT CRITERIA MET	TARGETED FIELD STUDIES REQUIRED	DEFINING CRITERIA MET (MINIMUM ABUNDANCES AND/OR DIVERSITY REQUIRED TO CONFIRM SWH)	SWH TYPE PRESENT
4. ANIMAL MOVEMENT CORRIDORS					
Amphibian Movement Corridors	N/A	Yes – It is possible that amphibian breeding SWH is present within the Greenbelt NHS and there are nearby forested habitats that would support movement. Amphibian breeding SWH was not present from the participating properties – it is unlikely that movement corridors would be supported within participating properties.	No	N/A	Candidate - within the Greenbelt and Non-Participating Properties.
Deer Movement Corridors	N/A	No – Mapping from the MNRF LIO database did not depict any deer yarding or wintering areas on or adjacent to the Study Area.	No	N/A	Not Present

Table 12A: Significant Valleyland Assessment – West Humber River (Reaches WHT4(3)3-2, WHT4(3)-1, WHT4(2)-2, WHT4(2)2-1) Between Bramalea Road and Torbram Road

1. ***Surface Water Functions***	
• Areas of water conveyance from catchment areas of 50 ha or greater, as defined by a stream channel conveying or holding water for at least two months of the year, or as defined by floodlines or by the meander belt width	**Criteria met**
• Areas of active or historic erosion as characterized by exposed soils on shorelines, river banks, valley walls and instream islands	**Criteria met**
• Areas of active or historic deposition characterized by alluvial soils forming bottomlands, terraces, levees and instream or river-mouth deltas or islands	**Criteria not met; no evidence of deposition in the form of alluvial soils, terraces, levees or islands**
• Associated wetlands important to water attenuation, storage and release	**Criteria met; riparian wetlands are present**
2. ***Groundwater Functions***	
• Areas contributing to groundwater infiltration; areas that make an important contribution to infiltration in the region	**Criteria not met; surficial soils consist of low-permeability sediments which preclude high infiltration rates. Where channels intersect permeable sediments, groundwater discharge rather than recharge is expected**
• Areas of groundwater release (i.e., springs, seepage slopes, wetlands)	**Criteria met; groundwater indicator species and seeps noted at locations just north and southwest of Property 9**
3. Landform Prominence	
• Areas with well-defined valley morphology (e.g., floodplains, meander belts, valley slopes) having an average width of 25 m or more	**Criteria met; valleyland has a clear top of slope and is greater than 25 m wide**
4. Distinctive Geomorphic Landforms	
• Distinctive landforms based on their representation of geomorphological processes and features, quality and rarity	**Criteria met**
• Features such as oxbows, bottom-lands, terraces, deltas, exposed soil strata or eroding slopes along riverbanks or valley walls	**Criteria met**
5. Degree of Naturalness	
• Areas of contiguous woodland, wetland and/or meadow considered cumulatively	**Criteria met; contiguous natural communities including various woodlands, wetlands and meadow types**
• The proportion of valleyland that has natural vegetation cover vs. a cultural use (e.g., golf course, landscaped parkland, agricultural field, urban area) – greater than 25% natural vegetation cover should be considered significant	**Criteria largely met; however, a small portion of the golf course within Property 9 is located within the valleyland**
• Proportion of valleyland that has natural riparian vegetation	**Criteria largely met; however, a small portion of the manicured golf course within Property 9 is located within the valleyland**
• Riparian vegetation greater than 30 m in width on each side of surface water features should be considered significant	**Criteria largely met; however, a portion of the golf course within Property 9 is located within 30 m of the valleyland**
• Assessment of Floristic Quality Index (FQI) score (Oldham et al., 1995) – high FQI in the context of the local watershed should be considered significant	**Unknown – Criteria to be evaluated following completion of summer and botanical inventories**
6. ***Community and Species Diversity***	
• Areas of high community and/or species diversity	**Criteria met; significant flora and fauna diversity present**

7. ***Unique Communities and Species***	
• Seasonally important habitats such as deer yards, migration stopovers, etc.	**Criteria not met; no such features identified**

Table 12A: Significant Valleyland Assessment – West Humber River (Reaches WHT4(3)3-2, WHT4(3)-1, WHT4(2)-2, WHT4(2)2-1) Between Bramalea Road and Torbram Road

• High proportion of regionally and locally significant species	**Criteria assumed to be met**
• Rare communities or the habitat of rare species, based on federal or provincial guidelines	**Criteria met; occupied Redside Dace habitat**
8. ***Habitat Value***	
• Areas determined to provide important habitat required to sustain native aquatic and terrestrial species diversity within the region	**Criteria met; habitat supports Redside Dace**
9. ***Linkage Function***	
• The portion of the valleyland with continuous natural vegetation corridors with a minimum width of 100 m	**Criteria met; at widest point measuring approximately 260 m wide**
• Areas with functional ecological connections to other natural areas within the watershed both inside and outside the valleylands	**Criteria met; apparent linkage as part of the West Humber River corridor**
• Areas that are determined to provide important wildlife corridors	**Criteria met; this section of the West Humber River likely acts as a primary linkage within the landscape**
10. ***Restoration and Potential Value***	
• Restoration will provide important ecological benefits such as linkage function, improvement of habitat for rare species, reduced fragmentation effects, and/or increased core natural areas	**Criteria met; restoration areas would increase core natural areas**
• Areas where restoration will provide a minimum 30 m corridor of riparian vegetation on each side of surface water features	**Criteria met; all development will be a minimum of 30 m the main watercourse**
• Areas where the public is interested in assisting in the implementation of ecological restoration	**Criteria not met; private lands**
• Areas that are in public ownership and that would benefit from restoration	**Criteria not met; private lands**
• Areas where restoration would buffer existing natural areas from the effects of adjacent development	**Criteria met; restoration will buffer the valleyland from the effects of the proposed development**

Overall Ranking:

Criteria Met – 21
Criteria Partial Met – 0
Criteria Not Met – 5

Criteria To Be Evaluated - 1

Table 12B: Significant Valleyland Assessment – West Humber River (Reach WHT4(3)-2) West of Bramalea Road

1. ***Surface Water Functions***	
• Areas of water conveyance from catchment areas of 50 ha or greater, as defined by a stream channel conveying or holding water for at least two months of the year, or as defined by floodlines or by the meander belt width	**Criteria met**
• Areas of active or historic erosion as characterized by exposed soils on shorelines, river banks, valley walls and instream islands	**Criteria met**
• Areas of active or historic deposition characterized by alluvial soils forming bottomlands, terraces, levees and instream or river-mouth deltas or islands	**Criteria not met; no evidence of deposition in the form of alluvial soils, terraces, levees or islands**
• Associated wetlands important to water attenuation, storage and release	**Criteria met; riparian wetlands are present**
2. ***Groundwater Functions***	
• Areas contributing to groundwater infiltration; areas that make an important contribution to infiltration in the region	**Criteria not met; surficial soils consist of low-permeability sediments which preclude high infiltration rates. Where channels intersect permeable sediments, groundwater discharge rather than recharge is expected**
• Areas of groundwater release (i.e., springs, seepage slopes, wetlands)	**Criteria met; groundwater indicator species and seeps noted at locations on southwest edge of Property 1**
3. Landform Prominence	
• Areas with well-defined valley morphology (e.g., floodplains, meander belts, valley slopes) having an average width of 25 m or more	**Criteria met; valleyland has a clear top of slope and is greater than 25 m wide**
4. Distinctive Geomorphic Landforms	
• Distinctive landforms based on their representation of geomorphological processes and features, quality and rarity	**Criteria met**
• Features such as oxbows, bottom-lands, terraces, deltas, exposed soil strata or eroding slopes along riverbanks or valley walls	**Criteria met**
5. Degree of Naturalness	
• Areas of contiguous woodland, wetland and/or meadow considered cumulatively	**Criteria met; contiguous natural communities including various woodlands, wetlands and meadow types**
• The proportion of valleyland that has natural vegetation cover vs. a cultural use (e.g., golf course, landscaped parkland, agricultural field, urban area) – greater than 25% natural vegetation cover should be considered significant	**Criteria met**
• Proportion of valleyland that has natural riparian vegetation	**Criteria largely met; however, portions of the valleyland are comprised of communities dominated by non-native species (e.g. Buckthorn)**
• Riparian vegetation greater than 30 m in width on each side of surface water features should be considered significant	**Criteria met**
• Assessment of Floristic Quality Index (FQI) score (Oldham et al., 1995) – high FQI in the context of the local watershed should be considered significant	**Unknown – Criteria to be evaluated following completion of summer and botanical inventories**
6. ***Community and Species Diversity***	
• Areas of high community and/or species diversity	**Criteria met; significant flora and fauna diversity present**

7. ***Unique Communities and Species***	
• Seasonally important habitats such as deer yards, migration stopovers, etc.	**Criteria not met; no such features identified**

Table 12B: Significant Valleyland Assessment – West Humber River (Reach WHT4(3)-2) West of Bramalea Road

	Criteria assumed to be met
• High proportion of regionally and locally significant species	**Criteria met; several Butternut recorded**
• Rare communities or the habitat of rare species, based on federal or provincial guidelines	
8. ***Habitat Value***	
• Areas determined to provide important habitat required to sustain native aquatic and terrestrial species diversity within the region	**Criteria met**
9. ***Linkage Function***	
• The portion of the valleyland with continuous natural vegetation corridors with a minimum width of 100 m	**Criteria met; at widest point measuring approximately 230 m wide**
• Areas with functional ecological connections to other natural areas within the watershed both inside and outside the valleylands	**Criteria met; apparent linkage as part of the West Humber River corridor**
• Areas that are determined to provide important wildlife corridors	**Criteria met; this section of the West Humber River likely acts as a primary linkage within the landscape**
10. ***Restoration and Potential Value***	
• Restoration will provide important ecological benefits such as linkage function, improvement of habitat for rare species, reduced fragmentation effects, and/or increased core natural areas	**Criteria met; restoration areas would increase core natural areas**
• Areas where restoration will provide a minimum 30 m corridor of riparian vegetation on each side of surface water features	**Criteria met; all development will be a minimum of 30 m the main watercourse**
• Areas where the public is interested in assisting in the implementation of ecological restoration	**Criteria not met; private lands**
• Areas that are in public ownership and that would benefit from restoration	**Criteria not met; private lands**
• Areas where restoration would buffer existing natural areas from the effects of adjacent development	**Criteria met; restoration will buffer the valleyland from the effects of the proposed development**

Overall Ranking:

Criteria Met – 21
Criteria Partial Met – 0
Criteria Not Met – 5

Criteria To Be Evaluated - 1

Table 12C: Significant Valleyland Assessment – Tributary of the West Humber River (Reaches WHT4(3)3-1, WHT4(3)2-1 a, WHT4(3)2-1b) along Torbram Road

1. ***Surface Water Functions***	
• Areas of water conveyance from catchment areas of 50 ha or greater, as defined by a stream channel conveying or holding water for at least two months of the year, or as defined by floodlines or by the meander belt width	**Criteria met**
• Areas of active or historic erosion as characterized by exposed soils on shorelines, river banks, valley walls and instream islands	**Criteria met**
• Areas of active or historic deposition characterized by alluvial soils forming bottomlands, terraces, levees and instream or river-mouth deltas or islands	**Criteria not met; no evidence of deposition in the form of alluvial soils, terraces, levees or islands**
• Associated wetlands important to water attenuation, storage and release	**Criteria met; riparian wetlands are present**
2. ***Groundwater Functions***	
• Areas contributing to groundwater infiltration; areas that make an important contribution to infiltration in the region	**Criteria not met; surficial soils consist of low-permeability sediments which preclude high infiltration rates. Where channels intersect permeable sediments, groundwater discharge rather than recharge is expected**
• Areas of groundwater release (i.e., springs, seepage slopes, wetlands)	**Criteria met; Groundwater indicator species and seeps encountered in the south portion of Property 9**
3. Landform Prominence	
• Areas with well-defined valley morphology (e.g., floodplains, meander belts, valley slopes) having an average width of 25 m or more	**Criteria met; valleyland has a clear top of slope and is greater than 25 m wide**
4. Distinctive Geomorphic Landforms	
• Distinctive landforms based on their representation of geomorphological processes and features, quality and rarity	**Criteria partially met; components of the golf course and ponds are located within the valleyland**
• Features such as oxbows, bottom-lands, terraces, deltas, exposed soil strata or eroding slopes along riverbanks or valley walls	**Criteria partially met; components of the golf course and ponds are located within the valleyland**
5. Degree of Naturalness	
• Areas of contiguous woodland, wetland and/or meadow considered cumulatively	**Criteria met; contiguous natural communities including various woodlands, wetlands and meadow types**
• The proportion of valleyland that has natural vegetation cover vs. a cultural use (e.g., golf course, landscaped parkland, agricultural field, urban area) – greater than 25% natural vegetation cover should be considered significant	**Criteria partially met; components of the golf course and agricultural ponds are located within the vallelyand**
• Proportion of valleyland that has natural riparian vegetation	**Criteria met**
• Riparian vegetation greater than 30 m in width on each side of surface water features should be considered significant	**Criteria partially met; components of the golf course and agricultural ponds are located within the valleyland**
• Assessment of Floristic Quality Index (FQI) score (Oldham et al., 1995) – high FQI in the context of the local watershed should be considered significant	**Unknown – Criteria to be evaluated following completion of summer and botanical inventories**
6. ***Community and Species Diversity***	
• Areas of high community and/or species diversity	**Criteria met; significant flora and fauna diversity present**

7. ***Unique Communities and Species***	
• Seasonally important habitats such as deer yards, migration stopovers, etc.	**Criteria not met; no such features identified**
• High proportion of regionally and locally significant species	**Criteria assumed to be met**

Table 12C: Significant Valleyland Assessment – Tributary of the West Humber River (Reaches WHT4(3)3-1, WHT4(3)2-1 a, WHT4(3)2-1b) along Torbram Road

• Rare communities or the habitat of rare species, based on federal or provincial guidelines	**Criteria met; occupied Redside Dace habitat**
8. ***Habitat Value***	
• Areas determined to provide important habitat required to sustain native aquatic and terrestrial species diversity within the region	**Criteria met; habitat supports Redside Dace**
9. ***Linkage Function***	
• The portion of the valleyland with continuous natural vegetation corridors with a minimum width of 100 m	**Criteria not met; continuous 100 m width is not met in several locations (golf course, non-participating parcel in north-east corner)**
• Areas with functional ecological connections to other natural areas within the watershed both inside and outside the valleylands	**Criteria met; connects into the main West Humber River and valleyland continues north of Old School Road**
• Areas that are determined to provide important wildlife corridors	**Criteria met; likely acts as a primary linkage within the landscape**
10. ***Restoration and Potential Value***	
• Restoration will provide important ecological benefits such as linkage function, improvement of habitat for rare species, reduced fragmentation effects, and/or increased core natural areas	**Criteria met; restoration areas would increase core natural areas and decrease fragmentation**
• Areas where restoration will provide a minimum 30 m corridor of riparian vegetation on each side of surface water features	**Criteria met; all development will be a minimum of 30 m the main watercourse**
• Areas where the public is interested in assisting in the implementation of ecological restoration	**Criteria not met; private lands**
• Areas that are in public ownership and that would benefit from restoration	**Criteria not met; private lands**
• Areas where restoration would buffer existing natural areas from the effects of adjacent development	**Criteria met; restoration will buffer the valleyland from the effects of the proposed development**

Overall Ranking:

Criteria Met – 16
Criteria Partial Met – 4
Criteria Not Met – 6

Criteria To Be Evaluated - 1

Table 12D: Significant Valleyland Assessment – Tributary of the West Humber River (Reaches WHT4(3)4-2 and WHT4(3)4-3) within Property 4 (outside of Greenbelt)

1. ***Surface Water Functions***	
• Areas of water conveyance from catchment areas of 50 ha or greater, as defined by a stream channel conveying or holding water for at least two months of the year, or as defined by floodlines or by the meander belt width	**Criteria met**
• Areas of active or historic erosion as characterized by exposed soils on shorelines, river banks, valley walls and instream islands	**Criteria met. Valley toe impact observed**
• Areas of active or historic deposition characterized by alluvial soils forming bottomlands, terraces, levees and instream or river-mouth deltas or islands	**Criteria not met; no evidence of deposition in the form of alluvial soils, terraces, levees or islands**
• Associated wetlands important to water attenuation, storage and release	**Criteria met; riparian wetlands are present**
2. ***Groundwater Functions***	
• Areas contributing to groundwater infiltration; areas that make an important contribution to infiltration in the region	**Criteria not met; surficial soils consist of low-permeability sediments which preclude high infiltration rates. Where channels intersect permeable sediments, groundwater discharge rather than recharge is expected**
• Areas of groundwater release (i.e., springs, seepage slopes, wetlands)	**Criteria partially met; groundwater indicator species representing unconfirmed groundwater discharge noted along Torbram Road**
3. Landform Prominence	
• Areas with well-defined valley morphology (e.g., floodplains, meander belts, valley slopes) having an average width of 25 m or more	**Criteria met; valleyland has a clear top of slope and is greater than 25 m wide**
4. Distinctive Geomorphic Landforms	
• Distinctive landforms based on their representation of geomorphological processes and features, quality and rarity	**Criteria partially met. Area controlled by dense vegetation (grasses)**
• Features such as oxbows, bottom-lands, terraces, deltas, exposed soil strata or eroding slopes along riverbanks or valley walls	**Criteria partially met. Area controlled by dense vegetation (grasses)**
5. Degree of Naturalness	
• Areas of contiguous woodland, wetland and/or meadow considered cumulatively	**Criteria partially met; contiguous woodland is a planted community adjacent to the riparian wetland**
• The proportion of valleyland that has natural vegetation cover vs. a cultural use (e.g., golf course, landscaped parkland, agricultural field, urban area) – greater than 25% natural vegetation cover should be considered significant	**Criteria partially met; woodland is not naturally occurring rather it is a cultural plantation**
• Proportion of valleyland that has natural riparian vegetation	**Criteria partially met; woodland is not naturally occurring rather it is a cultural plantation**
• Riparian vegetation greater than 30 m in width on each side of surface water features should be considered significant	**Criteria met**
• Assessment of Floristic Quality Index (FQI) score (Oldham et al., 1995) – high FQI in the context of the local watershed should be considered significant	**Unknown – Criteria to be evaluated following completion of summer and botanical inventories**
6. ***Community and Species Diversity***	
• Areas of high community and/or species diversity	**Criteria not met; low community and species diversity. Woodland is a monocultural planted stand**

7. ***Unique Communities and Species***	
• Seasonally important habitats such as deer yards, migration stopovers, etc.	**Criteria not met; no such features identified**
• High proportion of regionally and locally significant species	**Criteria not met; high proportions of regionally or locally rare species were not identified within the valleyland**

Table 12D: Significant Valleyland Assessment – Tributary of the West Humber River (Reaches WHT4(3)4-2 and WHT4(3)4-3) within Property 4 (outside of Greenbelt)

• Rare communities or the habitat of rare species, based on federal or provincial guidelines	**Criteria not met**
8. ***Habitat Value***	
• Areas determined to provide important habitat required to sustain native aquatic and terrestrial species diversity within the region	**Criteria not met**
9. ***Linkage Function***	
• The portion of the valleyland with continuous natural vegetation corridors with a minimum width of 100 m	**Criteria not met; continuous 100 m width is not met in several locations**
• Areas with functional ecological connections to other natural areas within the watershed both inside and outside the valleylands	**Criteria not met; While valleyland connects into the main West Humber River it does not have any natural features north of Old School Road that it is connecting to**
• Areas that are determined to provide important wildlife corridors	**Criteria not met; does not act as a primary linkage corridor**
10. ***Restoration and Potential Value***	
• Restoration will provide important ecological benefits such as linkage function, improvement of habitat for rare species, reduced fragmentation effects, and/or increased core natural areas	**Criteria met; restoration areas could increase diversity and size of core natural areas**
• Areas where restoration will provide a minimum 30 m corridor of riparian vegetation on each side of surface water features	**Criteria met; all development will be a minimum of 30 m the main watercourse**
• Areas where the public is interested in assisting in the implementation of ecological restoration	**Criteria not met; private lands**
• Areas that are in public ownership and that would benefit from restoration	**Criteria not met; private lands**
• Areas where restoration would buffer existing natural areas from the effects of adjacent development	**Criteria met; restoration will buffer the valleyland from the effects of the proposed development**

Overall Ranking:

Criteria Met – 8
Criteria Partial Met – 6
Criteria Not Met – 12

Criteria To Be Evaluated - 1

Table 12E: Significant Valleyland Assessment – Tributary of the West Humber River (Reaches WHT4(3)5-2) within Property 1 (outside of Greenbelt)

1. ***Surface Water Functions***	
• Areas of water conveyance from catchment areas of 50 ha or greater, as defined by a stream channel conveying or holding water for at least two months of the year, or as defined by floodlines or by the meander belt width	**Criteria met**
• Areas of active or historic erosion as characterized by exposed soils on shorelines, river banks, valley walls and instream islands	**Criteria not met; No evidence of erosion throughout system, as it exists as a pond / diffuse wetland.**
• Areas of active or historic deposition characterized by alluvial soils forming bottomlands, terraces, levees and instream or river-mouth deltas or islands	**Criteria not met; no evidence of deposition in the form of alluvial soils, terraces, levees or islands**
• Associated wetlands important to water attenuation, storage and release	**Criteria not met; riparian wetlands are not present (not including the created pond that has been identified as shallow aquatic)**
2. ***Groundwater Functions***	
• Areas contributing to groundwater infiltration; areas that make an important contribution to infiltration in the region	**Criteria partially met; Coarse, permeable sediments which facilitate infiltration are mapped in this area at surface. Could not be confirmed through the drilling program; further analysis to be conducted in Phase 2**
• Areas of groundwater release (i.e., springs, seepage slopes, wetlands)	**Criteria not met. No evidence of groundwater/surface water interaction in this area**
3. Landform Prominence	
• Areas with well-defined valley morphology (e.g., floodplains, meander belts, valley slopes) having an average width of 25 m or more	**Criteria met; valleyland has a clear top of slope and is greater than 25 m wide**
4. Distinctive Geomorphic Landforms	
• Distinctive landforms based on their representation of geomorphological processes and features, quality and rarity	**Criteria not met; No evidence of geomorphological function throughout system, as it exists as a pond**
• Features such as oxbows, bottom-lands, terraces, deltas, exposed soil strata or eroding slopes along riverbanks or valley walls	**Criteria not met; No evidence of geomorphological function throughout system, as it exists as a pond**
5. Degree of Naturalness	
• Areas of contiguous woodland, wetland and/or meadow considered cumulatively	**Criteria not met; one deciduous forest is present within an otherwise actively managed golf course**
• The proportion of valleyland that has natural vegetation cover vs. a cultural use (e.g., golf course, landscaped parkland, agricultural field, urban area) – greater than 25% natural vegetation cover should be considered significant	**Criteria not met; majority of valleyland consists of manicured golf course lawn**
• Proportion of valleyland that has natural riparian vegetation	**Criteria not met; valleyland located within golf course**
• Riparian vegetation greater than 30 m in width on each side of surface water features should be considered significant	**Criteria not met; no to minimal riparian vegetation present along entire extent of valleyland (outside of the Greenbelt)**
• Assessment of Floristic Quality Index (FQI) score (Oldham et al., 1995) – high FQI in the context of the local watershed should be considered significant	**Unknown – Criteria to be evaluated following completion of summer and botanical inventories**
6. ***Community and Species Diversity***	
• Areas of high community and/or species diversity	**Criteria not met; low community and species diversity**

7. ***Unique Communities and Species***	
• Seasonally important habitats such as deer yards, migration stopovers, etc.	**Criteria not met; no such features identified**
• High proportion of regionally and locally significant species	**Criteria not met; high proportions of regionally or locally rare species were not identified within the valleyland**

Table 12E: Significant Valleyland Assessment – Tributary of the West Humber River (Reaches WHT4(3)5-2) within Property 1 (outside of Greenbelt)

• Rare communities or the habitat of rare species, based on federal or provincial guidelines	**Criteria not met**
8. ***Habitat Value***	
• Areas determined to provide important habitat required to sustain native aquatic and terrestrial species diversity within the region	**Criteria not met**
9. ***Linkage Function***	
• The portion of the valleyland with continuous natural vegetation corridors with a minimum width of 100 m	**Criteria not met; continuous 100 m width is not met**
• Areas with functional ecological connections to other natural areas within the watershed both inside and outside the valleylands	**Criteria not met; While valleyland connects into the main West Humber River it does not have any natural features north of Old School Road that it is connecting to**
• Areas that are determined to provide important wildlife corridors	**Criteria not met; does not act as a primary linkage corridor**
10. ***Restoration and Potential Value***	
• Restoration will provide important ecological benefits such as linkage function, improvement of habitat for rare species, reduced fragmentation effects, and/or increased core natural areas	**Criteria not met; significant intervention required to restore functions**
• Areas where restoration will provide a minimum 30 m corridor of riparian vegetation on each side of surface water features	**Criteria not met; development may not be located 30 m from watercourse**
• Areas where the public is interested in assisting in the implementation of ecological restoration	**Criteria not met; private lands**
• Areas that are in public ownership and that would benefit from restoration	**Criteria not met; private lands**
• Areas where restoration would buffer existing natural areas from the effects of adjacent development	**Criteria not met; minimal natural areas existing within valleyland to protect**

Overall Ranking:

Criteria Met – 2
Criteria Partial Met – 1
Criteria Not Met – 23

Criteria To Be Evaluated - 1

Table 12F: Significant Valleyland Assessment – Southwest Tributary of the West Humber River (Reach CCC(2)) within Property 3

1. ***Surface Water Functions***	
• Areas of water conveyance from catchment areas of 50 ha or greater, as defined by a stream channel conveying or holding water for at least two months of the year, or as defined by floodlines or by the meander belt width	**Criteria met**
• Areas of active or historic erosion as characterized by exposed soils on shorelines, river banks, valley walls and instream islands	**Criteria met**
• Areas of active or historic deposition characterized by alluvial soils forming bottomlands, terraces, levees and instream or river-mouth deltas or islands	**Criteria met; evidence of deposition in the form of alluvial soils**
• Associated wetlands important to water attenuation, storage and release	**Criteria met; riparian wetlands are present**
2. ***Groundwater Functions***	
• Areas contributing to groundwater infiltration; areas that make an important contribution to infiltration in the region	**Criteria not met; surficial soils consist of low-permeability sediments which preclude high infiltration rates. Where channels intersect permeable sediments, groundwater discharge rather than recharge is expected**
• Areas of groundwater release (i.e., springs, seepage slopes, wetlands)	**Criteria met; groundwater indicator species and seeps noted at locations on southwest edge of Property 3**
3. Landform Prominence	
• Areas with well-defined valley morphology (e.g., floodplains, meander belts, valley slopes) having an average width of 25 m or more	**Criteria met; valleyland has a clear top of slope and is greater than 25 m wide**
4. Distinctive Geomorphic Landforms	
• Distinctive landforms based on their representation of geomorphological processes and features, quality and rarity	**Criteria met; channel exists within a distinct valley; Some evidence of substrate sorting / sediment transport observed**
• Features such as oxbows, bottom-lands, terraces, deltas, exposed soil strata or eroding slopes along riverbanks or valley walls	**Criteria met**
5. Degree of Naturalness	
• Areas of contiguous woodland, wetland and/or meadow considered cumulatively	**Criteria met; contiguous natural communities including various woodlands, wetlands and meadow types**
• The proportion of valleyland that has natural vegetation cover vs. a cultural use (e.g., golf course, landscaped parkland, agricultural field, urban area) – greater than 25% natural vegetation cover should be considered significant	**Criteria met**
• Proportion of valleyland that has natural riparian vegetation	**Criteria largely met; however, portions of the valleyland are comprised of communities consisting of non-native species (e.g. Buckthorn)**
• Riparian vegetation greater than 30 m in width on each side of surface water features should be considered significant	**Criteria met**
• Assessment of Floristic Quality Index (FQI) score (Oldham et al., 1995) – high FQI in the context of the local watershed should be considered significant	**Unknown – Criteria to be evaluated following completion of summer and botanical inventories**
6. ***Community and Species Diversity***	
• Areas of high community and/or species diversity	**Criteria partially met; some variation in communities and higher species diversity likely**

7. ***Unique Communities and Species***	
• Seasonally important habitats such as deer yards, migration stopovers, etc.	**Criteria not met; no such features identified**
• High proportion of regionally and locally significant species	**Criteria assumed to be met**

Table 12F: Significant Valleyland Assessment – Southwest Tributary of the West Humber River (Reach CCC(2)) within Property 3

• Rare communities or the habitat of rare species, based on federal or provincial guidelines	**Criteria met; occupied Redside Dace habitat**
8. ***Habitat Value***	
• Areas determined to provide important habitat required to sustain native aquatic and terrestrial species diversity within the region	**Criteria met; habitat supports Redside Dace**
9. ***Linkage Function***	
• The portion of the valleyland with continuous natural vegetation corridors with a minimum width of 100 m	**Criteria not met; continuous 100 m width is not met**
• Areas with functional ecological connections to other natural areas within the watershed both inside and outside the valleylands	**Criteria met; valleyland continues north of Dixie Road and south of Mayfield Road**
• Areas that are determined to provide important wildlife corridors	**Criteria met; likely acts as a primary linkage within the landscape**
10. ***Restoration and Potential Value***	
• Restoration will provide important ecological benefits such as linkage function, improvement of habitat for rare species, reduced fragmentation effects, and/or increased core natural areas	**Criteria met; restoration areas would increase core natural areas**
• Areas where restoration will provide a minimum 30 m corridor of riparian vegetation on each side of surface water features	**Criteria met; all development will be a minimum of 30 m the main watercourse**
• Areas where the public is interested in assisting in the implementation of ecological restoration	**Criteria not met; private lands**
• Areas that are in public ownership and that would benefit from restoration	**Criteria not met; private lands**
• Areas where restoration would buffer existing natural areas from the effects of adjacent development	**Criteria met; restoration will buffer the valleyland from the effects of the proposed development**

Overall Ranking:

Criteria Met – 20
Criteria Partial Met – 1
Criteria Not Met – 5

Criteria To Be Evaluated - 1

Appendix B3 – Beacon Environmental Natural Heritage Evaluation

Natural Heritage Evaluation for Part of Lots 19, 20 and 21 Concession 5, Town of Caledon, Region of Peel

Prepared For:

Mayfield Golf Course Inc. and Tullamore Industrial GP Limited

Prepared By:

Beacon Environmental Limited

Date:	*Project:*
2024-01-26	**222239**

BEACON ENVIRONMENTAL

GUIDING SOLUTIONS IN THE NATURAL ENVIRONMENT

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Version	Date	Revisions
1.	January 2024	

1. Introduction

Beacon Environmental Limited (Beacon) has been retained by Mayfield Golf Course Inc. and Tullamore Industrial GP Limited to prepare a Natural Heritage Evaluation (NHE) for the proposed development of Part of Lots 19, 20 and 21 Concession in the Town of Caledon, Region of Peel. Part of the development lands includes the redevelopment of the Mayfield Golf Course with the municipal address of 12580,12552 Torbram Road the lands also include a parcel of undeveloped land, with no municipal address, directly to the south. Combined, the area of study for the proposed development can be formally described as Part of Lots 19, 20 and 21 Concession 5 in the Town of Caledon, Regional Municipality of Peel (hereafter referred to as the "subject lands") (**Figure 1**).

The northern parcel of the subject lands is currently an existing golf course with anthropogenic structures. The southern parcel is outside of the existing golf course and contains agricultural fields and natural features. Natural features present on the subject lands are primarily associated with the valley and stream corridors of the West Humber River Tributaries, including several drainage features, wetlands, offline ponds, and woodlands. Malone Given Parsons (2023) has prepared a Draft Plan for the Subdivision (**Appendix A**) that identifies that the proposed development will include low density and medium density residential blocks, commercial blocks, an elementary school, a fire hall, stormwater management pond facilities and multiple natural areas specifically parklands/ open spaces.

Given this geographical setting, development applications concerning the lands are subject to policies including, but not limited to, those outlined in: *Species at Risk Act*, *Fisheries Act*, *Endangered Species Act* (ESA), Provincial Policy Statement (PPS), Regional Municipality of Peel Official Plan, Town of Caledon Official Plan and TRCA regulations and policies. This NHE considers that the subject lands will be reclassified to allow for urban development. This NHE has been prepared to support a Draft Plan of Subdivision application to redevelop the subject lands for residential land use.

An NHE is required, by the region, municipality and the TRCA, as part of the *Planning Act* applications to develop the subject lands; due to its proximity to (i.e., within 120 m of) natural features and within areas that are regulated by the TRCA. Therefore, the purpose of this NHE is to:

- Describe the existing natural heritage conditions and features both on and immediately adjacent to the subject lands;
- Identify the applicable environmental polices and evaluate project conformance with the relevant provincial and municipal planning documents, and the policies and regulations as set out by the TRCA;
- Identify any potential development impacts to natural heritage features and ecological functions; and
- Identify appropriate mitigation recommendations, if required.

A *Functional Servicing and Stormwater Management Report* (SCS 2023), *Detailed Factual Geotechnical and Hydrogeological Subsurface Investigation Report* (Gemtec 2023), *Tree Inventory & Assessment Report* (Schollen & Company Inc. 2023), and *Geomorphic Assessment* (Beacon 2024) have also been prepared for the subject lands to support the Draft Plan of Subdivision application. The NHE should be read in conjunction with these companion reports.

2. Natural Heritage Policy Review

A review of applicable natural heritage regulations, policies and guidelines was undertaken to identify environmental planning considerations and requirements, as applicable to the subject lands and proposed residential development and site alteration activities. The following sections summarize key environmental legislation policies and regulations that will apply to the subject lands within the context of the proposed development application once the lands are brought into the Town of Caledon Settlement Area through the new Caledon Official Plan which is currently underway and will subsequently need to be approved by Council.

2.1 Federal *Species at Risk Act* (2002)

The federal *Species at Risk Act* (SARA; 2002) is intended to prevent federally endangered or threatened wildlife (including plants) from becoming extinct in the wild, and to help in the recovery of these species. The Act is also intended to help prevent species listed as Special Concern from becoming endangered or threatened. To ensure the protection of Species at Risk, SARA contains prohibitions that make it an offence to kill, harm, harass, capture, take, possess, collect, buy, sell, or trade an individual of a species listed in Schedule 1 of SARA as endangered, threatened, or extirpated.

SARA applies primarily to lands under federal jurisdiction and relies on provincial laws to protect federal SAR habitat. On private land, SARA prohibitions apply only to aquatic species (see Section 2.2. below) and migratory birds that are also listed in the *Migratory Birds Convention Act* (1994). The intent of SARA is to protect critical habitat as much as possible through voluntary actions and stewardship measures.

2.2 Federal *Fisheries Act* (1985)

Fish and fish habitat are protected under the federal *Fisheries Act*, which was last amended on August 28, 2019, and is administered by the Fish and Fish Habitat Protection Program within Fisheries and Oceans Canada (DFO). The protection provisions of the Fisheries Act apply to all fish and fish habitat throughout Canada and the Act sets out authorities for the regulation of works, undertakings or activities that risk harming fish and fish habitat.

Fish habitat is defined in subsection 2(1) of the *Fisheries Act* to include all waters frequented by fish and any other areas upon which fish depend directly or indirectly to carry out their life processes. The types of areas that can directly or indirectly support life processes include, but are not limited to, spawning grounds and nursery, rearing, food supply and migration areas. Critical habitat is defined in subsection 2(1) of SARA as the habitat necessary for the survival or recovery of a listed wildlife species and that is identified as the species' critical habitat in the recovery strategy or in an action plan for the species. Also, SARA defines habitat for aquatic species as spawning grounds and nursery, rearing, food supply, migration, and any other areas on which aquatic species depend directly or indirectly in order to carry out their life processes, or areas where aquatic species formerly occurred and have the potential to be reintroduced.

Site Location	Figure 1
Natural Heritage Evaluation - Part of Lots 19, 20 and 21 Concession 5, Town of Caledon, Region or Peel	
BEACON ENVIRONMENTAL	Project: 222239 Last Revised: November 2023
Client: Mayfield Golf Course Inc. and Tullamore Industrial GP Limited	Prepared by: BD Checked by: DF
N 1:10,000	Inset Map: 1:100,000
Contains information licensed under the Open Government License– Ontario Orthoimagery Baselayer: FBS Peel Region (2022)	

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Section 35 of the Fisheries Act, which prohibits the carrying out of any work, undertaking, or activity that results in the harmful alteration, disruption, or destruction of fish habitat, applies to all fish habitat, including the critical habitat of endangered and threatened species listed under Schedule 1 of SARA. Under section 73 of SARA, the Minister may enter into an agreement with a person, or issue a permit to a person, authorizing the person to engage in an activity affecting a listed aquatic species, any part of its critical habitat, or the residences of its individuals, provided that the following requirements are met:

Subsections 73(2):

a) the activity is scientific research related to conservation;
b) the activity benefits the species or enhances the species chance of survival; or
c) or the affecting the species is incidental to carrying out the activity).

And subsection73(3):

a) all reasonable alternatives to the activity have been considered in order to reduce the impact(s);
b) all feasible measures will be taken to minimize the impact of the activity on its species or its residents or its critical habitat; and
c) the activity will not jeopardize the survival of the species, minimizing the impact of the authorized activity on the species or providing for its recovery.

The Fish and Fish Habitat Protection Program (FFHPP) ensures compliance with relevant provisions under the Fisheries Act and Species at Risk Act (SARA) by reviewing proposed works, undertakings and activities that may impact fish and fish habitat. If a project is taking place in or near water, the proponent is responsible for understanding project related impacts on fish and fish habitat and applying measures to avoid and/or mitigate potential impacts (i.e., harmful, alteration, disruption, or destruction) to fish and fish habitat. Per Section 73(3)(c) of SARA an activity would be considered to jeopardize the survival or recovery of a species at risk if it would prevent the *attainment of the population and distribution objectives described within the recovery strategy*. It is DFO's responsibility to complete an assessment to determine whether an activity would jeopardize the survival or recovery of the species on a case-by-case basis.

2.3 Provincial *Endangered Species Act* (2007)

Ontario's ESA came into effect on June 30, 2008 and replaced the former 1971 Act. The ESA protects species listed as endangered and threatened by the Committee on the Status of Species at Risk in Ontario (COSSARO). The purposes of the ESA are:

- To identify species at risk based on the best available scientific information, including information obtained from community knowledge and aboriginal traditional knowledge;
- To protect species that are at risk and their habitats, and to promote the recovery of species that are at risk; and
- To promote stewardship activities to assist in the protection and recovery of species that is at risk.

Section 9 of the ESA prohibits the killing, harming, harassing, possession, collection, buying and selling of extirpated, endangered, and threatened species on the Species at Risk in Ontario (SARO) List; and Section 10 prohibits the damage or destruction of protected habitat of species listed as extirpated, endangered, or threatened on the SARO List.

There are several species protected under the ESA that occur within the Region of Peel with some degree of regularity. Seasonally appropriate field studies are typically required to determine if these species are present or using the landscape to fulfill a part of their life cycle.

2.4 Provincial Policy Statement (2020)

The Provincial Policy Statement (PPS) (MMAH 2020) provides policy direction to municipalities on matters of provincial interest as they relate to land use planning and development. The PPS provides for appropriate land use planning and development while protecting Ontario's natural heritage. Development governed by the *Planning Act* must be consistent with the policy statements issued under the PPS. These are outlined in Section 2.1 - Natural Heritage, Section 2.2 – Water, and Section 3.1 - Natural Hazards of the PPS, and relevant sections from each are provided in the following pages.

Section 2.0 of the PPS provides direction to regional and local municipalities regarding planning policies specifically for the protection and management of natural heritage features and resources. The PPS includes policies that speak to the identification and protection of natural heritage systems, as well as levels of protection for the various components that comprise such systems. Some of these features are present within the subject lands and must be assessed in the context of these policies. The policies specific to natural heritage are found in Section 2.1 of the PPS and are provided in their entirety below:

2.1.1 Natural features and areas shall be protected for the long term.

2.1.2 The diversity and connectivity of natural features in an area, and the long-term ecological function and biodiversity of natural heritage systems, should be maintained, restored or, where possible, improved, recognizing linkages between and among natural heritage features and areas, surface water features and ground water features.

2.1.3 Natural heritage systems shall be identified in Ecoregions 6E & 7E, recognizing that natural heritage systems will vary in size and form in settlement areas, rural areas, and prime agricultural areas.

2.1.4. Development and site alteration shall not be permitted in:

1) *Significant wetlands in Ecoregions 5E, 6E and 7E; and*
2) *Significant coastal wetlands.*

2.1.5 Development and site alteration shall not be permitted in:

a. *Significant wetlands in the Canadian Shield north of Ecoregions 5E, 6E and 7E;*
b. *Significant woodlands in Ecoregions 6E and 7E (excluding islands in Lake Huron and the St. Marys River);*
c. *Significant valleylands in Ecoregions 6E and 7E (excluding islands in Lake Huron and the St. Marys River);*
d. *Significant wildlife habitat;*
e. *Significant areas of natural and scientific interest; and*

f. *Coastal wetlands in Ecoregions 5E, 6E and 7E that are not subject to policy 2.1.4(b).*

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

2.1.6 *Development and site alteration shall not be permitted in fish habitat except in accordance with provincial and federal requirements.*
2.1.7 *Development and site alteration shall not be permitted in habitat of endangered species and threatened species, except in accordance with provincial and federal requirements*.
2.1.8 *Development and site alteration shall not be permitted on adjacent lands to the natural heritage features and areas identified in policies 2.1.4, 2.1.5 and 2.1.6 unless the ecological function of the adjacent lands has been evaluated and it has been demonstrated that there will be no negative impacts on the natural features or on their ecological functions.*
2.1.9 *Nothing in policy 2.1 is intended to limit the ability of agricultural uses to continue.*

In terms of implementation, identification of the various natural heritage features noted above is a responsibility shared by the Ministry of the Environment, Conservation, and Park (MECP), Ministry of Natural Resources and Forestry (MNRF) and the municipal planning authority. The MECP is responsible for the confirmation of habitat of endangered species and threatened species, and for its regulation (under the Act as described above). The MNRF is responsible for the identification of Provincially Significant Wetlands (PSWs) and Areas of Natural and Scientific Interest (ANSIs). Local and regional planning authorities are responsible for the identification of Significant Woodlands, Significant Valleylands, and Significant Wildlife Habitat, with support from applicable guidance documents (i.e., Natural Heritage Reference Manual, OMNR 2010; Significant Wildlife Habitat Technical Guidelines, OMNR 2000; Significant Wildlife Habitat Criteria for Ecoregion 6E or 7E, MNRF 2015). Local and regional planning authorities in southern Ontario also typically work with their local conservation authority to identify and confirm non-PSWs that may have significance at the local or regional level. The protection provisions of the *Fisheries Act* apply to all fish and fish habitat throughout Canada. The FFHPP ensures compliance with relevant provisions under the Fisheries Act and Species at Risk Act (SARA) by reviewing proposed works, undertakings and activities that may impact fish and fish habitat.

In areas where significant natural heritage features have been identified by the appropriate agency or planning authority, the boundaries of such features can typically be refined through site-specific studies undertaken as part of the planning process, with input from the responsible agency and/or planning authority. There are no mapped PSWs within the subject lands, however there is fish habitat and suitable habitat for threatened or endangered species.

2.5 Greenbelt Plan (2017)

Portions of the subject lands have been designated as Protected Countryside in the Greenbelt Plan (2017). The Greenbelt Plan identifies that the Protected Countryside is defined by three geographic-specific policy lands: Agricultural System, Natural System, and Settlement Areas. The agricultural land base is comprised of *prime agricultural areas* which includes specific policies for *speciality crop areas* and *rural lands*.

The Natural System identifies lands that support natural heritage, hydrologic and/or landform features and functions. The Natural System is made up of a Natural Heritage System (includes core areas and linkages areas within the Protected Countryside) and a Water Resource System (includes ground and surface water features and areas and their associated functions). Specifically, these two systems can be broken down into the flowing:

- Key Hydrologic Areas, including:
  - Significant groundwater recharge areas;
  - Highly vulnerable aquifers; and
  - Significant surface water contribution areas;
- Key Natural Heritage Features (KNHFs), including:
  - Habitat of endangered species and threatened species;
  - Fish habitat;
  - Wetlands;
  - Life science areas of natural and scientific interest (ANSIs);
  - Significant valleylands;
  - Significant woodlands;
  - Significant wildlife habitat (including habitat of special concern species);
  - Sand barrens, savannahs and tallgrass prairies; and
  - Alvars;
- Key Hydrology Features (KHFs), including:
  - Permanent and intermittent streams;
  - Lakes (and their littoral zones);
  - Seepage areas and springs; and
  - Wetlands.

Generally, development or site alteration is not permitted in KNHFs and KHFs within the Natural Heritage System, including any associated vegetation protection zone, unless exemptions within the Greenbelt Plan apply. In the case of wetlands, seepage areas and springs, fish habitat, permanent and intermittent streams, lakes and significant woodlands, the minimum vegetation protection zone (MVPZ) is 30 m measured from the outside boundary of the feature.

A proposal for new development or site alteration within 120 metres of a KNHF in the Natural Heritage System or a KHF anywhere within the Protected Countryside requires a NHE or a hydrological evaluation which identifies if a vegetation protection zone:

- *Is of sufficient width to protect feature and its functions from the impacts of the proposed change and associated activities that may occur before, during and after construction and, where possible, restore or enhance the feature and/or its function; and*
- *Is established to achieve and be maintained as natural self-sustaining vegetation*.

Section 4.5 of the Greenbelt Plan indicates that all existing uses are permitted. Existing uses are defined within the Greenbelt Plan as uses legally established prior to the date that the Greenbelt Plan came into force on December 16, 2004.

2.6 Regional Municipality of Peel Official Plan (2022)

The premise of the Region of Peel Official Plan is to implement provincial policy through both the regional and municipal plans. The natural heritage features present on the subject lands are primarily associated with the valley and stream corridors of the two West Humber River Tributaries. These features are identified as lands within the Protected Countryside, as shown on Schedule B-5, and are subject to the entirety of the Greenbelt Plan. Schedule C-2 identified these natural features as Core Areas of the Region's Greenlands System. The Plan contains policies that are aimed at protecting, maintaining, and restoring a Greenlands System. The Greenlands System consists of "Core Areas", "Natural Areas and Corridors (NAC)", and "Potential Natural Areas and Corridors (PNAC)". Key elements of the Region's Greenlands System include the following:

- *Areas of Natural and Scientific Interest (ANSI);*
- *Environmentally Sensitive or Significant Areas (ESA);*
- *Escarpment Natural Areas;*
- *Escarpment Protection Areas;*
- *Fish and wildlife habitat;*
- *Habitats of threatened and endangered species;*
- *Wetlands;*
- *Woodlands;*
- *Valley and stream corridors;*
- *Shorelines;*
- *Natural lakes;*
- *Natural corridors;*
- *Groundwater recharge and discharge areas;*
- *Open space portions of the Parkway Belt West Plan; and*
- *Other natural features and functional areas.*

The above key elements are to be interpreted, identified, and protected in accordance with the policies of the Regional Official Plan.

2.6.1 Core Areas

Core Areas represent those features and areas that are considered to be significant at the provincial and regional levels. They generally correspond with significant features and areas listed in the PPS and include:

- *Significant Wetlands;*
- *Significant Coastal Wetlands;*
- *Core Woodlands;*
- *Environmentally Sensitive or Significant Areas*
- *Provincial Life Science ANSI;*
- *Habitats of Threatened and Endangered Species;*
- *Fish and wildlife habitat*
- *Escarpment Natural Areas of the Niagara Escarpment Plan; and*
- *Core Valley and Stream Corridors.*

Policy 2.3.2.6 prohibits development and site alteration within the Core Areas of the Greenlands System in Peel except for:

- *Forest, fish, and wildlife management;*
- *Conservation and flood or erosion control projects, but only if they have been demonstrated to be necessary in the public interest and after all reasonable alternatives have been considered;*
- *Essential infrastructure exempted, pre-approved or authorized under an environmental assessment process;*
- *Passive recreation;*
- *Minor development and minor site alteration;*
- *Existing uses, buildings, or structures;*
- *Expansions to existing buildings or structures;*
- *Accessory uses, buildings, or structures; and*
- *A new single residential dwelling on an existing lot of record, provided that the dwelling would have been permitted by the applicable planning legislation or zoning by-law on May 23, 2014. A new dwelling built after May 23, 2014, in accordance with this policy shall be deemed to be an existing building or structure for the purposes of the exceptions.*

The above noted exceptions are permitted provided that:

a) *The exceptions are permitted in accordance with the policies in an approved local municipal official plan or the Niagara Escarpment Plan, where applicable;*
b) *Any development and site alteration will not be permitted unless it has been demonstrated that there will be no negative impacts on the natural features or their ecological functions and that:*
    i. *there is no reasonable alternative location outside of the Core Area and the use, development or site alteration is directed away from the Core Area to the greatest extent possible;*
    ii. *if avoidance of the Core Area is not possible, the impact to the Core Area feature is minimized;*
    iii. *any impact to the Core Area or its functions is mitigated through restoration or enhancement to the greatest extent possible; and*
    iv. *where ecosystem compensation is determined to be appropriate and feasible, including for essential infrastructure, it may be considered in accordance with local municipal or conservation authority ecosystem compensation guidelines.; and*
c) *Within significant wetlands and significant coastal wetlands the above exceptions may only be considered in accordance with federal and provincial legislation, regulations and policies (e.g. Conservation Authorities Act); and*
d) *When developing policies to allow the exceptions, the local municipalities may consider appropriate implementation tools including existing approval requirements and tools of other agencies.*

2.6.2 Natural Areas and Corridors (NAC) and Potential Natural Areas and Corridors (PNAC)

Natural Areas and Corridors (NAC) include:

- *Evaluated non-provincially significant wetlands;*
- *Woodlands meeting one or more of the criteria in Table 1 of the ROP;*
- *Significant wildlife habitat;*
- *Fish habitat;*
- *Regionally significant life science Areas of Natural and Scientific Interest;*
- *Provincially significant earth science Areas of Natural and Scientific Interest;*
- *Escarpment Protection Areas of the Niagara Escarpment Plan; and*
- *The Lake Ontario shoreline and littoral zone and other natural lakes and their shorelines.*

Potential Natural Areas and Corridors (PNAC) include:

- *Unevaluated wetlands;*
- *Cultural woodlands and cultural savannahs within the Urban System and Rural Service Centers meeting one or more of the criteria in Table 1 of the ROP;*
- *Any other woodlands greater than 0.5 hectares (1.24 acres);*
- *Regionally significant earth science Areas of Natural and Scientific Interest;*
- *Sensitive groundwater recharge areas;*
- *Portions of Historic shorelines;*
- *Open space portions of the Parkway Belt West Plan Area;*
- *Potential ESA's identified as such by the conservation authorities; and*
- *Any other natural features and functional areas interpreted as part of the Greenlands System Potential Natural Areas and Corridors, by the individual area municipalities in consultation with the conservation authorities.*

NAC and PNAC represent natural features and areas that are considered locally significant. NAC and PNAC' are considered locally important. Regional policies pertaining to NAC and PNAC defer their interpretation, protection, restoration, enhancement, proper management, and stewardship to local municipalities.

2.7 Town of Caledon Official Plan (2018)

The Town of Caledon Official Plan (2018) provides direction as to the land use within the Town.

The Town details an Ecosystem Planning Strategy (Section 3.2.3) that outlines the policy approach to implementing the Town's ecosystem principle, goal and objectives and provides a basis for the General Policies and Performance Measures contained in Sections 3.2.4 and 3.2.5, as well as the detailed environmental and open space/recreation land use policies contained in Sections 5.7 and 5.8.

The Ecosystem Framework (3.2.3.1) outlined on Table 3.1 organizes ecosystem components into four categories:

- *Natural Core Areas;*
- *Natural Corridors;*
- *Supportive Natural Systems; and*
- *Natural Linkages.*

It should be noted that the Ecosystem Framework incorporates and refines the components of the Regional Greenlands System, as defined in the Region of Peel Official Plan, in a manner which conforms with the environmental policy directions contained in the Region of Peel Official Plan. Within the Greenbelt Plan Protected Countryside designation, this framework incorporates Key Natural Heritage Features (KNHFs) and Key Hydrologic Features (KHFs), and their related Vegetation Protection Zones, as defined in the Greenbelt Plan, and lands within 120 metres of such features.

The ecosystem components identified as Natural Core Areas and Natural Corridors (Section 3.2.3.1.1). Table 3.1 of the Official Plan Summarizes the Ecosystem Framework and its components. In addition to being subject to the general environmental policies and performance measures of this Plan, a portion of the subjects lands are designated Environmental Policy Area (EPA) and are subject to the detailed land use policies in Section 5.7.

Natural Core Areas and Natural Corridors shall be designated Environmental Policy Area (EPA), and development within and adjacent to EPA shall subject to the general policies of Section 3.2.4, the performance measures of Section 3.2.5, and the detailed land use policies of Section 5.7, and, within the Greenbelt Protected Countryside designation, the detailed policies of Section 7.13.

Environmental Policy Area

According to Section 5.7 new development generally is prohibited within areas designated Environmental Policy Area with limited exceptions described in Section 5.7.3.1.2:

> *The uses permitted in EPA shall be limited to: legally existing residential and agricultural uses; a building permit on a vacant existing lot of record; portions of new lots; activities permitted through approved Forest Management and Environmental Management Plans; limited extractive industrial; non-intensive recreation; and, essential infrastructure. Detailed policies with respect to each of these permitted uses are provided in Sections 5.7.3.2 to 5.7.3.7 inclusive. Within the ORMCPA or the Greenbelt Protected Countryside designation, permitted uses are also subject to the provisions of Sections 7.10 and 7.13, as applicable.*

Section 5.7.3.1.6 states that:

> *Lands designated EPA are not to be damaged or destroyed, unless as a result of an approved permitted use pursuant to Section 5.7.3.1.2 above, and, within the ORMCPA, pursuant to Section 7.10 and within the Greenbelt Protected Countryside designation, pursuant to Section 7.13. In the event that EPA is damaged or destroyed without required approvals, there shall be no adjustment to the boundary or re-designation of these areas, and the Town and Region of Peel will require replacement or rehabilitation of the affected ecosystem features, functions and/or landforms.*

Proposed new development adjacent to EPA will be required to complete an Environmental Impact Study (EIS) and Management Plan (MP) to the satisfaction of the Town and other relevant agencies (Section 5.7.3.7).

2.8 Toronto and Region Conservation Authority (TRCA) Polices and Regulations

There are ongoing changes to the *Conservation Authorities Act* associated with Ontario's Bill 23 (*More Homes Built Faster Act*, 2022), which revokes the individual regulations set out for each conservation authority. A generic regulation is proposed by the province that will specify the requirements that apply to all conservation authorities across the province. One new regulation (Ontario Regulation 686/21) which defines Mandatory Programs and Services, has been issued by the province which focuses the scope of the conservation authorities to regulations specifically associated with flooding and natural hazards and prevents them from commenting on natural heritage. In this regard, TRCA will review a project related to the risk of natural hazards within its jurisdiction and in accordance with Ontario Regulation 166/06, until such time as the new regulation is brought into force.

The subject lands are located within the Humber River Watershed and two tributaries of the West Humber River flow through the subject lands. Areas regulated by the TRCA on the subject lands are associated with the valley and stream corridors, associated floodplains, wetlands, and several of the drainage features.

2.8.1 Ontario Regulation 166/06

The TRCA regulates hazard lands including floodplains, watercourses, valleylands, shorelines, and wetlands under Ontario Regulation 166/06 (TRCA 2006). TRCA also regulates other areas where development could interfere with the hydrologic function of a wetland, including areas within 120 m of Provincially Significant Wetlands (PSWs), and within 30 m of other wetlands. Proposed development within the regulated area may require the preparation of an EIS.

Generally, development within the flood limit of a watercourse is not allowed. However, subject to conformity with the Official Plan and completion of appropriate studies and Conservation Authority permits, development may be permitted within other regulated areas. The Authority may grant permission for development in or on the areas regulated if, in its opinion, the control of flooding, erosion, dynamic beaches, pollution or the conservation of land will not be affected by the development. The permission of the Authority shall be given in writing, with or without conditions.

2.8.2 Toronto and Region Conservation Authority Living City Policies

The *Living City Policies* (LCP) *for Planning and Development in the Watersheds of the TRCA* was approved by its board on November 28, 2014. The LCP contains policies related to terrestrial resources, water resources, natural features and areas, natural hazards, and potential natural cover and buffers. Section 7.3 contains TRCA's policies for how to define, protect, enhance, and secure a Natural Heritage System. The policies described in Section 7.3.1.4 have been identified with the goal of protecting lands

that have the potential to be restored in order to enhance existing natural cover and manage natural hazards.

As per Section 7.3.1.4 of the LCP, the TRCA prescribes the following buffers to natural features and hazards as it may relate to the subject properties:

- *Valley or Stream Corridors – a 10 m buffer from the greater of the long-term stable top of slope/bank, the stable toe of slope, Regulatory flood plain, meander belt, and any contiguous natural features or areas;*
- *Wetlands – a 30 m buffer from PSWs and a 10 m buffer for all other wetlands and any contiguous natural features or areas;*
- *Any additional distances prescribed by federal, provincial, or municipal requirements or standards (e.g., Greenbelt);* and
- *Any additional distances demonstrated as necessary through technical reports.*

3. Methodology

To characterize natural heritage resources and functions associated with the subject lands and adjacent lands, Beacon Environmental has completed a review of all available background information. A summary of the desktop review and field investigations undertaken is summarized below.

3.1 Background Review

Background information was gathered and reviewed at the outset of the project. This involved consideration of the following documents and information sources, as relevant to the subject lands:

- PPS (2020);
- The Growth Plan for the Greater Golden Horseshoe (August 2020);
- Regional Municipality of Peel Official Plan (April 2022 Office Consolidation);
- Town of Caledon Official Plan (April 2018 Office Consolidation);
- TRCA policies (2014) and regulations (2006);
- Land Information Ontario (LIO) and Ministry Natural Resources and Forestry (MNRF) resource information;
- *Endangered Species Act* (2007), including relevant Ontario Regulations and guidance documents;
- *Species at Risk* (2002); and
- Federal *Fisheries Act (1985) including relevant policy and guidance documents.*

Other sources of information such as current and historical aerial photographs and local topographic survey data, were also reviewed prior to commencing field investigations. Further, Beacon's background review also includes analysis of numerous information sources in a Geographic Information System (GIS) environment that facilitates an assessment of the likelihood that species at risk and other natural heritage features are present in an area of interest. This system allows Beacon to combine the most current information provided by the MNRF through the LIO portal with GIS layers from other

provincial and local datasets, including but not limited to, floral and faunal atlas data. This system enables the creation of a list of Species at Risk (SAR) for which there are records, or which might be expected to occur within 5 km of a location. All relevant layers can then be overlaid on the most recent high resolution ortho-imagery. The screening process helps identify areas that can then be targeted (for example, potential habitat) during the field program to maximize the efficiency and effectiveness of on-site investigations.

Information sources reviewed included:

- Provincially tracked species layer (1 km grid LIO dataset);
- Ontario Reptile and Amphibian Atlas (ORAA);
- Ontario Breeding Bird Atlas (OBBA);
- Ontario Butterfly Atlas (MacNaughton et al. 2023);
- Natural Heritage Information Centre (NHIC) Data via the Make-A-Map application;
- SAR range maps (Government of Ontario);
- LIO and Aquatic Resource Area (ARA) dataset;
- DFO Aquatic Species at Risk Mapping;
- Committee on the status of Endangered Wildlife in Canada (COSEWIC) Assessment and Status Reports (including SAR distribution and range maps);
- High resolution aerial photography of the property;
- Natural and physical feature layers (e.g., topographic, wetland, waterbody, watercourse data); and
- Ontario Geological Survey (OGS) and soil physiography (Chapman and Putnam) datasets.

3.2 Feature Staking

The limits of the regulated top of slope, the dripline of the wooded valley features and unevaluated wetlands associated with the valley and stream corridors were surveyed and staked with TRCA staff. Nick Cascone (Senior Planner) and Maria Parish (Senior Ecologist) attended the staking on October 18, 2022, for the Golf Course Lands and on August 28, 2023 for the south lands.

3.3 Field Investigations

The field investigations detailed below are time sensitive and were completed during specific timing windows within the year to be valid, scientifically appropriate, and acceptable to the agencies.

Field investigations to identify existing natural heritage and hydrological features within the subject lands commenced in the summer of 2022 and have continued into the spring and summer of 2023. Note that additional land was added to the overall area of study at the beginning of 2023. Since there is a division within the timing of surveys and the surrounding land use, there are periodical references to the north and south parcels or the future development lands throughout the report.

A summary is presented in **Table 1**. More detailed survey descriptions are provided in the subsections that follow.

Table 1. Summary of Field Investigations

Field Investigation	Dates
Aquatic Habitat Assessment	June 28, 2022, and June 22, 2023
Headwater Drainage Feature Assessment	April 12, May 17, and September 5, 2023
Ecological Land Classification and Floral Inventory	September 1, 2022, and June 30, 2023
Breeding Bird Surveys	June 11 and July 4, 2022, and June 3, 27 and July 7, 2023
Breeding Amphibian Surveys	April 13, May 26, and June 22, 2023
Turtle Basking Surveys	May 25 and 26 and June 8, 2023
Feature Staking Exercise (TRCA)	October 18, 2022, and August 28, 2023

3.3.1 Aquatic Habitat Assessment

An aquatic habitat assessment was completed within the West Humber River tributaries that traverse the subject lands. The assessment of aquatic habitat was completed on foot and involved a visual assessment of the following characteristics:

- Channel width and depth profile, bank height, bank stability;
- Substrate types and distribution;
- Fish barriers;
- Riparian vegetation type and cover; and
- In-stream cover type and extent.

3.3.2 Geomorphic Assessment

A geomorphic assessment, provided under a separate cover, was also completed for the two West Humber River tributaries. This assessment included the results of the field investigation and provides an impact assessment of the proposed development concept plan from a geomorphic perspective. Additionally, this assessment provides a meander belt analysis for the West Humber River Tributary meander belt, on a reach basis, to delineate the protected Redside Dace habitat limit. Reach names identified in the Geomorphic Assessment (Beacon 2023) will also be referenced in Section 4.1 to maintain naming consistency.

3.3.3 Headwater Drainage Feature Assessment

Part 1 of the *Evaluation, Classification and Management of Headwater Drainage Features Guidelines* (Toronto and Region Conservation Area and Credit Valley Conservation 2014) is to collect data on the identified features. Data is collected according to the *Ontario Stream Assessment Protocol Headwater Drainage Feature Module* (Stanfield *et al*. 2013) on the identified features, scoped for data relevance and adapted to a reach-based approach. Per the OSAP HDFA Module (Stanfield et al. 2013) spring sampling shall occur between March and the middle of June in southern Ontario. However, data collected in the late summer can provide valuable insight into vegetive growth and flow conditions that can support the spring data.

In support of the assessment three site visits were undertaken by Beacon staff on April 4, May 10 and September 5, 2023. Part 2 of the HDFA Guidelines (TRCA & CVC 2014) provides an approach to classify features by providing a step-by-step characterization of specific functions that may be associated with the features assessed. This includes hydrology, riparian function and provision of fish or terrestrial habitat.

Part 3 of the HDFA Guidelines (TRCA & CVC 2014) provides guidance on linking the characteristics and functions of features to specific management recommendations that may be applied to those features. Recommendations for management generally fall into one of the following:

- *Protection – Important Functions: i.e., swamps with amphibian breeding habitat; perennial headwater drainage features; seeps and springs; Species at Risk (SAR) habitat; permanent fish habitat with woody riparian cover.*
- *Conservation – Valued Functions: i.e., seasonal fish habitat; with woody riparian cover; marshes with amphibian breeding habitat; or general amphibian habitat with woody riparian cover.*
- *Mitigation – Contributing Functions: i.e., contributing fish habitat with meadow vegetation or limited cover.*
- *Recharge Protection – Recharge Functions: i.e., features with no flow with sandy or gravelly soils.*
- *Maintain or Replicate Terrestrial Linkage – Terrestrial Functions: i.e., features with no flow with woody riparian vegetation and connects two other natural features identified for protection.*
- *No Management Required – Limited Functions: i.e., features with no or minimal flow; cropped land or no riparian vegetation; no fish or fish habitat; and no amphibian habitat.*

3.3.4 Ecological Land Classification and Floral Inventory

Vegetation surveys and community mapping was undertaken to describe and map the existing vegetation communities on current colour ortho-photography of the lands using the Ecological Land Classification (ELC) system for southern Ontario (Lee *et al*. 1998). This is the standard method used for describing vegetation communities in southern Ontario.

A flora inventory was completed, and a list of vascular plants was compiled for the subject lands.

3.3.5 Breeding Bird Surveys

Surveys for the north parcel were conducted on the mornings of June 11 and July 4, 2022, on days with low to moderate winds, no precipitation, and temperatures within 5°C of average seasonal temperatures. Start times were between 5:00 and 5:30 AM to capture the peak period of avian vocalization. The breeding bird community was surveyed using a roving type of survey, in which all parts of the subject lands were walked to within 50 m and all birds heard or observed and showing some inclination toward breeding were recorded as breeding species. All birds heard and seen were recorded in the location observed on an aerial photograph of the site. A third breeding bird survey is typically conducted when suitable grassland habitat is present that may support protected grassland specialists.

These birds (Bobolink and Eastern Meadowlark) were detected on the first and second visits (discussed in Section 4.3.4 below) and therefore the third visit was not deemed to be required as presence of these species had been confirmed.

Three surveys for the south parcel were conducted in 2023 (June 3, 27 and July 7) and implemented the same methodology as above.

3.3.6 Breeding Amphibian Surveys

Three evening visits were made to survey the subject lands for breeding amphibians. Survey locations were placed in proximity to wetland habitat that may support breeding amphibians. The surveys were conducted as per the protocol outlined in the Great Lakes Marsh Monitoring Program. Surveys consisted of auditory surveys undertaken during the prime breeding period to record calling males that are present, spread throughout the breeding season to include the short temporal peak for each species of interest. The surveys involved visiting the site after dusk when minimum night-time air temperatures of at least 5°C during the first visit, 10°C during the second visit and 17°C during the third visit. Calling amphibians, if present, were identified to species and chorus activity was assigned a code from the following options:

0 No calls;
1 Individuals of one species can be counted, calls not simultaneous;
2 Some calls of one species simultaneous, numbers can be reliably estimated and shown in brackets; and
3 Full chorus, calls continuous and overlapping.

3.3.7 Turtle Basking Surveys

Staff undertook three turtle basking surveys in May and June to study the potential presence of these animals on the subject lands. Survey stations were developed based on the location of wetland communities such as the open ponds and marsh communities.

These surveys are typically completed on sunny days in May through to mid-June. Staff walk the perimeter of the identified communities and scan the community with binoculars to enhance visual detection.

3.3.8 Endangered or Threatened Species

Beacon staff completed an in-house desktop screening for endangered and threatened species. The list of species was screened against potential habitat, which was confirmed through field investigations and seasonal, species-specific surveys and will be verified with the applicable regulatory bodies, as required.

3.3.9 Incidental Wildlife

Incidental observations of other wildlife, including reptiles, amphibians, mammals and/or migrant birds, were made during field investigations. This included sounds heard, scat, tracks, and visual observations.

4. Existing Conditions

The following sections detail the existing natural heritage conditions on the subject lands.

4.1 Aquatic Resources

The onsite aquatic systems are composed of several drainage features that all drain into a tributary that diagonally bisects the subject lands, from northeast to southwest, to its confluence with the West Humber River (herein referred to as the 'North-South Tributary'). A tributary of the West Humber River enters the subject lands from the west and naturally meanders southeast for approximately 950 m. Both the West Humber River Tributary and the North-South Tributary have origins approximately 5 km north of the subject lands (i.e., north of King Street).

The 2004 Humber River Fisheries Management Plan (OMNR and TRCA) identified the North-South Tributary as a small riverine warmwater habitat. This habitat category is usually made up of first and second order tributaries draining from the Peel Plain. Due to the dominance of clay soils in the Peel Plain, infiltration rates are low, as are the rates of groundwater discharge to streams. As a result, many of these tributaries are either reduced to standing pools or completely dry up during the warmer summer months (OMNR and TRCA 2004). Fish community assemblage has a low diversity and consists of warmwater species. Fish habitat is generally limited during the summer months. The management plan (OMNR and TRCA 2004) also denotes a historical presence of Redside Dace (*Clinostomus elongatus*) in these systems.

The West Humber River Tributary was identified as an intermediate riverine warmwater system. This habitat category is usually made up of third and forth order tributaries draining from the Peel Plain. As noted above, infiltration rates and baseflow is low, therefore some of these streams dry up or become standing pools in the summer, particularly those in the West Humber River subwatershed. As well, the flow regime and water temperatures fluctuate due to low amounts of baseflow (OMNR and TRCA 2004). Fish community assemblage consists of warmwater species and includes Redside Dace and Rainbow Darter (*Etheostoma caeruleum*).

There are three (3) offline ponds within the subject lands that were constructed for irrigation purposes for the golf course. The Management Plan (2004) specifies that artificial ponds are common throughout the Humber River watershed. Artificial ponds are typically characterized as low slope, low velocity zones of sediment deposition and many are eutrophic near the bottom during summer months. Due to detention time and exposure to the sun's rays, these waterbodies experience high summer temperatures which typically have negative impacts to downstream aquatic communities (OMNR and TRCA 2004).

- Blackchin Shiner (*Miniellus heterodon*)
- Blacknose Dace (*Rhinichthys atratulus*)
- Bluegill (*Lepomis macrochirus*)
- Brassy Minnow (*Hybognathus hankinsoni*)
- Brook Stickleback (*Culaea inconstans*)
- Common Shiner (*Luxilus cornutus*)
- Creek Chub (*Semotilus atromaculatus*)
- Fantail Darter (*Etheostoma flabellare*)
- Fathead Minnow (*Pimephales promelas*)
- Iowa Darter (*Etheostoma exile*)
- Johnny Darter (*Etheostoma nigrum*)
- Largemouth Bass (*Micropterus salmoides*)
- Longnose Dace (*Rhinichthys cataractae*)
- Mottled Sculpin (*Cottus bairdii*)
- Ninespine Stickleback (*Pungitius pungitius*)
- Northern Hog Sucker (*Hypentelium nigricans*)
- Northern Pearl Dace (*Margariscus nachtriebi*)
- Pumpkinseed (*Lepomis gibbosus*)
- Rainbow Darter
- Redside Dace
- River Chub (*Nocomis micropogon*)
- Rock Bass (*Ambloplites rupestris*)
- Rosyface Shiner (*Notropis rubellus*)
- Sand Shiner (*Miniellus stramineus*)
- Slimy Sculpin (*Cottus cognatus*)
- Smallmouth Bass (*Micropterus dolomieu*)
- White Sucker (*Catostomus commersonii*)

Most of the fish listed above are either highly tolerant species (i.e., has a low sensitivity or is adaptive to) or intermittently tolerant species (i.e., neither particularly sensitive nor insensitive) to environmental or anthropogenic stresses. All the species listed, apart from Redside Dace, are common with a widespread range throughout Ontario (Eakins 2023). Redside Dace is a federally and provincially listed endangered species that is afforded habitat protection under both the provincial ESA and the federal SARA legislation Fish community assemblage is likely similar for the North-South Tributary as field investigations have confirmed that the system contains water that is present throughout the year and no identifiable impediments to fish movement were observed.

4.1.1 Watercourses

Watercourses, drainage features and waterbodies on the subject lands are detailed below based on analysis of field data collected. Representative photographs of the watercourses within the subject lands are included in **Appendix B**.

4.1.1.1 West Humber River Tributary

North Parcel Reach (WHT-1)

The northwest reach was characterized as a permanent, naturally meandering feature through a densely forested (deciduous swamp) riparian area with areas of open herbaceous vegetation. Flow was moderate and the water was clear with a temperature of 15 ºC. The average wetted width and depth were 2.25 m and 0.12 m, respectively. The channel in this reach contained a varied morphology with riffle (20%) and run (80%) sections with substrate dominated by cobble (50%), gravel (20%), sand, boulder, and silt (in order of dominance). Banks were a low gradient with areas of moderate erosion (with exposed tree roots) on outer meanders. Instream cover was dominated by woody debris, cobble, and boulders (**Photograph 1 – Appendix B**). No groundwater indicators were identified. Fish were observed throughout the reach.

South Parcel Reach (WHT-1A)

The southeast reach was also characterized as a permanent, naturally meandering feature (**Photograph 2, Appendix B**). However, the surrounding riparian area was contained within a defined floodplain encompassing a wet meadow marsh that transitioned to agricultural lands beyond the slope gradient of the valley. Flow was moderate, water was clear and there were no observed indicators of groundwater influence. Channel dimensions varied in width and water depth for each habitat section, however generally pooled sections had a mean wetted width of 8 m, and a wetted depth of 0.32 m and riffle sections had a mean wetted width of 1.75m and depth of 0.05 m. The channel in this reach maintained the varied morphology seen in the upstream reach, however sections were more equally divided between pool (30%) riffle (25%) and run (25%) habitats with flat (20%) sections in lesser amounts. Riffle substrate consisted of sand, large gravel, cobble, and boulders. Pool substrate consisted of clay, sand, and gravel. Instream cover was moderate and largely provided by cobble and aquatic vegetation (filamentous algae and emergent species) with boulders and small woody debris in lesser amounts. Shore cover was low (< 30% of stream shaded) and there was no canopy cover. Banks displayed areas of high and low gradient and there was evidence of erosion (exposed bank, no vegetative growth) on outer meanders. Deposition zones consisting largely of sand and silt (10 cm deep) were observed and dry cut off chutes were forming islands within the channel. No groundwater indicators were identified. Fish were observed throughout the reach, primarily in pooled habitats.

4.1.1.2 North-South Tributary (WHT-2 & WHT-2)

The North-South Tributary flows diagonally across the north parcel from the northeast to the southeast to its confluence with the West Humber River Tributary on the subject lands. This tributary receives drainage from HDFs 1 through 10 (**Figure 2**). The average wetted width and depth were 0.85 m and 0.12 m, respectively. Flow was low and water was clear with a temperature of 15 ºC. The watercourse was a permanent and natural feature; however, there is evidence of slight channel modification (i.e., channelization) as the sinuosity of the channel does not mimic those of upstream and downstream reaches. The upstream reach was contained within a 2 – 5 m riparian buffer dominated by wet marsh and grass (MAM2-2 and MAM2-10) species with areas of thicket (CUT1-1) (**Appendix B – Photographs 3 and 4**). The channel was incised, and the banks were steep and well vegetated with no signs of erosion. The upstream channel substrate was composed of cobble (40%) gravel (40%), sand (15%) and silt (5%). The flow sequence followed a riffle (50%) and flat (50%) sectioning. Instream cover was provided by a combination of cobble and aquatic vegetation. Evidence of groundwater influence (i.e., *Nasturtium officinale*) was identified in several locations throughout the upstream reach. Within the upstream reach there was no canopy providing shade to the reach.

As the tributary flows south the riparian buffer increases in width becomes dominated by a thicket (CUT1) community and overhanging vegetation and riparian undergrowth become more abundant. Channel substrate within the downstream reach of are composed of sand (35%), gravel (25%), cobble (25%), silt (10%) and clay (5%). Morphology of the tributary becomes much more naturalized, dominated by slow flowing riffle (30%), flat (20%) and run (50%) sections. Average wetted width and depth were 0.95 m and 0.07 m, respectively. Instream cover is provided by cobble, aquatic vegetation and undercut banks. No groundwater indicators were identified throughout the downstream reach. The downstream reach then continues through a deciduous forest (FOD5-5) then drains directly into the West Humber River Tributary. Fish were observed throughout the reach.

4.1.2 Offline Ponds

During the aquatic field reconnaissance, three offline ponds, primarily used for golf course irrigation, were identified within the subject lands. Although mapping shows a connection between Pond A and the North-South Tributary, further investigations have confirmed this pond is offline. Water level within the pond is maintained by several surface level PVC overflow pipes which drain into the Tributary. Pond A has a large open water surface with limited aquatic macrophytes or algae growth (**Appendix B – Photographs 5**). The shoreline is comprised of a moderately sized vegetated buffer (1-3 m), which was lined with sedges and grasses, herbaceous plants, small patches of invasive phragmites (European Common Reed) (*Phragmites australis subsp. australis*) and a larger swath of thicket.

Pond B (**Appendix B – Photographs 6**) is an offline pond that was bordered predominantly by the manicure grass of the golf course to the southeast and a larger vegetated buffer (0.5 – 2 m) on the northwest shoreline. As noted above, Pond B appears to receive drainage from HDF-10 which originated in a small wetland depression near the eastern boundary of the north parcel.

Pond C is an offline pond bordered predominantly by forest along the northern shoreline and by manicured lawn, with patches of invasive phragmites along the southeast and west shoreline (**Appendix B – Photographs 7**). Pond C also has a large open water surface with limited aquatic macrophyte; however, algae growth is more predominant. There were no visible surface level PVC drainpipes from the shoreline. However, during the aquatic assessment of the West Humber River Tributary, three PVC drainpipes appeared to have been draining pond water into the tributary. The most southern shoreline of Pond C is approximately 65 m from the channel of the West Humber River Tributary and a large portion of the pond is with the mapped floodlines (**Figure 2**).

4.1.3 Drainage Features

As identified in the Functional Servicing and Stormwater Management Report (FSSR) prepared by SCS Consulting Group Ltd. (SCS 2023), the existing surface drainage pattern for the subject lands consists of five catchment areas. Runoff from Catchment 101 (11.85 ha) and Catchment 102 (4.31 ha) is conveyed overland towards the center of the subject lands via the drainage features. The drainage features from both Catchments ultimately confluence within the subject lands and continue southwards as the North-South Tributary. Runoff from Catchment 103 (17.70 ha) is conveyed overland west towards the North-South Tributary. The North-South Tributary combines with the West Humber River Tributary at the west edge of the subject lands which then flows southeast towards an existing culvert at Torbram Road. Runoff from Catchment 104 (17.96 ha) is conveyed overland east towards an existing culvert underneath Torbram Road. Runoff from Catchment 105 (3.60 ha) is conveyed overland west towards the West Humber River Tributary and outlets along the southern boundary of the subject lands.

Ten (10) potential headwater drainage features (HDF) were identified within the north parcel and two (2) features were identified within the south parcel. Representative photographs of the drainage features on the subject lands are included in **Appendix B (Photographs 8 to 23)**.

HDF 1 & 2

These features originated in the northwest portion of the subject lands and received drainage from the neighbouring agricultural fields. The features exhibited areas of standing water in early spring and were

Legend

- Subject Lands

Terrestrial Resources

- Ecological Communities
- Barn Swallow Locations
- BoboLink Locations
- Eastern Meadowlark Locatons
- Turtle Survey Locations
- Amphibian Survey Locations
- Soil Sample Locations

Aquatic Features (Beacon 2023)

- Intermittent
- Ephemeral
- Peramanent
- Waterbody (Pond)
- Tiled (Underground)

Redside Dace Habitat

- Watercourse
- Meander Belt + 30 m

Code	Cultural Communities
CUM1	Mineral Cultural Meadow
CUM1-1	Dry - Moist Old Field Meadow
CUT1	Mineral Cultural Thicket
CUT1-1	Sumac Cultural Thicket
CUT1-5	Raspberry Cultural Thicket
CUW1	Mineral Cultural Woodland

Code	Aquatic Communities
OAO	Open Aquatic
SAM1-4	Pondweed Mixed Shallow Aquatic
	Forest Communities
FOD3	Dry - Fresh Poplar - White Birch Deciduous Forest
FOD4	Dry - Fresh Deciduous Forest
FOD5-5	Dry - Fresh Sugar Maple - Hickory Deciduous Forest
FOD7	Fresh - Moist Lowland Deciduous Forest
	Wetland Communities
MAM2	Mineral Meadow Marsh
MAM2-10	Forb Mineral Meadow Marsh
MAM2-2	Reed-canary Grass Mineral Meadow Marsh
MAS2-1	Cattail Mineral Shallow Marsh
SWD4	Mineral Deciduous Swamp
SWD4-1	Willow Mineral Deciduous Swamp
SWT2-2	Willow Mineral Thicket Swamp
	Other Communities
AG	Agricultural Crop
ANT	Anthropogenic

Existing Conditions

Figure 2

Natural Heritage Evaluation - Part of Lots 19, 20 and 21 Concession 5, Town of Caledon, Region or Peel

BEACON ENVIRONMENTAL

Project: 222239

Last Revised: January 2024

Client: Mayfield Golf Course Inc. and Tullamore Industrial GP Limited

Prepared by: SZ
Checked by: DF

1:5,000

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dry by the late spring investigation. HDF 1 measured 0.3 m wide, while HDF 2 measured 0.7 m wide. The features may provide ephemeral drainage during spring freshet and during large precipitation events via undefined grassy swales to the North-South Tributary. The swales exhibited no substrate or riparian buffers. Multiple corrugated steel pipe (CSP) culverts, to conveyed flow under the cart path crossings, were observed along both features.

HDF 3

This feature was broken up into three segments to address the conditions in each of the branches and downstream of their confluence. HDF 3A and 3B originated in the northwest portion of the subject lands and received drainage from the neighbouring farm field. HDF 3A and 3B merge to form HDF 3C.

HDF 3A exhibited substantial flow during early spring and minimal flow by the late spring investigations. The channel width was 1 m and was heavily vegetated with cattail and Phragmites species. The riparian vegetation extended approximately 3 m from the channel on both banks. Multiple 1 m CSP culverts conveyed flow under the cart path crossings. Water depth of the scour pool associated with the culvert was 0.2 m.

HDF 3B was tiled, with an undefined grassy swale remaining on the surface. Flow was observed exiting the tile drain during the early spring investigation. No water was present during the late spring investigation.

HDF 3C exhibited substantial flow during early spring and minimal flow during the late spring investigations. The channel width was 1.4 m and was heavily vegetated with cattail (*Typha spp.*) and European Common Reed). Measurements were taken during the Round 2 investigation. Water depth was 5 cm, hydraulic head was 3 mm, and bankfull depth was 0.28 m. The riparian vegetation extended approximately 3 m from the channel on both banks. A double 1 m CSP culvert conveyed flow under the cart path crossing. Sand was the dominant substrate; gravel was the sub-dominate substrate. Deposition measuring 3 cm was noted on the banks. No barrier to fish movement was present at the downstream limit of HDF 3C and it is possible that fish from the North-South Tributary could seasonally access the feature.

HDF-3 was observed to be dry during the June 2022 aquatic habitat assessment and during the summer (round 3) headwater assessment completed in September 2023.

HDF 4

This feature was broken up into three segments to address the conditions in each of the branches and downstream of their confluence. HDF 4A and 4B originated in the southwest portion of the subject lands and received drainage from the neighbouring farm field. HDF 4A and 4B merge to form HDF 4C.

HDF 4A was a surface feature for a small section (i.e., the upstream extent within the subject lands) then became a tiled feature, with a poorly defined grassy swale on the surface. HDF 4B was a poorly defined, grassy swale. Both features exhibited standing water in early spring and were observed to be dry by the late spring investigation. A golf cart path crossed both features at several locations along their respective segments; at these crossings CSP culverts (averaging 0.3 m in diameter) conveyed flow downstream.

HDF 4C exhibited substantial flow in early spring and minimal flow during the late spring investigations. The tile drain associated with HDF 4A outlets within the wooded area associated with the West Humber Tributary. Measurements were taken during the Round 2 investigation. The channel width was 0.65 m, the water depth was 10 cm, the hydraulic head was 3 mm, and the bankfull depth was 0.3 m. No instream or riparian vegetation was observed. Woody debris was present. Cobble was the dominant substrate; sand was the sub-dominate substrate. No barrier to fish movement was present at the downstream limit of HDF 4C and it is possible that fish from the North-South Tributary could seasonally access the feature.

HDF-4 was observed to be dry during the June 2022 aquatic habitat assessment and during the summer (round 3) headwater assessment completed in September 2023.

HDF 5 & 6

These small (i.e., less than 30 m in length) features originated directly adjacent to Pond A. They were both observed to be dry during the early spring investigations. HDF 5 appeared to drain over land flow from the backyard of an adjacent residential property. HDF 6 was a tiled feature that appeared to provide drainage to the manicure golf course greens to the south.

HDF 7

This feature originated in the central portion of the subject lands, east of the North-South Tributary. The undefined grassy swale appeared to provide surface drainage to the manicure golf course greens to the east. The feature was dry during the early spring investigations. This feature may convey very early spring freshet and lar precipitation events to the North-South Tributary.

HDF 8

This feature was observed as a narrowly defined swale that drained southwest through a steeply sloped thicket (CUT1) and wooded community (FOD4) associated the staked stream corridor of the North-South Tributary. A small wetland depression, dominated by cattails (MAS2-1), was present at the bottom of the slope. From the wetland depression, the feature continues as an undefined grassy swale to a CSP culvert that drains it under a golf cart path into the dense riparian vegetation of the Tributary. During the early spring investigation, the feature was damp with areas of standing water and small sections of minimal flow (in areas of steep slopes). By late spring the feature was observed to be dry; apart from standing water noted within the small wetland depression.

HDF 9

This small feature originated at the top of the slope associated with the stream corridor of the North-South Tributary. This feature was poorly defined throughout the wooded (FOD4) corridor. The feature was observed to be dry in the early spring. This feature may convey very early spring freshet and large precipitation events to the North-South Tributary.

HDF 10

This feature originated in a small wetland (MAS2-1) depression (dominated by cattails) near the eastern boundary of the north parcel. From the wetland, a poorly defined grass swale was observed to traverse south to its confluence with Pond B. The wetland contained standing water in throughout both spring investigations, however the feature was observed to be dry throughout its length during both spring investigations. This feature may convey very early spring freshet and large precipitation events to the North-South Tributary.

HDF 11

This feature is the uppermost reach of a feature that drains southeast of subject lands. The feature appears to drain a large, ponded depression in the centre of the cultural meadow (CUM1) on the tablelands west of the West Humber River Valley. The feature was an undefined grassy swale until the fence line along the southern boundary; at which point it transitioned to a narrow, incised feature that traversed through an agricultural field south of the south parcel. Apart from the standing water observed within the ponded depression, the feature was dry during the early spring investigation. This feature may convey very early spring freshet and large precipitation events south of the subject lands.

HDF 12

This feature originated directly north of the south parcel on the west side of the tablelands. The feature was an undefined swale with a small depression of standing water within the agricultural field. There was also standing water upstream of a CSP culvert that provided drainage of the feature into the roadside ditch. An additional CSP culvert, facilitated drainage of the roadside ditch under Torbram Road. This feature may convey very early spring freshet and large precipitation events east of the subject lands.

4.1.3.1 Drainage Feature Management Recommendation

With respect to management of existing functions through the replication of primary functions for HDF 1 through 12 features, **Table 2** below provides an assessment following the TRCA and CVC (2014) Guidelines. A summary table of the functional classifications and the management recommendations is provided in **Appendix C.**

Table 2. Summary of Drainage Feature Management Recommendations

Drainage Feature Segment	Output from HDFA	Final Management Recommendations	Comments/Rationale
HDF 1	Mitigation	No Management	Ephemeral flow conditions, no meadow riparian vegetation or cover, no fish habitat, and no breeding amphibians.
HDF 2	Mitigation	No Management	Ephemeral flow conditions, no meadow riparian vegetation or cover, no fish habitat, and no breeding amphibians.

Drainage Feature Segment	Output from HDFA	Final Management Recommendations	Comments/Rationale
HDF 3A	Conservation	Conservation	No change in management recommendation. Feature segment shall be maintained within the NHS.
HDF 3B	Mitigation	Mitigation	No change in management recommendation.
HDF 3C	Protection	Protection	No change in management recommendation. Feature segment shall be maintained within the NHS.
HDF 4A	No Management	No Management	No change in management recommendation.
HDF 4B	No Management	No Management	No change in management recommendation.
HDF 4C	Conservation	Conservation	No change in management recommendation. Feature segment shall be maintained within the NHS.
HDF 5	No Management	No Management	No change in management recommendation. Feature segment shall be maintained within the NHS.
HDF 6	No Management	No Management	No change in management recommendation. Feature segment shall be maintained within the NHS.
HDF 7	No Management	No Management	No change in management recommendation. Feature segment shall be maintained within the NHS.
HDF 8	Conservation	Mitigation	No change in management recommendation. Feature segment shall be maintained within the NHS.
HDF 9	Maintain/ Replicate Terrestrial	Maintain/ Replicate Terrestrial	No change in management recommendation. Feature segment shall be maintained within the NHS.
HDF 10	Mitigation	Mitigation	No change in management recommendation. Feature segment shall be maintained.
HDF 11	No Management	No Management	No change in management recommendation.
HDF-12	No Management	No Management	No change in management recommendation.

4.1.4 Assessment of Fish Habitat

The West Humber River Tributary and the North-South Tributary support a warmwater thermal regime with a cool to warm species assemblage. Although no fish were observed in HDF 3C and 4C, it was determined that the downstream reaches of these features may provide direct (although seasonal) fish habitat for the more tolerant species identified within the West Humber River Tributaries based the presence of refuge pools, seasonal flow, and connection to a fish bearing watercourse. The ephemeral (i.e., dry after spring freshet) flow conditions, dense vegetative growth (in the late spring and summer) and/ or the prevalence of tiled reaches limit fish movement into the upstream reaches of these features. All other HDFs contribute to allochthonous inputs (detritus/ invertebrates) to downstream fish-bearing reaches and therefore provide indirect fish habitat.

The three offline ponds within the subject lands may support fish populations. However, the protection prohibitions of the *Fisheries Act* do not apply to certain 'prescribed waterbodies', which includes artificial waterbodies e.g., ponds currently and historically used for golf course irrigation) that are not connected to a waterbody that contains fish at any time during any given year. Review of the historical aerial imagery, provided in the Geomorphic Assessment (Beacon 2024), the ponds within the subject lands appear to have originated naturally as depressions or wetland features. However, they have been historically modified (e.g., dug) to support the golf course irrigation requirements for over 45 years. Although the ponds have been identified as offline to the surrounding fish bearing waterbodies, Pond A and C likely contain fish as they are either partially or fully with the floodplains of the West Humber River Tributaries. Although Pond A and C are man made/created (artificial), they may have a potential connection to the West Humber River Tributaries only during large flood events and therefore the fish habitat protection provisions under the *Fisheries* Act may apply to these features and any alteration will require DFO review (refer to **Section 2.1**). Pond B, however, does meet the exception requirements for a waterbody where the prohibitions do not apply.

4.1.4.1 Redside Dace Habitat

Both the North-South Tributary and the West Humber River Tributary are mapped as critical habitat for Redside Dace in the species Recovery Strategy (DFO 2024). Also, provincial mapping (MNRF 2023) provides records for Redside Dace in the West Humber River Tributary. In accordance with *Ontario Regulation 832/21* of the ESA and the Federal Redside Dace Recovery Strategy (DFO, 2024), protection of Redside Dace habitat extends to the meander belt plus an additional 30 m of vegetated area extending from the meander belt width. Beacon (2023) has completed a geomorphic assessment, under a separate cover, to delineate the meander belt plus 30 m riparian area of the West Humber River Tributary (**Figure 2**). However, the assessment did not include a meander belt analysis for the North-South Tributary as the Recovery Strategy and Action Plan for the Redside Dace (DFO 2024), identifying the Tributary as critical habitat, was not yet published on the SARA registry. A meander belt study for the North-South Tributary will be conducted to delineate the extent of critical habitat.

Although no records for Redside Dace were identified from the provincial mapping tool (MNRF 2023) the North-South Tributary may also be considered 'occupied' Redside Dace habitat by MECP as there were no identifiable impediment to fish passage between this reach and the West Humber River Tributary. Therefore, it is anticipated that MECP will regulate the North-South Tributary as an occupied watercourse and the extent of the critical habitat determined in accordance with the Recovery Strategy will be coincident with occupied habitat.

Additionally, *O.Reg. 832/21* of the ESA, defines and protects contributing Redside Dace habitat. Contributing features are defined as a stream, permanent or intermittent headwater drainage feature, groundwater discharge area or wetland that augments or maintains the baseflow, coarse sediment supply or surface water quality of an occupied reach. Based on this definition, HDF-3 may be considered contributing Redside Dace habitat. Consultation should be undertaken, with the applicable regulatory agencies, to confirm the extent of the Redside Dace habitat within the subject lands.

4.2 Terrestrial Resources

4.2.1 Vegetation Communities

Much of the subject lands consist of an active golf course with rolling topography. The North-South Tributary stream corridor is centrally positioned within the subject lands and supports a variety of habitats including wetlands, woodlands, thickets, meadows, and ponds. The lands in the south parcel consist of thicket and meadow communities within the valley corridor of the West Humber River Tributary surrounded by active cropped agriculture. Vegetation communities identified within the subject lands are illustrated in **Figure 2** and photographic record of each community is provided in **Appendix B.**

The portions of the subject lands that have been classified as Anthropogenic (ANT) are primarily associated with the existing golf course. This is not considered a formal ELC community according to the provincial methodology, however, is included as a representation of the ongoing land use at this location. Vegetation in this area consists of manicured turf and trees, along with a patchwork of planted deciduous and coniferous trees and shrubs. Trees included Silver Maple (*Acer saccharinum*), Scots Pine (*Pinus sylvestris*), White Pine (*Pinus strobus*), White Spruce (*Picea glauca*), Colorado Blue Spruce (*Picea pungens*), American Basswood (*Tilia americana*), Red Oak (*Quercus rubra*), Norway Maple (*Acer platanoides*), Common Hackberry (*Celtis occidentalis*), and Carolina Poplar (*Populus x canadensis*). Refer to **Appendix B – Photograph 24**.

There are two Agricultural (AG) fields located within the south parcel of the subject lands. At the time of surveys there were row crops of corn planted. Like anthropogenic areas, agricultural lands are not considered a formal ELC community, but recorded to document current land use.

4.2.1.1 Cultural Communities

Dry-Moist Old Field Meadow (CUM1-1)

There are several meadows within the subject lands dominated by cool season grasses including but not limited to Kentucky Blue Grass (*Poa pratensis*), Smooth Brome (*Bromus inermis*), Common Timothy (*Phleum pratensis*), Canada Goldenrod (*Solidago canadensis*), New England Aster (*Symphyotrichum novae-angliae*) along with Common Milkweed (*Asclepias syricia*), Queen Anne's Lace (*Daucus carota*), and St. John's Wort (*Hypericum perforatum*). On this basis, the meadows are characterized as dry-moist old field meadow communities (CUM1-1). Some of the meadow communities had shrub or sapling cover given the adjacent cultural thickets and wooded areas in the vicinity. Other plants noted within these meadow communities included Canada Thistle (*Cirsium arvense*), Lesser Burdock (*Arctium minus*), Cow Vetch (*Vicia cracca*), and Annual Fleabane (*Erigeron annuus*). Refer to **Appendix B – Photograph 25**.

The CUM1-1 community within the southwestern corner is slightly different than the other CUM1-1 units as it includes scattered mature Basswood and shrubs such as European Buckthorn (*Rhamnus cathartica*) and hawthorns (*Craetagus* spp.). In addition to the cool season grasses with the southwest CUM1-1 community, other species include but are not limited to Curled Thistle (*Carduus crispus*), Wild Teasel (*Dipsacus fullonum*), Garden Bird's-foot Trefoil (*Lotus corniculatus*), Ox-eye Daisy (*Leucanthemum vulgare*), and Elecampane (*Inula helenium*). Relatively large sections of the southwest

CUM1-1 community is dominated by Common Reed (*Phalaris arundinacae*). Refer to **Appendix B – Photograph 26**.

Common Reed can grow in a variety of moisture regimes (i.e., dry to wet) and is considered a wetland indicator plant under the Ontario Wetland Evaluation System (OWES). As such, during the field staking site visit on August 28, 2023, TRCA staff requested soil sampling to be completed within this area to confirm the presence/absence of hydric soils. Hydric soils are formed through prolonged periods of water saturation or flooding and their formation could indicate a potential wetland.

A total of six soil samples were taken within the CUM1-1 community in the southwest corner of the subject property as shown in **Figure 2**. Soils within the upper portions of the samples (i.e., ranging between an average of 0 cm to 40 cm) included loam, silty clay loam, silt loam, and in one sample, sandy clay. Soils within the lower portions of the samples (i.e., ranging between an average of 40 cm to 60 cm) included silty clay, silt loam, loam, and clay loam. Mottles occurred in five of the samples at depths of 30 cm to 60 cm. Using the "Soil Description" section of the ELC system for southern Ontario (Lee *et al*. 1998), drainage was determined to range between moderately well/imperfect to imperfect/poor and the soil moisture regime was determined to range between moderately moist to moist. On this basis, the soil samples were determined not to be hydric soils as the soil moisture regime was outside/below the "wet" range of hydric soils.

Cultural Thicket (CUT1)

The CUT1 units on the lands were dominated by shrub cover which was predominantly European Buckthorn or hawthorns with lesser amounts of Staghorn Sumac (*Rhus typhina*) along the fringes of the more open communities (**Appendix B – Photograph 27**). The CUT1 units within the south parcel were generally more open and contained higher amounts of Hawthorn, as well as European Buckthorn, and Common Apple (*Malus pumila*). There was a few scattered mature Sugar Maple, and Basswood present. Staghorn Sumac was absent from the southern CUT1 communities (**Appendix B – Photograph 28**). European Buckthorn was widespread throughout the north parcel and most of the noted CUT1 communities, along with regeneration progressing into adjacent non-thicket areas.

Sumac Cultural Thicket (CUT1-1)

Like the CUT1 community noted above, the CUT1-1 unit was predominantly composed of Staghorn Sumac, with lesser amounts of European Buckthorn.

Raspberry Cultural Thicket (CUT1-5)

This thicket community occurred in one location on the subject lands in the valleyland bottom and was dominated by Red Raspberry (*Rubus idaeus*) canes.

Mineral Cultural Woodland (CUW1)

This cultural woodland community is located within the southern boundary of the golf course lands. The species composition of CUW1 is planted White Spruce, White Pine, and Tamarack (*Larix laricina*) as

well as planted and regenerating Black Walnut (*Juglans nigra*). There is some European Buckthorn within the understory. Common meadow species occur in canopy gaps and along the woodland edges. Refer to **Appendix B – Photograph 29**.

4.2.1.2 Woodland Communities

Dry-Fresh Poplar – White Birch Deciduous Forest (FOD3)

There is a large FOD3 community located southwest corner of the north parcel. The FOD3 community is associated with the valley of the West Humber River Tributary. It is separated from the adjacent mineral swamp community (SWD4) by a ridge that transects the communities east to west. The canopy is composed of primarily Large-toothed Trembling Aspen (*Populus grandidentata*), Sugar Maple (*Acer saccharum*), Black Cherry (*Prunus serotina*), Red Oak, American Elm (*Ulmus americana*), and dead Ash (*Fraxinus* sp.). There is a relatively small coniferous Scots Pine plantation (CUP3-3) inclusion within woodland. The understory and ground layers are relatively dense and include Ironwood (*Ostrya virginiana*) and Northern Bush-honeysuckle (*Diervilla lonicera*) in the drier ridge areas, and European Buckthorn, and Chokecherry (*Prunus virginiana*) in the tableland sections. Other species present include Garlic Mustard (*Alliaria petiolata*), Broad-leaved Enchanter's Nightshade (*Circaea canadensis*), Virginia Waterleaf (*Hydrophyllum virginianum*), and Bloodroot (*Sanguinaria canadensis*), among others. Refer to **Appendix B – Photograph 30**.

Dry-Fresh Deciduous Forest (FOD4)

One FOD4 community was delineated in the central portion of the north parcel. Much of the FOD4 unit exists on the downslope into the valley and stream corridor of both the West Humber River tributaries and along the shoreline of Pond C. Tree species found here included Manitoba Maple (*Acer negundo*), Black Walnut and White Ash (*Fraxinus americana*) with a dominant shrub layer of European Buckthorn. Other species noted included Wild Strawberry (*Fragaria vesca*), Wood Avens (*Geum urbanum*), Wild Grape (*Vitis riparia*), Zigzag Goldenrod (*Solidago flexicaulis*), Garlic Mustard, and Choke Cherry. Several of the ash trees in the canopy of the FOD4 were in poor condition or dead.

Dry-Fresh Sugar Maple - Hickory Deciduous Forest (FOD5-5)

One FOD5-5 vegetation unit was delineated in the north parcel along the north bank of the North-South tributary corridor. The community was composed of a variety of tree species such as Manitoba Maple, Sugar Maple, Bitternut Hickory (*Carya codiformis*), Ironwood, and American Elm (*Ulmus americana*), with an abundance of European Buckthorn in the lower layers.

Wetland vegetation was noted as an inclusion along the tributary corridor and included Orange Jewelweed (*Impatiens capensis*), Watercress (*Nasturtium officinale*) and Swamp Dodder (*Cuscuta gronovii*), with upland vegetation persisting on either side.

Fresh-Moist Lowland Deciduous Forest (FOD7)

One FOD7 forest community was recorded along the southernmost limit of the subject lands and continued offsite to the south. The dripline and only a few individual trees extended onto the site. The community was generally surveyed from the south parcel boundary and viewed 50 m into the wooded area. The canopy was composed of primarily White Willow, and Manitoba Maple. The understory was dense with European Buckthorn. Other species noted include Wood Avens, Garlic Mustard, Wild Grape, Herb-Robert (*Geranium robertianum*), and Ground-ivy (*Glechoma hederacea*).

4.2.1.3 Wetland Communities

Forb Mineral Meadow Marsh (MAM2-10)

Several MAM2-10 units were present on the lands and generally are within the riparian areas surrounding HDF 3 and the North-South Tributary. Botanical composition included Reed Canary Grass, Field Horsetail (*Equisetum arvense*), Curly Dock (*Rumex crispus*), Lance-leaved Aster (*Symphyotrichum lanceolatum*), Joe Pye-weed (*Eutrochium maculatum*), Purple Loosestrife (*Lythrum salicaria*), Grass-leaved Goldenrod (*Euthamia graminifolia*), Orange Jewelweed and Tall Goldenrod (*Solidago altissima*). Patches of the non-native and invasive Common Reed (*Phragmites australis*) were noted periodically throughout these communities. Refer to **Appendix B – Photograph 31**.

Reed Canary Grass Mineral Meadow Marsh (MAM2-2)

Two MAM2-2 units occur within the subject lands. The larger unit occurs in the northernmost portion of the subject lands and is associated with the riparian area surrounding the North-South Tributary. The second unit is within the valley of West Humber River Tributary on the south parcel. The meadow marsh is almost entirely composed of Reed Canary Grass, with lower abundances of wetland plants noted within the MAM2-10 units.

Cattail Mineral Shallow Marsh (MAS2-1)

Two MAS2-1 units were noted within the subject lands; one isolated within the active golf course and one within the valley of the West Humber River. Both units were dominated by cattail species. A few others were noted including Bittersweet Nightshade (*Solanum dulcamara*), Blue Vervain (*Verbena hastata*), Purple Loosestrife (*Lythrum salicaria*) and Stinging Nettle (*Urtica dioica*). Refer to **Appendix B – Photograph 32**.

Mineral Deciduous Swamp (SWD4)

Deciduous swamp units were identified in the lower valley of the West Humber River Tributary within the north parcel. Tree species included White Willow (*Salix alba*), Balsam Poplar (*Populus balsamifera*), Manitoba Maple, Black Maple (*Acer nigrum*), along with both White and Green Ash (*Fraxinus pennsylvanica*). Red-osier Dogwood (*Cornus sericea*) and European Buckthorn were abundant in the understory. Along the community edges and canopy openings the vegetation was dense and included Spotted Jewelweed, Joe Pye Weed, Swamp Dodder, Virginia Clematis (*Clematis virginiana*), Rice

Cutgrass (*Leersia oryzoides*), and Red Raspberry. In areas with increased shade, the ground layer was sparse, and included Thicket Creeper (*Parthenocissus vitacea),* Forget-me-not (*Myosotis stricta*), Bittersweet Nightshade, and Ostrich Fern (*Matteuccia struthiopteris*).

Areas adjacent to the watercourse were dry during time of surveys, however there was evidence of inundation of water within the floodplain. There was a large amount of wood debris and fallen trees within the community. Refer to **Appendix B – Photograph 33**.

Willow Mineral Deciduous Swamp (SWD4-1)

The SWD4-1 unit was composed of mature Weeping Willow (*Salix sepulcralis*) trees in the northern portion of the north parcel, along with Balsam Poplar and Freeman's Maple (*Acer x freemanii*).

Willow Mineral Thicket Swamp (SWT2-2)

A small SWT2-2 unit was noted along the edge of Pond B and was completed composed of young and regenerating willow shrubs such as Missouri Willow (*Salix eriocephala*) and Sandbar Willow (*Salix interior*).

4.2.1.4 Aquatic Communities

Open Aquatic (OAO) - Offline Ponds

There are two large ponds (identified as Pond A and C in **Figure 2**) within north parcel that have been characterized as OAO based on their size and apparent depth. These ponds are fringed with little to no wetland vegetation. Refer to **Appendix B – Photograph 34**.

Pondweed Mixed Shallow Aquatic (SAM1-4)

The smallest pond (identified as Pond B in **Figure 2**) was much more naturalized and biodiverse than the OAO communities and contained a mixture of upland and wetland vegetation along the fringe. Submerged and floating vegetation included charotype green algae (*Chara* spp.), Common Duckweed (*Lemna minor*), Canada Waterweed (*Elodea canadensis*), and Hornwort (*Ceratophyllum demersum*). Emergent vegetation along the edges included Narrow-leaved Cattail, Fox Sedge (*Carex vulpinoidea*), Water Plantain (*Alisma plantago-aquatica*), Broadleaf Arrowhead (*Sagittaria latifolia*) and Soft-stem Bulrush (*Schoenoplectus tabernamontanii*). Refer to **Appendix B – Photograph 35.**

4.2.2 Arborist Report

A Tree Inventory and Assessment Report prepared by Schollen and Company Inc. (2023) was prepared under a separate cover.

A total of 980 trees were assessed within the proposed development site. The recorded species were comprised of a mix of planted and naturalized tree species, most commonly identified as Silver Maple,

Scots Pine, Colorado Spruce, American Basswood, Eastern White Pine (*Pinus strobus*), Norway Maple, White Spruce and Red Oak.

4.2.3 Floral Inventory

A total of one hundred sixty-one (161) plant taxa were observed on the subject lands (**Appendix D**) with over one third (42%) being non-native plant species (ranked L+ or L+? by the TRCA). The high number of exotic species reflects the disturbed nature of the site, and large number of cultural and anthropogenic communities. No floral SAR were recorded on the subject property.

Most native plant species are ranked provincially as S5 (Secure) except for Common Hackberry (*Celtis occidentalis*), Lance-leaved Tickseed (*Coreopsis lanceolata*), Running Strawberry-bush (*Euonymus obovatus*), Red and White Ash, Michigan Lily (*Lilium michiganense*), and Black Willow (*Salix nigra*) that are ranked provincially as S4 (Apparently Secure). The Common Hackberry were of planted origin and the Lance-leaved Tickseed often used as an ornamental plant were likely a garden escapee within the north parcel.

Water Plantain, Running Strawberry-bush, Tamarack, Michigan Lily, White Spruce, and Black Willow are ranked as L3, and Red Pine ranked L1 by the TRCA, and were located within the FOD3, SWD3, CUW1, SAM1-4 communities on the subject lands. L3 species are tolerant to minor disturbances and are generally secure within natural areas. While Red Pine is ranked L1, they are frequently utilized for shelterbelts and as landscape trees and were of planted origin on the subject lands.

Hornwort, Swamp Dodder, Canada Waterweed, White Spruce, Red Pine, Greater Water Dock (*Rumex Britannica*), Sandbar Willow, and Black Willow generally located within the SAM1-4, SWD3, and CUW1 communities are listed as rare in Peel Region by Varga (2005). Likewise, Common Hackberry, Canada Wildrye (*Elymus canadensis*), Red Pine, and Black Willow located within the ANT and CUM1-1 units are also listed as rare in the GTA by Varga (2005). All the aforementioned species are widespread provincially and ranked as S4 or S5.

4.2.4 Breeding Birds

The breeding bird data sets have been separated into areas of study: the north parcel, and the south parcel. Data for the north parcel was collected in 2022 and data for the south parcel was surveyed in 2023.

North Parcel

A total of 51 species were documented within the north parcel in 2022 (**Appendix E**). This diversity is reflective of the variable habitats present within the north parcel, including woodlands, swamps, meadows, ponds, marshes, and open manicured space. Observations were generally well distributed through the lands, however, were slightly more concentrated around the habitat fringes and transition zones. The open habitat within the north parcel offered the least habitat for nesting birds.

The avian community is comprised of species indicative of both rural and urbanizing settings. The most abundant species included the following, with over seven separate observations: American Robin

(*Turdus migratorius*), Chipping Sparrow (*Spizella passerina*), Song Sparrow (*Melospiza melodius*), Red-winged Blackbird (*Agelaius phoeniceus*), Yellow Warbler (*Setophaga petechia*) and Savannah Sparrow (*Passerculus sandwichensis*). Other species with multiple observations included Black-capped Chickadee (*Poecile atricapillus*), House Wren (*Troglodytes aegon*), Red-bellied Woodpecker (*Melanerpes carolinus*), Gray Catbird (*Dumetella carolinensis*) and Willow Flycatcher (*Empidonax traillii*).

Most of the breeding records were of common disturbance-tolerant species often found near human habitation. Several habitat specialists were noted in association with their preferred habitats, including species tied to woodlands, species tied to wetlands and species of the open country. Woodland communities supported breeding forest birds such as Great Crested Flycatcher (*Myiarchus crinitus*), Eastern Wood-pewee (*Contopus virens*), Red-eyed Vireo (*Vireo olivaceus*), American Redstart (*Setophaga ruticilla*) and Rose-breasted Grosbeak (*Pheucticus ludovicianus*), whereas the wetlands supported Red-winged Blackbirds, Yellow Warblers and Common Yellowthroat (*Geothlyphis trichas*). Open country or grassland species were recorded as breeding such as Horned Lark (*Eremophila alpestris*), Eastern Meadowlark (*Sturnella magna*), Savannah Sparrow and Vesper Sparrow (*Pooecetes gramineus*). The habitat types on the subject lands were generally represented by a fairly diverse avian community.

Area-sensitive birds require larger tracts of suitable habitat in which to breed or are those that have a higher breeding success in larger areas of suitable habitat. Five such species were recorded. Three of these are forest-sensitive species which requires large areas of woodland habitat in which to breed successfully (American Redstart, Least Flycatcher and Hairy Woodpecker). The remaining two, Savannah Sparrow and Eastern Meadowlark, are grassland-sensitive species requiring large areas of open habitat for successful breeding. While Savannah Sparrow is a common breeder in a wide variety of such open habitats, including old-field and agricultural edge habitat, Eastern Meadowlark are less common, less tolerant to disturbance.

The TRCA has developed a species sensitivity ranking system from L1-L5, with the L5 species being the commonly encountered, urban tolerant and secure individuals. Species between L1 and L3 are considered species of conservation concern. Many of the birds that were present on this location were either L4 or L5. Five L3 species were present and are less commonly encountered. These were Brown Thrasher (*Toxostoma rufum*), Eastern Meadowlark, Least Flycatcher (*Empidonax minimus*), Vesper Sparrow and Wild Turkey (*Meleagris gallopavo*).

Although no species provincially ranked as S1 through S3 (Critically Imperiled through Vulnerable) were encountered, one species regulated under the ESA were recorded: Eastern Meadowlark. This bird is listed as Threatened federally and provincially and breeds in a variety of grassland habitats including hayfields, pasturelands, and weedy meadows. Its populations initially increased in Eastern Canada following settlement and the clearance of forests in favor of pasturelands and hayfields, but it has faced decline since the mid-20th century due to changes in agricultural practices (COSEWIC 2011). One territory of this species was observed (**Figure 2**).

Additionally, two species listed as Special Concern, Eastern Wood-Pewee and Barn Swallow (*Hirundo rustica*), were observed breeding at this location. Firstly, with respect to Eastern Wood-pewee, these birds are special concern provincially and federally based on a declining trend over their range, these birds remain relatively common in both urban and urbanizing woodlands. They are somewhat tolerant of forest fragmentation and will live in both edge habitats and forest interiors. Special Concern species

are not afforded with habitat protection under the ESA. Barn Swallow were recorded on site foraging throughout, with a presumed nesting location identified on **Figure 2**.

South Parcel

Breeding bird surveys on the south parcel revealed the presence of 29 breeding species, with an additional one species noted as foraging on site and not breeding. This work was completed in 2023 and is provided in **Appendix E**.

The landscape for the south lands differs from the north parcel described above, and therefore supported a different avian community. Much of these lands are open meadow, marsh or agricultural. The breeding bird species were reflective of this with Red-winged Blackbirds, Bobolink (*Dolichonyx oryzivorus*) and Savannah Sparrow being the most abundant species. A total of eight, seven and six pairs of each were noted, respectively. All the birds observed in the south lands had been previously observed in the north parcel, apart from Eastern Towhee (*Pipilio erythrophtalmus*).

The area-sensitive birds were largely the same and included Hairy Woodpecker, American Redstart, Savannah Sparrow, and Bobolink. The latter species represents the only species protected by the ESA on the south parcel, however these birds were observed in relatively high numbers within the suitable habitat, totalling seven territories or pairs (**Figure 2**).

Like the north parcel, four species of conservation concern according to the TRCA L-ranking system were identified. These were Brown Thrasher, American Redstart, Eastern Towhee and Bobolink.

4.2.5 Breeding Amphibians

The results of the nocturnal amphibian call surveys are summarized in **Table 3**. Amphibian vocalizations were studied at seven locations throughout the subject lands as illustrated on **Figure 2**.

Vocalizations of four species were present: Wood Frog (*Lithobates sylvaticus*), Green Frog (*Rana clamitans*) Gray Treefrog (*Hyla versicolor*) and American Toad (*Anaxyrus americanus*). In addition to the data presented in the table below; visual and auditory observations of these species were made outside of the station boundaries and elsewhere within the subject lands. Leopard Frogs (*Lithobates pipiens*) were also visually encountered on the lands during unrelated fieldwork; however, this species was not detected during the vocalization surveys. The call code (CC) and total number of individuals recorded is provided alongside each station and survey, where appropriate.

Table 3. Amphibian Call Survey Findings

Location	Survey 1	Survey 2	Survey 3
1	American Toad (CC2 - 2 individuals)	None heard	None heard
2	None heard	None heard	None heard
3	None heard	None heard	Green Frog (CC1 – 2 individuals); Gray Treefrog (CC1 – 1 individual)

Location	Survey 1	Survey 2	Survey 3
4	None heard	None heard	None heard
5	None heard	Green Frog (CC 1 - 1 individual); Gray Treefrog (CC2 -2 individuals)	Green Frog (CC1 – 2 individuals); American Toad (CC1-1)
6	None heard	Green Frog (CC 1 - 1 individual); Gray Treefrog (CC2 -2 individuals)	Green Frog (CC1 - 2 individuals); Gray Treefrog (CC 2 – 4 individuals); American Toad (CC2-2)
7	Wood Frog (CC 1 - 2 individual); American Toad (CC1 – 1 individual)	None heard	Gray Treefrog (CC 1 – 2 individuals)

The amphibians that were encountered implement different overwintering strategies, with Green Frogs and Leopard Frogs overwintering aquatically and Wood Frogs and American Toads overwintering terrestrially. The aquatic overwintering species require a year-round water source of sufficient depth such that the ponds do not entirely freeze.

4.2.6 Turtle Basking Surveys

Basking surveys took place and targeted the wetland communities on the lands that offer potential turtle habitat. These areas are depicted on **Figure 2**.

Several Midland Painted Turtle (*Chrysemys picta*) and Snapping Turtle (*Chelydra serpentina*) observations were made throughout the wetland and pond features within the subject lands, with observation detailed outlined below in **Table 4**. The table below presents the data from the targeted basking surveys, however additional observations of the same species in greater numbers were made during unrelated fieldwork. For example, in September 2022 there were approximately seven (7) large Snapping Turtles observed in Pond C (OAO) within valley of West Humber River Tributary, and thirteen (13) Midland Painted Turtles along with four (4) Snapping Turtles within Pond B (SAM1-4 community).

Table 4. Turtle Survey Findings

Location	Survey 1	Survey 2	Survey 3
1	No turtles	No turtles	No turtles
2	6 Midland Painted Turtles	1 Snapping Turtle	4 Midland Painted Turtles
3	6 Midland Painted Turtles	6 Midland Painted Turtles and 2 Snapping Turtles	1 Midland Painted Turtle
4	1 Midland Painted Turtle and 1 Snapping Turtle	1 Snapping Turtle	4 Snapping Turtles
5	No turtles	No turtles	No turtles
6	No turtles	No turtles	No turtles

In addition to this data, Beacon was informed by golf course staff that Snapping Turtles are somewhat regularly encountered traveling through the north parcel between wetland communities and have been relocated to the Pond C in the valley corridor (**Figure 2**).

Adults and younger individuals of both these species were present, suggesting they nest successfully on the subject lands. The persistence of these animals along with the presence of suitable habitat suggests they are likely overwintering in the deeper ponds as well.

4.2.7 Incidental Wildlife

Several incidental wildlife species were recorded during field investigations within the subject lands. Mammal species recorded included Beaver (*Castor canadensis*), Muskrat (*Ondatra zibethicus*), White-tailed Deer (*Odocoileus virginianus*), and Grey Squirrel (*Sciurus carolinensis*). Evidence of Coyote (*Canis latrans*) presence within the subject lands was also recorded.

Other common mammal species that are likely present on and adjacent to the subject lands include Raccoon (*Proycon lotor*), Striped Skunk (*Mephitis mephitis*), Meadow Vole (M*icrotus pennsylvanicus*) and/or Red Fox (*Vulpes vulpes*). Two snake species Eastern Gartersnake (*Thamnophis sirtalis sirtalis*) and Dekay's Brownsnake (*Storeria dekayi*) were both observed on the subject lands.

4.3 Endangered or Threatened Species

As described in the preceding sections, Beacon staff conducted both desktop and on-site investigations to assess whether any Endangered or Threatened species were likely to occur on or adjacent to the subject lands. **Table 5** provides Beacon's assessment based on the results of field investigations combined with knowledge of the habitat preferences and natural history of the species being considered.

Table 5. Endangered and Threatened Species (Provincial)

Species	Status on SARO List	Were Species and/or Habitat Documented during on-site Assessment?
Vascular Plants (Dicots)		
Butternut, *Juglans cinerea*	END	**No,** a targeted search for Butternut trees (*Juglans cinerea*) was conducted and no Butternut were found to be present within the subject lands. This species is a provincially and nationally endangered tree species that, while still relatively common in southern Ontario, has been listed because the population has been declining due to the presence of a Butternut Canker disease.
Fish		
Redside Dace, *Clinostomus elongatus*	END	**Yes,** both West Humber River and North – South Tributaries are identified as protected Redside Dace habitat.
Birds		

Species	Status on SARO List	Were Species and/or Habitat Documented during on-site Assessment?
Bank Swallow, *Riparia riparia*	THR	**No**, vertical exposed banks (suitable habitat) are not present at this location. No Bank Swallow were recorded during breeding bird surveys.
Chimney Swift, *Chaetura pelagica*	THR	**No**, a habitat assessment was conducted, and suitable habitat was not identified. These birds typically nest in uncapped vertical chimney columns. No foraging individuals were recorded during the 2022 or 2023 breeding season.
Bobolink, *Dolichonyx oryzivorus*	THR	**Yes,** grassland habitat is present on the subject lands. Bobolink were present breeding within the south parcel as well as on the fringe of the north parcel in an area slated for future development. These areas are shown on **Figure 2**.
Eastern Meadowlark, *Sturnella magna*	THR	**Yes,** grassland habitat is present within the subject lands. One occurrence of Eastern Meadowlark breeding was identified within the north parcel. These areas are shown on **Figure 2**.
Acadian Flycatcher, *Empidonax virescens*	END	**No**, the subject lands are generally outside of the range for this species, and none were recorded during breeding bird surveys. These birds utilize mature forests on both their breeding and wintering grounds.
Prothonotary Warbler, *Protonotaria citrea*	END	**No,** the subject lands are generally outside of the range for this species, and none were recorded during breeding bird surveys. These birds typically nest in large woodlands, swamps and forests near lakes and streams.
Mammals		
Endangered Bats Little Brown Myotis, *Myotis lucifugus* Northern Myotis, *Myotis septentrionalis* Tri-colored Bat, *Perimyotis subflavus* Eastern Small-footed Myotis, *Myotis leibii*	END	**Yes,** there is potentially suitable roosting bat habitat within the woodland communities on site. A detailed habitat inventory (snag survey) will need to be completed in later phases of the planning process if any suitable trees or structures are identified for removal**.**

Species at Risk in Ontario List (SARO): END – Endangered; THR – Threatened.

Based on the above assessment in **Table 5** and on-site investigations, there is confirmed habitat present for the endangered Redside Dace and suitable habitat present for threatened Bobolink and Eastern Meadowlark and endangered bats within the subject lands. These species are discussed in **Section 5.**

4.4 Significant Wildlife Habitat

Significant Wildlife Habitat designation is the responsibility of the planning authority and determination of it on a site-by-site basis is generally not an appropriate manner in which to determine this constraint given that it is necessary to understand the context of the habitat within the local environment. In this case, the Town of Caledon and Region of Peel have not identified significant wildlife habitat within their jurisdiction. There is guidance provided in two provincial documents: the Significant Wildlife Technical Guide (OMNR 2000) and the Natural Heritage Reference Manual (MNRF 2010).

The *Significant Wildlife Habitat Technical Guidelines* (MNRF 2000) identify four broad categories of Significant Wildlife Habitat (SWH):

- Seasonal Concentration Areas of Animals;
- Rare Vegetation Communities or Specialized Habitat for Wildlife;
- Habitat for Species of Conservation Concern; and
- Animal Movement Corridors.

Within each of these categories, there are multiple types of SWH, each intended to capture a specialized type of habitat that may or may not be captured within other existing feature-based categories (e.g., significant wetlands, significant woodlands).

As the identification of SWH is the under the jurisdiction of the planning authority (i.e., Municipality or Region) any types of SWH discussed below have been identified as potential SWH for the purposes of this study (**Table 6**).

Table 6. Assessment of Potential Significant Wildlife Habitat for the Subject Lands

Wildlife Habitat Category	Presence or Absence on Subject Lands Based on MNRF Criteria for Ecoregion 6E	
	Absent	Potential Presence
Seasonal Concentration Areas for Wildlife Species		
Waterfowl Stopover and Staging Areas (Terrestrial)	X	
Waterfowl Stopover and Staging Areas (Aquatic)	X	
Shorebird Migratory Stopover Area	X	
Raptor Wintering Area	X	
Bat Hibernacula	X	
Bat Maternity Colonies		X
Bat Migratory Stopover Area	X	
Turtle Wintering Areas		X
Reptile Hibernaculum		X
Colonially-Nesting Bird Breeding Habitat (Bank and Cliff)	X	
Colonially-Nesting Bird Breeding Habitat (Tree/Shrubs)	X	
Colonially-Nesting Bird Breeding Habitat (Ground)	X	

Wildlife Habitat Category	Presence or Absence on Subject Lands Based on MNRF Criteria for Ecoregion 6E	
	Absent	Potential Presence
Migratory Butterfly Stopover Areas	X	
Land bird Migratory Stopover Areas	X	
Deer Yarding Areas	X	
Deer Winter Congregation Areas	X	
Rare Vegetation Communities		
Cliffs and Talus Slopes	X	
Sand Barren	X	
Alvar	X	
Old Growth Forest	X	
Tallgrass Prairie	X	
Savannah	X	
Provincially Rare S1, S2 and S3 vegetation communities	X	
Regionally or Locally Rare vegetation communities	X	
Specialized Habitats of Wildlife		
Waterfowl Nesting Area	X	
Bald Eagle and Osprey Nesting, Foraging and Perching Habitat	X	
Woodland Raptor Nesting Habitat	X	
Turtle Nesting Areas		X
Seeps and Springs	X	
Amphibian Breeding Habitat (Woodland)		X
Amphibian Breeding Habitat (Wetlands)		X
Woodland Area-Sensitive Bird Breeding Habitat	X	
Habitats of Species of Conservation Concern		
Marsh Bird Breeding Habitat	X	
Open Country Bird Breeding Habitat		X
Shrub/Early Successional Bird Breeding Habitat	X	
Terrestrial Crayfish	X	
Special Concern and Rare Wildlife Species		X
Animal Movement Corridors		
Amphibian Movement Corridors		X
Deer Movement Corridors	X	

In summary, this analysis has considered that there are eight SWH types on the subject lands. Three of these are under the *Seasonal Concentration Areas for Wildlife Species* category and are: Bat Maternity Colonies, Turtle Wintering Areas, and Reptile Hibernaculum. The bat category is presumed given the presence of suitable habitat, however, was not studied. Turtle wintering is assumed given the observation of several turtles throughout the wetlands of the golf course, and specifically the

observation of juveniles and adults. Two snake species were observed on site and likely overwinter on site in a hibernacula below the frost line. Three of the SWH types are under *Specialized Habitats of Wildlife* and are: Turtle Nesting Areas and Amphibian Breeding Habitat (woodland and wetland), based on the observation of juvenile and mature turtles along with multiple amphibian species discussed under Section 4.3.5 of this report. Two SWH categories were under *Habitats of Species of Conservation Concern*: Open Country Bird Breeding Habitat and Special Concern and Rare Wildlife Species. The latter is in relation to Eastern Wood-pewee and Snapping Turtle, whereas the former is in relation to breeding records of Vesper Sparrow and Savannah Sparrow. Lastly, the final SWH category is Amphibian movement Corridors given the mosaic of wetlands and uplands throughout the subject lands and confirmation of multiple breeding amphibians that winter both aquatically and terrestrially.

None of these areas have been identified as potential SWH by the Town and all SWH types are within the natural heritage corridor.

4.5 Landscape Connectivity

Landscape connectivity and natural linkages have become common parlance when discussing environmental planning. The idea is that variously sized habitat patches, so-called 'core' natural areas, and supporting features are linked by natural corridors in an often-fragmented landscape of land uses. Current planning policy typically includes provisions for the maintenance of such corridors. For example, as in section 2.1.2 of the Provincial Policy Statement (MMAH 2020):

> *The diversity and connectivity of natural features in an area, and the long-term ecological function and biodiversity of natural heritage systems, should be maintained, restored or, where possible, improved, recognizing linkages between and among natural heritage features and areas, surface water features and ground water features.*

The wooded valley and riparian feature running centrally through the subject lands and to the east of the subject lands provides connectivity within the local landscape, as it provides a continuous vegetated conduit for the movement of both aquatic and urban-tolerant terrestrial species. This north-south linkage for movement will be maintained post development and will observe an increase in area with the implementation of plantings associated with an edge management plan to be established at the detailed design stage.

In general, the open space element of the north parcel (that results from the current land use), provides a larger landscape connection for larger animals to move through the landscape.

5. Assessment of Significant Natural Heritage Features

The findings of this study have been used to determine if the subject lands support any natural heritage components that are recognized under the PPS, the Peel Region Official Plan, and the Town of Caledon Official Plan (**Table 7**).

Table 7. Assessment of Significant Natural Heritage Features

Natural Heritage Feature	Assessment	Present within the subject lands?
Wetlands	No Provincially Significant Wetlands (PSWs) have been identified within 5 km of the subject lands. There are four wetland communities that occur on the subject lands: Meadow Marsh, Shallow Marsh, Deciduous Swamp, and Thicket Swamp. These communities have not been evaluated through OWES and are not considered significant. All wetland communities, except for one small MAS unit, are associated with the regional NHS as identified on Schedule B5 Green Plan Area Land Use Designations and Schedule C-1 Regional Greenlands Systems of the Peel Regional Official Plan and are regulated by the TRCA. Any outlier boundaries of wetland communities associated with the NHS were staked and confirmed by the TRCA in October 2022 and August 2023. Unevaluated wetlands are classified as PNAC under the Peel ROP.	Yes
Woodlands	There are several natural and cultural woodland communities that have been identified within the subject lands; all of which are located within the NHS. These woodlands are associated with the NHS and thus are identified on Schedule B5 Green Plan Area Land Use Designations and Schedule C-1 Regional Greenlands Systems of the Peel Regional Official Plan. Any natural woodland community that is 4 ha or greater and supports the habitat of a threatened or endangered species meets the criteria listed in Table 1 of the ROP to classify them as NAC. Woodland communities supported most of the forest birds observed within the subject lands and provided suitable habitat for bats. The dripline of the woodland communities, within the NHS, was staked and confirmed by the TRCA in October 2022 (**Figure 3**).	Yes
Valley and Stream Corridors	The stream corridor of the North-South Tributary and the valley corridor of the West Humber River Tributary delineated the NHS within the subject lands. These systems are also identified as NHS on Schedule B5 Green Plan Area Land Use Designations and Schedule C-1 Regional Greenlands Systems of the Peel Regional Official Plan. The valley and the stream corridor of the West Humber River Tributaries satisfy the criteria in Table 2 of the Peel ROP to be considered a Core Area Valley and Stream Corridor. The top of slope and dripline associated with the West Humber River Tributary valley and the corridor of the North-South Tributary were staked in the field with TRCA in October 2022 (north parcel) and August 2023 (south parcel). Additionally, TRCA requested the top of slope associated with HDF-3 was staked (**Figure 3**). However, HDF 3 does not meet the criteria in Table 2 of the Peel ROP to be considered a Core Area Valley and Stream Corridor.	Yes
Significant Wildlife Habitat	There are eight potential SWH types within the subject lands. Seasonal Concentration Areas for Wildlife Species: • Bat Maternity Colonies (presumed based on suitable habitat within the NHS); • Turtle Wintering Areas (assumed based on presence of wetlands and species observations); and, • Reptile Hibernaculum (assumed based on species observations). Specialized Habitats of Wildlife: • Turtle Nesting Areas (assumed based of the age diversity of the observed turtle species); and,	Yes

Natural Heritage Feature	Assessment	Present within the subject lands?
	• Amphibian Breeding Habitat (woodland and wetland) (based the results of the breeding amphibian surveys). Habitats of Species of Conservation Concern: • Open Country Bird Breeding Habitat (based on observations of breeding Vesper Sparrow and Savannah Sparrow); • Special Concern and Rare Wildlife Species (based on observations of Eastern Wood-pewee and Snapping Turtle). Animal Movement Corridors: • Amphibian Movement Corridors (inferred based on mosaic of wetlands and uplands throughout the subject lands and the confirmation of multiple breeding amphibians that winter both aquatically and terrestrially, not studied). None of these areas have been identified as SWH by the Town.	
Fish Habitat	Both the West Humber River Tributary and the North-South Tributary support a warmwater thermal regime with a cool to warm species assemblage. The fish habitat assessment has determined that HDF 3C and 4C may provide seasonal habitat for the more tolerant warm water species found downstream. These watercourses would be considered direct fish habitat. The remaining HDF's do not have habitat conditions to support fish and are therefore considered indirect fish habitat through the contribution of exported food (detritus/ invertebrates) downstream. The three offline ponds within the subject lands may support fish populations. Pond A and C are within the West Humber River Tributary floodplain and therefore these ponds may have a seasonal connection to a fish bearing watercourse. Pond B is located outside of the floodplain of the West Humber River Tributary and therefore there is no potential connection to a fish bearing watercourse.	Yes
Habitat for Endangered or Threatened Species	Both the North-South Tributary and the West Humber River Tributary are mapped as critical habitat for Redside Dace in the species Recovery Strategy (DFO 2024). Also, provincial mapping (MNRF 2023) provides records for Redside Dace in the West Humber River Tributary. As per the explanation provided Section 4.1.4., it is anticipated that MECP will regulate the North South Tributary as an occupied watercourse. In accordance with Ontario Regulation 832/21 of the ESA and the Federal Redside Dace Recovery Strategy (DFO, 2024), protection of Redside Dace habitat extends to the meander belt plus an additional 30 m of vegetated area extending from the meander belt width. Additionally, O.Reg. 832/21 of the ESA, HDF-3 may be considered contributing Redside Dace habitat. However, due to the data discrepancies between provincial and federal records/ mapping, further discussions should be undertaken, with the applicable regulatory agencies, to confirm the extent of the Redside Dace habitat within the subject lands. The threatened Eastern Meadowlark and Bobolink were confirmed breeding within the subject lands as illustrated on **Figure 2**. The woodland communities contained within the valley and stream corridors and the exiting anthropogenic structures may provide suitable habitat for endangered bats. No other threatened or endangered species were recorded within the subject lands.	Yes

Natural Heritage Feature	Assessment	Present within the subject lands?
Significant Area of Natural and Scientific Interest	There are no Significant Area of Natural and Scientific Interest within 5 km of the subject lands.	No

The natural heritage features within the subject lands are discussed in **Section 7** in the context of the proposed development, the results of the vegetation and wildlife surveys, and based on applicable policy and regulations related to natural heritage.

6. Proposed Development

The proposed development, as illustrated on the Draft Plan (**Appendix A**), identifies a subdivision that will provide low and medium density residential areas (18.36 ha). In addition to the residential land uses, an elementary school (2.06 ha), a firehall (0.84 ha), a commercial block (0.5 ha), open spaces (0.02 ha) and parkland (9.08 ha) have been identified.

Internal road access for the proposed development will be provided by Streets 'A' through Street 'O'. A connection to Torbram Road will be provided by Street 'A', Street 'B' and Street 'O'. internal roads and private laneways will account for 10.1 ha of the development lands. Approximately 0.5 ha is required to accommodate the widening of Torbram Road.

All development blocks, apart from the SWM Ponds and parklands/ open spaces are outside of the boundary of the Greenbelt and reflect a Limit of Development (LOD) confirmed by the TRCA. The proposed development will retain 41.8 ha of the NHS. The proposed development plan is shown in **Figure 4** and on the Draft Plan located in **Appendix A.**

6.1 Servicing

Key servicing details, as they relate to natural environmental features, are provided below and in greater detail within the draft FSSR (SCS 2023).

6.1.1 Stormwater Management

The implementation of a SWM Plan is required to protect the natural environment from the following:

- Increased risk of flooding to downstream areas;
- Erosion of the valley and stream corridors from uncontrolled surface water runoff and flows; and

- Impaired water quality and increased turbidity leading to impacts to fisheries, macroinvertebrates, and aquatic vegetation.

The analysis provided in the FSSR (SCS 2023) determined that four underground wet SWM facilities are required for quality and quantity control. The location of the proposed facilities is identified on **Figure 4** within the blocks identified for the SWM Facilities.

The proposed wet underground SWM facilities will provide quantity control, erosion control, quality control, and temperature mitigation for the subject lands. The underground wet SWM facilities will control proposed peak flows from the subject lands to the West Humber River Tributaries at the allowable release rates for the 2-to-100-year storm events. The extended detention volumes will be sized based on the detention of the 25 mm – 4-hour Chicago rainfall event. The volumes calculated for the extended detention will be attenuated for a minimum of 48 hours. However, due to the small size of the SWM Facility 4 catchment, extended detention cannot be provided for 48 hours.

All SWM facilities will have a permanent pool depth of 1.0 m and an active storage depth of 2.0 m (total internal height of 3.0 m). The control manholes will outlet to storm sewers; three of which will convey flows to the North-South Tributary and one of which will convey flows to the West Humber River Tributary. The preliminary locations of the proposed outlets are provided in the FSSR (SCS 2023).

The regional floodplain elevation is well within the limits of the valley and stream corridors; therefore, the existing floodplain will not impact the hydraulics outlet control structures for the SWM facilities. An emergency overflow channel will be provided at each SWM block which will convey the uncontrolled 100-year storm event peak flow from the SWM block to the valley. This overflow channel will act as the emergency conveyance for the SWM facilities to avoid additional disturbance through the valley wall.

The storm sewer system (minor system) will be designed for the 10-year return storm as per the Town of Caledon standards. The major system flow drainage (up to the 100-year storm event) will generally be conveyed overland along the road rights-of-way and easements. Major system flows (greater than the 10-year up to the 100-year storm event) will be conveyed within the road rights-of-way to the SWM facilities captured at low points adjacent to the facilities.

6.1.2 Wastewater and Sanitary Sewers

There are no existing sanitary sewer systems within the immediate vicinity of the subject lands. In accordance with the Region of Peel Water and Wastewater Master Plan, the subject lands are anticipated to be serviced by a regional trunk sanitary sewer which will be constructed as part of the proposed development immediately to the east of the subject lands. Two connections, located on the east side of Torbram Road at the proposed intersections of Street ‘A’ and Street ‘B, will be provided to service the subject lands. The proposed sanitary sewers will be extended underneath Torbram Road. The proposed sewer crossings will require underground installation under North-South Tributary (associated with Street ‘A’) and HDF 3A (associated with Street ‘C’).

The Region of Peel Water and Wastewater Master Plan identifies that the subject lands are to be serviced by a regional trunk sanitary sewer which will be constructed as part of the proposed development immediately to the east of the subject lands and will therefore not have direct impacts on the natural heritage features or wildlife within the subject lands.

6.2 Water Balance

The Geotechnical and Hydrogeological Report (Gemtec 2023) identifies that the preliminary data collected observes a negative vertical gradient, which is indicative of recharging conditions. However, the preliminary data identified one location that observed a positive vertical hydraulic gradient, which may indicate a groundwater discharge location. Artesian conditions were observed in the boreholes located in the northwest corner of the subject lands, as such, the vertical hydraulic gradient could not be estimated at these locations. Continued monitoring and analysis of the groundwater condition within the subject lands is currently ongoing. Therefore, a water balance analysis for the subject lands is forthcoming.

However, low impact development measures have been proposed (refer to **Section 7.2**) to maintain or increase existing infiltration rates and appropriate treatments shall be further explored and confirmed as design progresses. It is anticipated that an appropriate infiltration volume will be achieved through the application of these design measures.

6.3 Grading

As per the FSSR (SCS 2023), the subject lands will be graded in accordance with the Town of Caledon lot and road grading criteria and in a manner which will satisfy the following goals:

- Provide a minimum road grade of 0.75%, a maximum road grade of 6.0%; a minimum lot grade (split lots) of 2%, a minimum lot grade (front draining lots) of 3%, a maximum lot grade of 5% and a maximum slope between houses (in any direction) of 4:1;
- Provide a 0.6 m wide gently sloped area at 2.0% away from the house on at least one side of the building where side yard setbacks permits;
- Provide continuous road grades for overland flow conveyance;
- Minimize the need for retaining walls;
- Minimize the volume of earth to be moved and minimize cut/fill differential;
- Minimize the need for rear lot catchbasins; and
- Achieve the stormwater management objectives required for the subject lands.

At the detailed design stage, the preliminary grading will be subject to a more in-depth analysis to balance the cut and fill volumes and minimize slopes and walls.

6.4 Road Crossings of the NHS

Two road crossings of the NHS are proposed to facilitate access to the residential areas in the northeast section of the subject lands (**Figure 4**). To aid in the preliminary design, a TRCA HEC-RAS model (West Humber) was used to quantify the hydraulic characteristics of the West Humber River Tributaries based on the proposed development and the recommendations from the Geomorphic Assessment (Beacon 2024) were incorporated.

Street 'A' crosses the North-South Tributary and Street 'C' crosses the upper reach of HDF-3A. The Street 'A' crossing will consist of a 14.9 m wide open bottom arch culvert. The existing golf cart crossing at this location will be removed and restored as part of the construction of the proposed development. A low flow channel will be provided within the open bottom arch culvert to maintain natural channel processes and to allow for fish passage. The arch open bottom culvert will be embedded into the natural streambed.

The proposed Street 'C' crossing over HDF3 will be a 6.4 m wide by 1.5 m high by 40.6 m long concrete box culvert.

6.5 Amenities

The proposed development includes approximately 10 ha of parkland and open space (throughout the subject lands) that will surround the NHS and are contained within the boundary of the Greenbelt (**Figure 4**). The proposed development will also include an elementary School and a firehall that will service the proposed subdivision as well as the surrounding communities.

7. Assessment of Potential Impacts

The proposed development of the north parcel is generally confined to lands that are already modified by golf course operations and associated manicured landscape and infrastructure. The proposed development of the south parcel is confined to lands that are currently in active agriculture. The subject lands are divided by a natural heritage system associated with the valley and stream corridor of the West Humber River and North South Tributaries. The NHS within the subject lands is identified on Schedule C-2 as Core Areas of the Region's Greenlands System. Furthermore, many of the natural heritage features within the NHS have been identified as either a NAC or a PNAC in accordance with the criteria set out in the applicable natural heritage policy documents.

The subject lands are in an area that is already altered and subject to existing rural and agricultural stressors and disturbances (e.g., noise, light, landscaping, and vegetation maintenance). Most of the proposed development area, apart from lands designated as parklands and / or open spaces and the four SWM Facilities, have been planned outside of the NHS. Appropriate mitigation measures will be required to protect the NHS (a) during the construction phase and (b) following the completion of construction, as discussed below to minimize the temporary and residual impacts to the extent possible.

7.1 Vegetation Removal

A large portion of the subject lands are utilized as active agriculture or golf course and consist of landscaped and cropped areas with individual trees scattered throughout.

7.1.1 Tree Removal

The Tree Inventory and Assessment Report prepared by Schollen and Company Inc. (2023) under separate cover provides details on the protection, management, and monitoring of retained tress, any individual tree removals, and compensation. A total of 335 trees were identified for retention (pending detailed design), a total of 610 trees were identified for removal, a total of 6 trees were identified for removal due to poor condition, a total of 16 dead trees were identified for removal and a total of 13 dead trees were identified for retention (Schollen and Company inc. 2023). Trees proposed for removal are located outside of the NHS and woodland communities and are located within the golf course areas, which were likely planted during the construction of the golf course.

Trees situated within the areas for development will need to be removed; however, the proposed development has been designed so that trees have been integrated within open space or parklands, or where feasible lots of residences. Considerable effort has been taken to preserve as many trees as possible. The naturally vegetated areas within the subject lands are largely contained within the NHS and will be protected.

7.1.2 Wetland Communities

One isolated wetland unit is proposed for removal to accommodate the proposed development. There will be minor encroachments into the riparian wetland units associated with HDF 3 and the North-South Tributary to facilitate the crossings of Street 'A' and Street 'C'. This includes the following communities, as illustrated in **Figure 2**:

- Complete removal of Cattail Mineral Shallow Marsh Willow (MAS2-1); and
- Partial removal of Forb Mineral Meadow Marsh (MAM2-10).

The Cattail Mineral Shallow Marsh Willow (MAS2-1) in the north parcel is an isolated unit outside of the NHS and surrounding by manicured golf course. This wetland unit is approximately 0.06 ha in size and is dominated by cattail species. Anecdotal evidence was provided by golf course staff indicate that turtles are regularly encountered traveling through the north parcel between wetland and open water features. This wetland is not within the TRCA regulation limits.

Approximately 0.06 ha of Forb Mineral Meadow Marsh (MAM2-10) will be temporarily removed to accommodate the proposed road crossings. The MAM2-10 units are within the riparian areas surrounding HDF 3 and the North-South Tributary. This wetland area contained a combination of native and nonnative species. The wetland has undergone notable modifications to accommodate the manicured landscape of the surrounding golf course and is relatively narrow in this area.

TRCA provides the conditions for which a wetland may be "interfered with", or in this case, removed. Accordingly, these wetlands are not provincially significant, are all less than 0.5 ha., they do not provide significant wildlife habitat or habitat for rare species, and they are not part of a significant groundwater discharge area as per the Geotechnical and Hydrogeological Report (Gemtec 2023). The proposed road crossings have been placed in locations where the riparian vegetation, associated with the meadow marsh community, is relatively limited in width and in proximity to existing trial crossings. Disturbances to wildlife linkages provided by the wetlands within the stream corridors will be temporary and the proposed crossing structures will not inhibit amphibian and reptile passage. A permit will be required by the TRCA to remove these wetland units. The total area of wetland that will be removed is

0.12 ha (**Figure 4**) and opportunities for restoration and enhancement in the NHS will be developed at detailed design to mitigate this loss.

7.1.3 Woodland Communities

All woodland communities are located within the NHS and will be retained. No tree removals are proposed to any of the forested communities during construction or in the post-development condition. Potential impacts to the woodlands on the subject lands may include changes to the water balance. Without mitigation, less drainage may reach these features which could cause long-term impacts. These impacts can be avoided through the implementation of LID measures. **Section 7.5** of this report addresses recommended mitigation measures related to the water balance. These woodlands to be retained are also generally the most active with respect to forest bird species and may provide suitable bat habitat.

7.2 Road Crossings of the NHS

Two road crossings are proposed for connectivity, neighborhood structure and traffic flow within the proposed development (refer to **Figure 4**. Street 'A' will cross the North-South Tributary, and Street 'C' crosses the upper reach of HDF 3. The TRCA Policies and Regulations were reviewed when identifying the design of the proposed crossing structures.

7.2.1 Road Crossing of HDF 3A

As part of the proposed development plan, a 40.6 m long concrete box culvert is proposed to facilitate the road crossing of Street 'C' over HDF 3A. At the proposed crossing location, HDF 3A reach has been identified as an ephemeral feature that provides allochthonous inputs (detritus/ invertebrates to the direct (seasonal) fish habitat in its lower reaches at its confluence with the North-South Tributary. The feature traverses south, through a small wetland (meadow marsh community) that has been modified into a 2 m riparian buffer (as maintained by the golf course). Data presented in the Geotechnical and Hydrogeological Report (Gemtec 2023), indicates that this feature may provide groundwater recharge. Results from the HDFA suggest that this feature may provide a valued function primarily due to the riparian wetland that borders it and its contribution to downstream fish habitat. The proposed crossing structure will maintain the form and function of the feature. The feature will still provide exported food (detritus/ invertebrates) to downstream fish-bearing reaches and any passage of wildlife life will remain post development. Furthermore, there are opportunities for the riparian corridor of the feature to be enhanced post-development.

7.2.2 Road Crossing of the North-South Tributary

The proposed Street 'A' crossing over the North-South Tributary has been designed to be a 14.9 m wide open bottom arch culvert. The existing golf cart crossing at this location will be removed and restored as part of the construction of the proposed development. This perennial watercourse carries flows through a primarily natural channel. There is evidence of minor channel modification (i.e., straightening/ channelization and constriction) and at the existing (undersized) golf cart crossings

throughout the reach. The proposed road crossing will require a partial removal of the riparian wetland community on either side of the watercourse. Impacts to the channel, stream bed and any groundwater exchange will be minor as a result of the proposed open bottom structure. A low flow channel is proposed throughout the culvert to maintain the natural channel processes and to promote fish passage. The arch open bottom culvert shall be embedded into the natural streambed.

The two road crossings are proposed in areas that are already disturbed by the presence of the golf course trail crossings. Wetland removals associated with the crossing are discussed above in **Section 7.1.3**.

The remainder of the proposed roads within the subject lands are located away from the NHS and are mainly proposed within areas that are already developed or being used for golf course crossings or agriculture.

Typical approvals from the TRCA will be required to construct the crossings to the watercourses and to interfere with their associated wetlands. As noted in **Table 5**, both West Humber River tributaries have been identified as protected habitat for Redside Dace. MECP and DFO consultation will be required to define the critical/ regulated habitat limit of this species within the subject lands as per each respective legislation. The proposed crossing structure identified for the North-South Tributary will require approval and/or permits/ authorizations from both DFO and MECP.

7.3 Stormwater Facilities and Outfalls Within the NHS

Four underground wet SWM facilities are proposed to support the proposed development. The location of these facilities, the associated outlet storm sewers and outlet headwall infrastructure are shown on **Figure 4**. Impacts of the outlet storm sewers will be evaluated in more detail during future design stages of the development plan. However, since the outlet storm sewers are underground, they can be installed with minimal impacts. There will be a minor footprint at each of the proposed outlet headwall locations within the NHS. The construction of the outlet headwall for the SWM Facilities 1-3 to will be placed in the stream corridor of the North-South Tributary and may result in minor removal of vegetation associated with cultural thicket, meadow marsh and deciduous forest communities. One outlet headwall is proposed for SWM Facility 4. This proposed outlet headwall will fall within the south parcel and may result in minor removal of vegetation associated with cultural thicket and meadow communities. Construction of the outlet headwalls may result in an increased potential for erosion and sediment run off as a result of grubbing and stripping.

7.4 Potential Changes to Site Water Balance

A water balance analysis is ongoing.

7.5 Changes to Site Grading

The preliminary grading plan design has allowed for major storm drainage to be directed to the proposed underground wet SWM facilities which will outlet to the valley and stream corridors. Grading for the

subject lands has generally been driven by the NHS, the existing infrastructure (i.e., matching existing grades), road and lot grading criteria and pipe cover. A more in-depth analysis to balance the cut and fill volumes and minimize slopes and walls will be completed in the detailed design stage.

7.6 Displacement of Wildlife

Wildlife including birds, amphibians, turtles, and mammals utilize the subject lands to fulfill their life cycles. This includes breeding, rearing young and overwintering. It is anticipated that changes to the wildlife community will result from the proposed development as a reflection of the shift of available habitat and an increase in overall anthropogenic activity and density.

The recorded breeding bird communities were diverse and reflective of the range of available habitat on site, including wetlands, woodlands, meadows, and open anthropogenic areas. The proposed development will likely result in a reduction in the overall number of birds that utilize the subject lands given the shift in proposed land use and removal of vegetation (i.e., trees, wetlands, meadows) as described above. The proposal is generally concentrated in the open areas of the lands and therefore a reduction in species utilizing those landscapes is proposed. The woodland and wetland communities on site are generally being retained, however changes to the surrounding environment will likely reduce the future habitat functionality, as is often the case in urbanizing matrices.

The isolated MAS2-1 wetland unit within the subject lands is proposed for removal. This wetland unit is approximately 0.06 ha in size and is dominated by cattail species. A permit to relocate any wildlife will be obtained prior to removal. It is anticipated that small mammals such as raccoon, grey squirrel and skunk will continue to use the subject lands post development.

7.7 Endangered and Threatened Species

Targeted field surveys were conducted for endangered and threatened species on the subject lands. Potential impacts are discussed below with respect to confirmed species discussed under **Section 4.4** of this report.

7.7.1 Removal of Habitat for Eastern Meadowlark

Approximately 2.25 ha of cultural meadow communities will be removed to accommodate the proposed development. These meadows provided botanical biodiversity and habitat for grassland bird species, including Eastern Meadowlark, a threatened avian species. The removal of this meadow habitat will proceed in conformity with the ESA, as discussed in **Section 8.9** of this report.

Bobolink territories were also recorded during breeding bird surveys however these meadows are within other constraints and are not proposed for alteration.

7.7.2 Impacts to Redside Dace Habitat

As noted in **Section 4.1.5.1**, data discrepancies in the background review will require consultation with MECP and DFO to confirm the extent of the habitat within the subject lands. Potential impacts can not be fully understood until the protected habitat is confirmed with the above noted agencies. However, potential impacts to Redside Dace habitat may result from the Street 'A' road crossing of the North-South Tributary, the proposed stormwater inputs, and footprints within the regulated/critical habitat that may result from the placement of the proposed SWM outlet headwalls.

Impacts related to the Street 'A' road crossing can generally be avoided upon applying the appropriate design mitigations such as crossing location, structure size, orientation, and method of construction. The proposed design and construction mitigations are expanded upon in **Section 8.5**. The result of agency consultation will determine what type of compliance approval/permit/authorization will be required for both crossings.

8. Recommended Mitigation Measures

The following section identifies mitigation measures to minimize effects of the proposed development plan. The proposed development is situated within an area that has been transformed over time to an increasingly urbanized landscape, which inevitably reduces natural heritage functions of any site within that larger landscape area. However, these kinds of landscape level changes cannot be wholly mitigated on a site-by-site basis, and a shift in the natural heritage values towards an urban tolerant system will continue to occur. Despite the recommendation of the numerous mitigation measures in this section, potential impacts such as a general trend towards urbanization can not be addressed at the site level.

8.1 Mitigation by Design

As the predominant natural heritage features and functions of the subject lands are largely contained within the valley corridor, it is anticipated that the site-specific effects have largely been mitigated by the design of the development plan. The maintenance of a contiguous natural corridor is proposed. The development is proposed within areas that have been previously altered and is currently represented by a golf course.

8.2 Maintenance and Enhancement of the NHS

One of the primary design principles adopted for the development was to protect the natural heritage corridor for terrestrial and aquatic species associated with the West Humber and North-South tributaries. As impact avoidance is generally the most effective means of reducing the risk of development impacts on the natural environment, the proposed development includes the maintenance of the Natural Heritage System such that it is a contiguous block buffered from any future development. The natural features (woodland, wetland and top of slope) limits were confirmed in the field during the site walk with the TRCA.

The limit of constraints associated with the proposed Natural Heritage System within the greenbelt are a combination of the setbacks and buffers associated with:

- Wetlands plus a 30 m buffer (within the greenbelt) or 10 m buffer (outside of the Greenbelt);
- Woodlands plus a 30 m buffer (within the greenbelt) or 10 m buffer (outside of the Greenbelt);
- Top of Slope plus a 30 m setback (within the greenbelt) or 10 m setback (outside of the Greenbelt); and
- Redside Dace protected habitat limits (i.e. meander belt width plus 30 m vegetated area) for the two reaches of the West Humber Tributary within the subject lands.

All the above-mentioned setbacks and buffers have been incorporated into an overall limit of constraint which has been delineated as the Natural Heritage System on **Figure 3** and **Figure 4** and is reflected in the Draft Plan (**Appendix A**).

An Edge Management and Buffer Planting Plan will be prepared for these areas as the project moves to detailed design. The addition of a planted buffer area will convert existing golf course to natural areas and will further bolster the utility of the buffer distance to protect the natural feature from potentially adverse impacts associated with the proposed development, in addition to increasing overall naturalized cover area.

8.3 Maintenance of Site Drainage

The following drainage features will require full removal or alteration as a result of the proposed development.

Table 8. Management of Drainage Features

Drainage Feature Segment	Final Management Recommendation	Proposed Removal/ Alteration	Recommended Management
HDF 1, HDF 2, HDF 3B and HDF 10.	Mitigation	Either partial or full removal of the features are proposed. Features existing connection to the North-South tributary shall be maintained within the NHS.	Drainage features that are identified as “Mitigation” can be maintained, relocated and/or enhanced. If catchment drainage had been previously removed or will be removed due to diversion of stormwater flows, restore lost functions through enhanced lot level controls (i.e., restore original catchment using clean roof drainage), where feasible. Maintain or replace on-site flows using mitigation measures. Flows shall be maintained. Drainage feature must connect to downstream.

Drainage Feature Segment	Final Management Recommendation	Proposed Removal/ Alteration	Recommended Management
HDF 4B and HDF 12	No Management	Full removal of both feature segments is proposed. Features existing connection to the North-South tributary shall be maintained within the NHS.	Drainage features that are identified as "No Management" can be removed without the need for feature or function replication. Nonetheless, an appropriate stormwater management (SWM) system and low impact developments (LID) will be implemented.

Replication of function shall be achieved through applying the proposed lot level/conveyance controls and stormwater management as identified in **Section 8.4.**

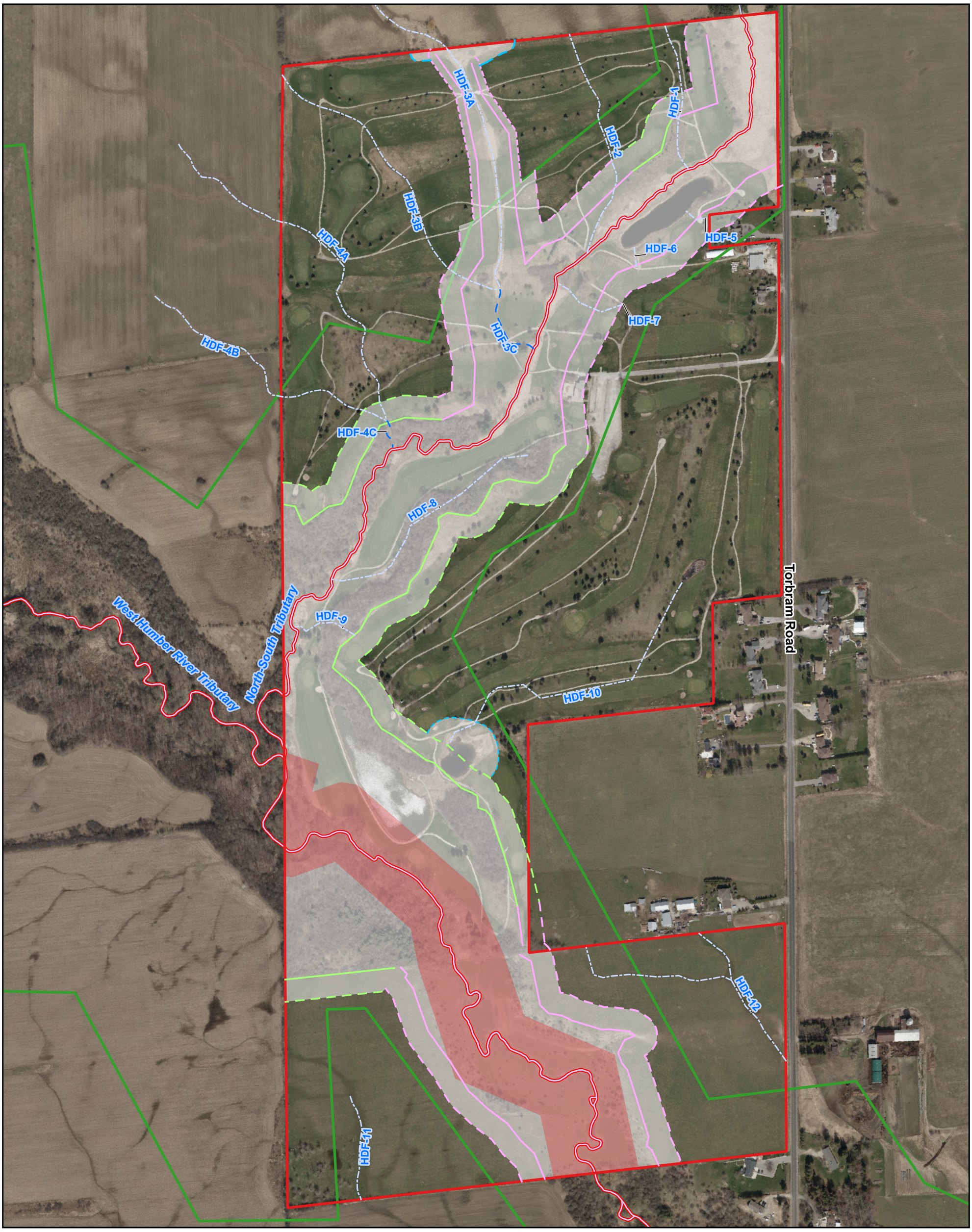
Details on the LID measures specific to each feature that will be removed to facilitate the proposed development will be determined and finalized in consultation with the TRCA and addressed in the Final FSSR (SCS) during detailed design.

8.4 Low Impact Development Techniques

A water balance analysis is ongoing and will be finalized; however, the following low impact development measures can be incorporated in the detailed design to maintain or increase existing infiltration rates:

- Increased Topsoil Depth – An increase in the restored topsoil depth on lots can be used to promote lot level infiltration and evapotranspiration (up to 0.3 m depth). Increased topsoil depth will contribute to lot-level quality and water balance control. A minimum depth of 0.3 m is proposed in all landscaped areas;
- Roof Leaders to Grassed Areas – Roof leaders will be discharged to grassed areas to promote lot level infiltration, thereby passively contributing to water quality and quantity control;
- Rear Yard At-Surface Infiltration Trenches – Rear yard at-surface infiltration trenches can be provided on the single detached lots to meet the onsite retention and water balance targets and provide passive water quality and quantity control. Adequate separation to the seasonally high groundwater will be provided to ensure functionality. The trenches will be located beneath the rear yard swales, covered in topsoil, and vegetated. Where residential lots back toward the valley corridor, any overflow from the rear yard infiltration trenches will be directed via the storm sewer system to the proposed SWM Facilities; and
- Underground Wet SWM Facilities – Sized in accordance with the MECP criteria, these end of pipe facilities can provide water quality, quantity, and erosion control treatment. An end of pipe wet facility is proposed to provide water quality, quantity, and erosion control treatment for the development.

There may be additional opportunities to provide other LIDs, which will be explored at detailed design in consultation with the TRCA.



Legend

- Subject Lands
- Greenbelt Outer Boundary (MMAH 2017)
- Wetland + 10 m
- Wetland + 30 m

TRCA Staked Natural Features

- Top of Bank (TRCA 2022 & 2023*)
- Top of Bank + 10 m
- Top of Bank + 30 m
- Dripline (TRCA 2022 & 2023*)
- Dripline + 30 m

Aquatic Features (Beacon 2023)

- Intermittent
- Ephemeral
- Permanent

Redside Dace Habitat

- Watercourse
- Meander Belt + 30 m

* TRCA staked the north parcel in October 2022 and the south parcel in August 2023.

Natural Heritage Constraints

Figure 3

Natural Heritage Evaluation - Part of Lots 19, 20 and 21 Concession 5, Town of Caledon, Region or Peel

BEACON ENVIRONMENTAL

Project: 222239

Last Revised: January 2024

Client: Mayfield Golf Course Inc. and Tullamore Industrial GP Limited

Prepared by: SZ
Checked by: DF

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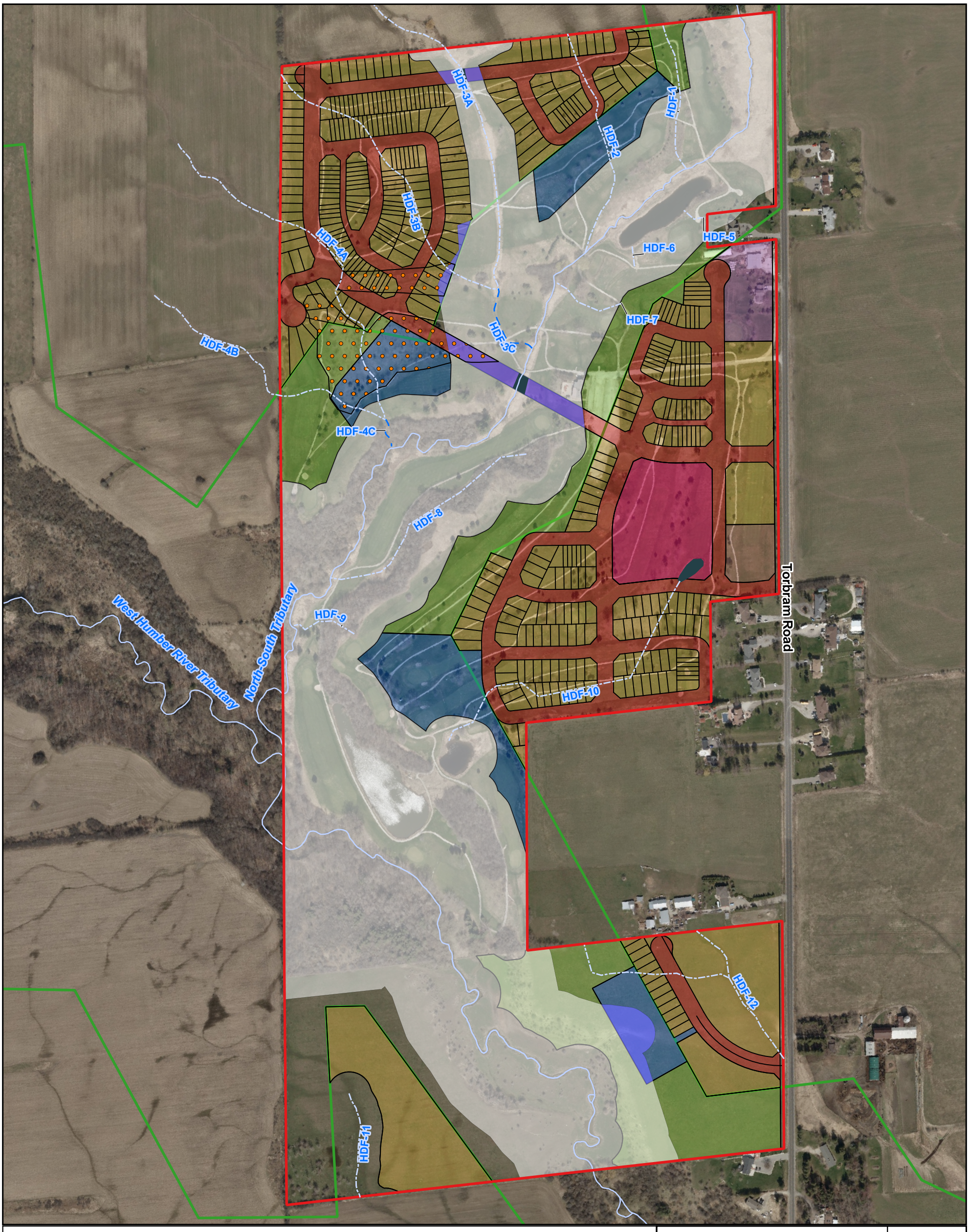

Legend

- Subject Lands
- Proposed Development
- Greenbelt Outer Boundary (MMAH 2017)
- Natural Heritage System

Aquatic Features (Beacon 2023)

- Intermittent
- Ephemeral
- Permanent

Schedule of Land Use

- Residential
- Stormwater Management Facility
- Parkland
- Firehall
- School
- Commercial
- Road

Impacted Areas

- Cultural Meadow Removal (2.25 ha)
- Area of NHS Encroachment (1.02 ha)
- Wetland Removal (0.12 ha)

Proposed Development | **Figure 4**

Natural Heritage Evaluation - Part of Lots 19, 20 and 21 Concession 5, Town of Caledon, Region or Peel

BEACON ENVIRONMENTAL

Project: 222239
Last Revised: November 2023

Client: Mayfield Golf Course Inc. and Tullamore Industrial GP Limited

Prepared by: BD
Checked by: DF

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8.5 Best Management Practices for Development in Regulated Redside Dace Habitat

The West Humber Tributary and the North-South Tributary have been identified as protected Redside Dace habitat. The proposed road and sewer crossings within protected Redside Dace habitat will require a comprehensive assessment of impacts at the detailed design stage to determine the appropriate compliance and compensation requirements under the ESA and the *Fisheries Act*.

Since the drainage within the subject lands ultimately discharge into Redside Dace habitat, temperature mitigation and quality control for stormwater discharge needs to be considered and meet the Redside Dace stormwater BMP's and design criteria outlined in the *Guidance for Development Activities in Redside Dace Protected Habitat* (MNRF, 2016) and any additional requirements identified through consultation with DFO. The BMPs identify both thermal and water quality targets that must be met to ensure compliance with the ESA. To meet this requirement, as outlined in the FSSR (SCS 2023), the stormwater will be treated on-site in underground storage tanks and will achieve 80% TSS removal as well as a discharge temperature below 24 ^{o}C.

The proposed road network has been designed to avoid crossing the West Humber River and has minimized the number of crossings in protected Redside Dace habitat as per the BMP's outlined in the MNRF Guidance Document (2016). The proposed open bottom arch culvert will maintain groundwater exchange, has been sized to not restrict flow and has been oriented to cross over a straight segment of the channel and in a location that will require minimal removal of riparian wetland community. The design will incorporate a low flow channel to maintain the natural channel processes and to promote fish passage. Design of the crossing structure in future stages shall ensure that stormwater drainage will avoid direct discharge into the watercourse.

8.6 Timing of In-Water Works

All construction activities (on land or in water) within regulated Redside Dace habitat shall occur within the recognized timing window (July 1 to September 15) for the species, upon approval from the appropriate regulatory agencies. Additionally, a fish and wildlife salvage plan shall be prepared prior to works within wetlands or waterbodies/ watercourses.

8.7 Erosion and Sediment Control

Prior to any construction, a detailed Erosion and Sediment Control Plan will be developed using the Greater Golden Horseshoe Area Conservation Authorities' Erosion and Sediment Control Guidelines for Urban Construction (2019). Any grading or site alteration related activities should be confined to the established limit of development. Fencing at the development limit should be regularly inspected and maintained in good working order throughout the construction period. Fencing should be removed upon completion of construction after exposed soils have been stabilized. Standard Best Management Practices, including the provision of sediment control measures, should also be employed during the construction process.

8.8 Timing of Vegetation Removal

The federal *Migratory Bird Convention Act* (1994) protects the nests, eggs and young of most bird species from harm or destruction. Environment Canada considers the 'general nesting period' of breeding birds in southern Ontario to be between late March and the end of August. This includes times at the beginning and end of the season when only a few species might be nesting. In light of this it is recommended that during the peak period of bird nesting (i.e., between mid-April and mid-July), no vegetation clearing or disturbance to nesting bird habitat should occur.

In the 'shoulder' seasons of April 1 to April 15, and July 16 to August 31, vegetation clearing could occur, but only after an ecologist with appropriate avian knowledge has surveyed the area to confirm lack of nesting. For any proposed clearing of vegetation within the breeding bird season an ecologist should undertake detailed nest searches immediately prior (within two days) to site alteration to ensure that no active nests are present.

If nesting is found, then vegetation clearing in an area around the nest, the size of which depends on the specific circumstances, has to wait until nesting has concluded. The likelihood of nesting birds being present in the 'shoulder' seasons also depends on the habitat type.

From September 1 through to March 31, vegetation clearing can occur without nest surveys, but the need to ensure nest protection still applies (i.e., if an active nest is known to be present it must be protected).

8.9 Compensation/Mitigation for Removal of Eastern Meadowlark Habitat

Eight Bobolink breeding territories were recorded on the south parcel and one Eastern Meadowlark breeding territory, and one Bobolink pair breeding territory was recorded on the north parcel (**Figure 2**). The proposed development involves the removal of habitat for the one Eastern Meadowlark nesting location.

Under the habitat regulations for these species (Section 23.2 of Ontario Regulation 242/08), it is possible to remove the habitat provided suitable habitat is created within the same ecoregion. MECP has developed species specific guidelines and regulations to address habitat removals. Prior to removal of the meadow habitat, a plan must be developed in accordance with MECP guidelines to ensure compliance with the regulations. Alternatively, compensation through the Species at Risk Conservation Fund may be explored where the proponent is required to pay a species conservation charge to the MECP.

8.10 Tree Removal and Preservation

An Arborist Report prepared by Schollen and Company Inc. (2023) under separate cover will provide details on individual tree removals and compensation. These plans detail single trees and groups of trees that are outside of woodland areas. The Plan includes recommendations for retention or removal of each of these trees. The report also includes general guidelines including nest surveys during the

breeding bird season prior to removal of any specimens, as well as direction for the installation of tree protection fencing.

8.11 Noise and Light Effects on Wildlife

Acute and cumulative effects for a single development associated with noise and light are very difficult to quantify. Noise may be a reason why landscape-level effects are known to occur within urban matrices even as natural areas are set aside. The effects of these stressors can be significant in previously undeveloped areas; however, this system is already heavily influenced by the light and noise of the existing golf course, nearby agricultural operations, and roadways. This has resulted in a suite of species that are already tolerant to these stressors.

9. Restoration and Enhancement Opportunities

Restoration and enhancement areas have not yet been identified at this stage of design, however, based on the current plan, opportunities do exist for restoration. An Edge Management and Buffer Planting Plan is proposed as the project moves to detailed design. It is recommended that the following restoration and enhancement objectives be achieved:

- Buffering existing habitats (**Section 8.2**);
- Providing connectivity between natural areas;
- Creating new habitat; and
- Enhancing and restoring existing habitats.

These will be addressed as the project moves to detailed design through the preparation of restoration, enhancement, and edge management plans.

10. Policy Conformity

A summary of federal, provincial, and municipal environmental protection and planning policies and regulations applicable to the subject lands were discussed in **Section 2**. An evaluation of how the proposed development complies with the applicable environmental policies and legislation are summarized below in **Table 9**.

Table 9. Policy Compliance Assessment

Applicable Policy / Legislation	Relevant NHE Findings and Recommendations	Policy Compliance
Federal *Fisheries Act* (1985) and Species at Risk Act (2002)	Two road and sewer crossings are proposed for connectivity, neighborhood structure and to service the proposed development (refer to **Figure 4**). Street 'A' will cross the North-South Tributary, and Street 'C' crosses the upper reach of HDF 3. Additionally, consideration in further planning stages will need to be	Yes (Subject to DFO approval)

Applicable Policy / Legislation	Relevant NHE Findings and Recommendations	Policy Compliance
	made to reduce impacts from SWM Pond infrastructure and the quality and quantity of any stormwater inputs into fish habitat. The protection provisions of the *Fisheries Act* apply to all fish habitat (including critical habitat) except for the prescribed waterbodies that meet the criteria for exemption. When work is proposed within fish habitat and/or in the critical habitat of Redside Dace, a Request for Project Review shall be the first step to engage with DFO in order to ensure compliance with and identify the appropriate approval process that will be required under paragraphs 34.4(2)(b) and 35(2)(b) of the *Fisheries Act* and subsection 73(1) of SARA.	
Provincial *Endangered Species Act* (2007)	Habitat for Bobolink (threatened), Eastern Meadowlark (threatened), Redside Dace (endangered) has been confirmed within the subject lands. Bobolink and Eastern Meadowlark habitat will be removed from subject lands to accommodate the proposed development. Compensation for the removal of the habitat will be provided in accordance with ESA regulations to the satisfaction of MECP. The woodland communities contained within the NHS and the exiting anthropogenic structures may provide suitable habitat for endangered bats. If later phases of the planning process result in anticipated impacts to the woodland communities, a detailed habitat inventory will likely need to be completed. Exit surveys are recommended for the existing structures that are currently being used for golf course operations. Pending the determination of impacts, consultation with the MECP may be required to ensure conformity with the ESA. The West Humber River Tributary and the North-South Tributary are designated as regulated Redside Dace habitat. Further consultation with MECP is warranted to the confirm status of the habitat in the North-South Tributary, ensure compliance and identify the appropriate approval process that will be required under the ESA.	Yes (Subject to MECP approval)
Provincial Policy Statement (2020) Section 2.1 – Natural Heritage		
1. Habitat for Threatened and Endangered Species	Habitat for endangered and threatened species has been identified within the subject lands and will be addressed in conformity with the applicable acts (see above).	Yes (Subject to MECP and DFO approval)
2. Core Area Valley and Stream Corridor	The West Humber River Tributaries have been identified as Core Area Valley and Stream Corridors. A road crossing of the North-South Tributary is proposed to facilitate access to the residential areas. The SWM Facilities proposed to service the proposed development will require three outlet structures within the corridor of the North-South Tributary and one within the valley of the West Humber River Tributary.	Yes (Subject to Municipal, federal, and provincial agency approvals)
3. Significant Wetlands	Not applicable – There are no Significant Wetlands on or adjacent to the subject lands.	Yes
4. Significant Woodlands	There are several natural and cultural woodland communities that have been identified within the subject lands. This woodland met the criteria in Table 1 of	Yes

Applicable Policy / Legislation	Relevant NHE Findings and Recommendations	Policy Compliance
	the ROP to classify them as NAC. All woodland communities are located within the NHS and will be retained.	
5. Significant Wildlife Habitat	There are eight potential SWH types within the subject lands None of these areas have been identified as potential SWH by the Town.	Yes (Subject to Municipal approvals)
6. Significant Areas of Natural and Scientific Interest	Not applicable – There are no ANSIs on or adjacent to the subject lands.	Yes
7. Fish Habitat	See Above.	Yes (Subject to DFO and MECP approvals)
Town of Caledon Official Plan (2018)	Natural Core Areas and Natural Corridors are designated as Environmental Policy Area (EPA), and development within and adjacent to EPA shall subject to the general policies of Section 3.2.4, the performance measures of Section 3.2.5, and the detailed land use policies of Section 5.7, and, within the Greenbelt Protected Countryside designation, the detailed policies of Section 7.13. This EIS has been prepared per the policies of the Town to demonstrate no negative impact on the identified natural heritage features. Features were identified to trigger the completion of this report and include wetlands, woodlands, valley corridor, Habitat of threatened and endangered species, fish habitat and watercourses (West Humber and North-South tributary) Ecologically appropriate buffers have been applied to protect the features and their function. Mitigation measures have been recommended to minimize any potential effects of the development on the NHS.	Yes (Subject to Municipal, TRCA and provincial and federal agency approvals)
Toronto and Region Conservation Authority (TRCA) Polices and Regulations	TRCA regulated areas are present on the subject lands and therefore a permit will likely be required from the authority to proceed with site alteration. Beacon provided TRCA with a draft Terms of Reference (ToR) for this NHE in 2022 prior to completing the staking exercise. TRCA did not provide a review of the (ToR). It was communicated by TRCA that it was too early in the planning process for site-specific studies. TRCA did agree to conduct a feature staking of the north parcel under a Concept Development Application. Ecologically appropriate buffers have been applied to natural features to prevent any negative impacts and to enhance the Natural Heritage System Features and function. A buffer planting plan will be prepared to include additional plantings within the identified buffer areas. The addition of a planted buffer area will convert existing golf course to natural areas and will further bolster the utility of the buffer distance to protect the natural feature from potentially adverse impacts associated with the proposed development, in addition to increasing overall naturalized cover area.	Pending the provision of a permit under *Ontario Regulation 166/06* from TRCA.

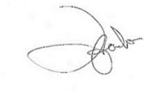
11. Conclusion

Beacon has conducted a background review and field investigations to prepare this NHE for the proposed subdivision development. Seasonal field studies including vegetation characterization, breeding bird surveys, amphibian call surveys and aquatic assessments were completed. The appropriate natural heritage policy framework was reviewed with respect to the PPS, Growth Plan, Town of Caledon Official Plan, as well as the TRCA regulations, ESA, *Fisheries Act* and *SARA*.

The proposed development has been described and an impact analysis undertaken in the context of natural heritage. The proposed development will occur largely within the current existing golf course area and result in the removal of one small isolated unevaluated wetland, the partial removal of riparian wetlands associated with the West Humber River tributaries, the infilling of a portion of four headwater features, individual tree loss and the removal of cultural meadow communities. The natural heritage corridor will be maintained and buffered resulting in an overall increase in areas within the NHS. These features will be compensated for through restoration and enhancement areas that will be identified in future stages of the planning and design process. Other general mitigation measures have been proposed and are to be adhered to, to ensure any potential adverse impacts to the natural system do not occur, including vegetation timing windows and ESC measures.

Subject to the implementation of the recommended mitigation measures, the proposed redevelopment of the subject lands demonstrates compliance and conformity with the relevant policies of the PPS, Region, Town, and the regulations of the TRCA Consultation with MECP and DFO will be complete at the appropriate stage in the planning process, to ensure compliance with and to obtain any necessary approvals, permits and authorizations under the ESA, *Fisheries Act* and SARA.

Report prepared by:
Beacon Environmental Ltd.



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Ecologist

Report reviewed by:
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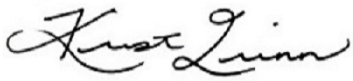

Kristi Quinn, B.E.S., Cert. Env. Assessment
Principal, Senior Environmental Planner

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Appendix A

Draft Plan of Subdivision

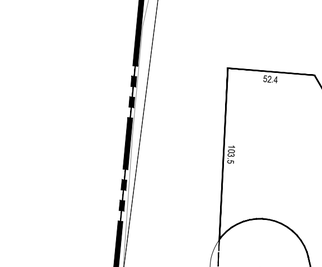
DRAFT PLAN OF SUBDIVISION

Part of Lots 19, 20 and 21
Concession 5,
East of Hurontario Street
Town of Caledon
Regional Municipality of Peel

Prepared For:

Geranium Corporation

KEY PLAN



SUBJECT PROPERTY

SCHEDULE OF LAND USE

LOT/BLOCK	LAND USE		UNITS	AREA (ha)
1-240	Single Detached Min. 13.40m	+	44	2.22
	Single Detached Min. 11.60m	o	164	6.53
	Single Detached Min. 9.75m	^	32	1.21
Blks 241-261	Street Townhouse Min. 6.0m	x	127	2.89
Blks 262-272	Lane Townhouse Min. 6.0m	L	62	1.39
Blks 273-277	Medium Density			3.98
Blks 278	Elementary School			2.06
Blks 280-284	Park			9.06
Blks 285-288	Storm Water Management Pond			5.40
Blk 289	Commercial			0.51
Blk 290	Firehall			0.86
Blks 291-293	Natural Heritage System			41.83
Blks 294-310	Future Residential			2.73
Blks 311-313	Road Widening			0.48
Blk 314	Open Space			0.02
Blks 315-319	0.3m Reserve			0.01
Streets A-B	22.0m Right of Way - 1,562m			3.53
Streets C-O	18.0m Right of Way - 3,308m			6.23
Laneway A-C	8.0m Right of Way - 233m			0.24
TOTAL			429	91.18

OWNER'S AUTHORIZATION

I hereby authorize Malone Given Parsons Ltd. to prepare and submit this Draft Plan of Subdivision to the Town of Caledon.

Geranium Corporation — Date

SURVEYOR'S CERTIFICATE

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

RPE — Date

ADDITIONAL INFORMATION

AS REQUIRED UNDER SECTION 51(17) OF THE PLANNING ACT, CHAPTER P.13(R.S.O. 1990).
(a),(e),(f),(g),(j),(l) - As shown of the Draft Plan.
(b),(c) - As shown on the Draft and Key Plan.
(d) - Land to be used in accordance with the Schedule of Land Use.
(i) - Soil is silt and clay loam.
(h),(k) - Full municipal services to be provided.

Date	Revision	By

MGP File No.: 22-3154
Date: August 29, 2023

Malone Given Parsons.
140 Renfrew Drive, Suite 201 | Markham, ON | L3R 6B3
905 513 0170 | mgp.ca

Appendix B

Photographic Record

Appendix B

Photographic Record of Aquatic Resources

West Humber River Tributaries (WHT-1, WHT-2 and WHT-3)

Photograph 1.
Representative View of the North Parcel Reach (WHT-1) of the West Humber River Tributary.

Photograph 2.
Representative View of the South Parcel Reach (WHT-1A) of the West Humber River Tributary.

Photograph 3.
Representative View of the Downstream Reach (WHT-2) of the North-South Tributary.

Photograph 4.
Representative View of the Upstream Reach (WHT-3) of the North-South Tributary.

Irrigation (Golf Course) Ponds

Photograph 5.
Pond A – View From South Shoreline Looking North (June 28, 2022).

Photograph 6.
Pond B – View From East Pathway Looking West (June 28, 2022).

Photograph 7.
Pond C – View From Southeast Shoreline Looking North (June 28, 2022).

Drainage Features

Photograph 8.
HDF 1 – Downstream View (April 12, 2023).

Photograph 9.
HDF 2 – Downstream View (April 12, 2023).

Photograph 10.
HDF 3A – Downstream View (April 12, 2023).

Photograph 11.
HDF 3B – Upstream View of Tile Drain Outfall (April 12, 2023).

Photograph 12.
HDF 3C – Downstream View (May 17, 2023).

Photograph 13.
HDF 4A – Downstream View of Tile Drain (April 12, 2023).

Photograph 14.
HDF 4B – Upstream View (April 12, 2023).

Photograph 15.
HDF 4C – Downstream View (May 17, 2023).

Photograph 16.
HDF 5 – Upstream View (April 12, 2023).

Photograph 17.
HDF 6 – Upstream View (April 12, 2023).

Photograph 18.
HDF 7 – Downstream View (April 12, 2023).

Photograph 19.
HDF 8 – Upstream View (April 12, 2023).

Photograph 20.
HDF 9 – Upstream View (April 12, 2023).

Photograph 21.
HDF 10 – Upstream View (April 12, 2023).

Photograph 22.
HDF 11 – Downstream View (April 12, 2023).

Photograph 23.
HDF 12 – Downstream View (April 12, 2023).

Photographic Record of Terrestrial Communities

Photograph 24. View of North Parcel (Golf Course Lands) (September 1, 2022)

Photograph 25. View of CUM1-1 Unit (September 1, 2022)

Photograph 26. View Within CUT1 Unit (September 1, 2022)

Photograph 27. View Outside of CUT1 (Background) and Surrounding CUM1 (Foreground) Within the South Parcel (June 30, 2023)

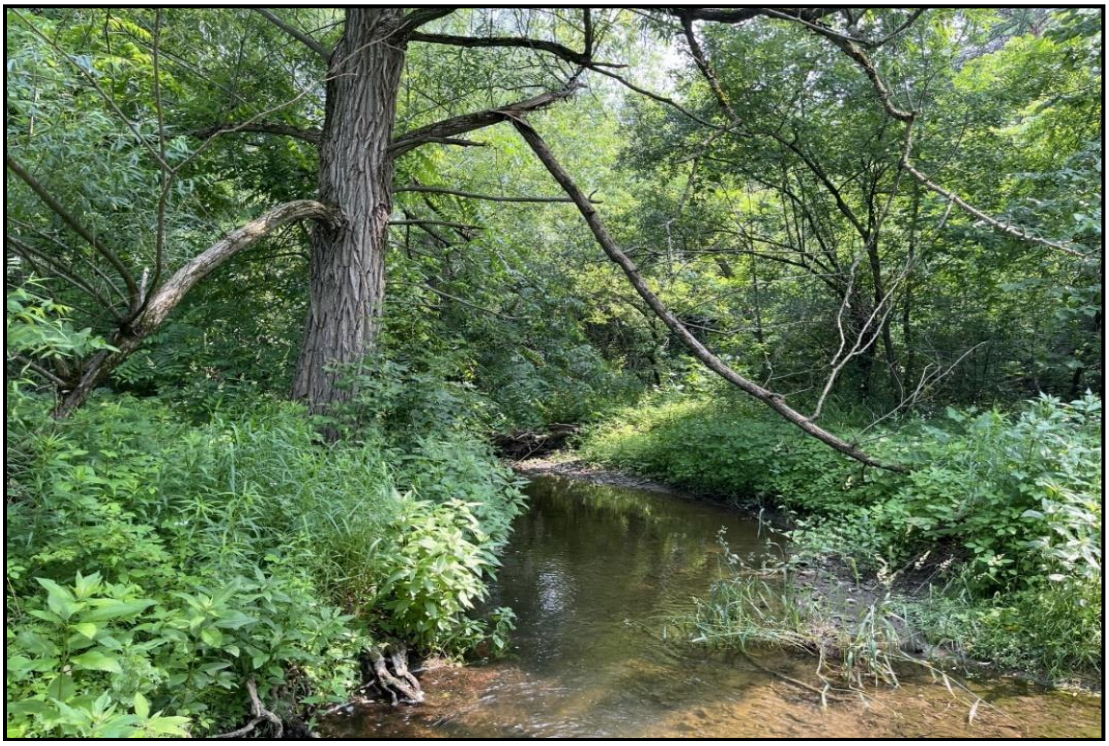
Photograph 28. View of Outside of CUW1a (June 30, 2023)

Photograph 29. View Within CUW1b (June 30, 2023)

Photograph 30. View Within FOD3 Community (June 30, 2023)

Photograph 31. View of MAM2-10 Unit (Foreground) with SWD4-1 (Background; September 1, 2022)

Photograph 32. View of Isolated MAS2-1 Community (May 26, 2023)



Photograph 33. View of SWD4 Community and West Humber River Tributary (June 30, 2023)

Photograph 34. Representative View of OAO Ponds (September 1, 2022)

Photograph 35. View of SAM1-4 Pond (June 30, 2023)

Appendix C

Summary of Functional Classifications and Management Recommendations

Appendix C

Summary of Functional Classifications and Management Recommendations

Drainage Feature Segment	Step 1 Hydrology	Step 1 Modifiers	Step 2 Riparian	Step 3 Fish Habitat	Step 4 Terrestrial Habitat	Management Recommendation per HDFA Guidelines	Rational	Final Management Recommendation
HDF-1	**Contributing Function:** minimal flow present in early spring. Channel was observed to be dry by late spring.	None	**Contributing Function**: the riparian corridor is dominated by lawn and there are no important or valued riparian functions**.**	**Contributing Function:** may contribute to the transport of allochthonous materials to downstream fish habitat.	**Limited Function:** no terrestrial habitat present.	Mitigation - *Contributing Functions: i.e., contributing fish habitat with meadow vegetation or limited cover.*	Ephemeral flow conditions, no meadow riparian vegetation or cover, no fish habitat, and no breeding amphibians.	No Management – *Limited Functions: i.e., features with no or minimal flow; cropped land or no riparian vegetation; no fish or fish habitat; and no amphibian habitat.* Partial removal of the feature is proposed. Replication of function shall be achieved through applying the proposed lot level/conveyance controls and stormwater management. Features existing connection to the North-South tributary shall be maintained within the NHS.
HDF-2	**Contributing Function:** minimal flow present in early spring. Channel was observed to be dry by late spring.	None	**Contributing Function:** the riparian corridor is dominated by lawn and there are no important or valued riparian functions.	**Contributing Function:** may contribute to the transport of allochthonous materials to downstream fish habitat.	**Limited Function:** no terrestrial habitat present.	Mitigation	Ephemeral flow conditions, no meadow riparian vegetation or cover, no fish habitat, and no breeding amphibians.	No Management Partial removal of the feature is proposed. Replication of function shall be achieved through applying the proposed lot level/conveyance controls and stormwater management. Features existing connection to the North-South tributary shall be maintained within the NHS.
HDF-3A	**Valued Function**: substantial flow in early spring transitioning to minimal flow by late spring. Channel was observed to be dry by summer.	None	**Important Function**: the riparian corridor is dominated by wetland.	**Contributing Function:** may contribute to the transport of allochthonous materials to downstream fish habitat.:	**Valued Function:** wetland habitat occurs within the corridor, but no breeding amphibians are present.	Conservation – *Valued Functions: i.e., seasonal fish habitat; with woody riparian cover; marshes with amphibian breeding habitat; or general amphibian habitat with woody riparian cover.*	No change in management recommendation.	Conservation Feature segment shall be maintained within the NHS.
HDF-3B	**Valued Function:** substantial flow in early spring transitioning to minimal flow by late spring. Channel was observed to be dry by summer.	Approximately 90% of feature segment is tiled.	**Contributing Function**: the riparian corridor is dominated by lawn and there are no important or valued riparian functions.	Not applicable due to modifier.	**Limited Function:** no terrestrial habitat present.	Mitigation.	No change in management recommendation.	Mitigation Full removal of the feature segment is proposed. Replication of function shall be achieved through applying the proposed lot level/conveyance controls and stormwater management. Features existing connection to the HDF-3 shall be maintained within the NHS.

Drainage Feature Segment	Step 1		Step 2	Step 3	Step 4	Management Recommendation per HDFA Guidelines	Rational	Final Management Recommendation
	Hydrology	Modifiers	Riparian	Fish Habitat	Terrestrial Habitat			
HDF 3C	**Valued Function:** substantial flow in early spring transitioning to minimal flow by late spring. Channel was observed to be dry by summer.	None	**Important Function:** the riparian corridor is dominated by forest.	**Valued Function:** may provide seasonal fish habitat.	**Valued Function:** wetland habitat occurs within the corridor, but no breeding amphibians are present.	Protection – *Important Functions: i.e., swamps with amphibian breeding habitat; perennial headwater drainage features; seeps and springs; Species at Risk (SAR) habitat; permanent fish habitat with woody riparian cover.*	No change in management recommendation.	Protection Feature segment shall be maintained within the NHS.
HDF 4A	**Limited Function:** standing water observed in early spring and dry conditions in late spring.	Approximately 90% of feature segment is tiled.	**Valued Function:** a portion of the riparian corridor is dominated by meadow, however there are no important riparian functions.	Not applicable due to modifier**.**	**Limited Function:** no terrestrial habitat present.	No Management Required – *Limited Functions: i.e., features with no or minimal flow; cropped land or no riparian vegetation; no fish or fish habitat; and no amphibian habitat.*	No change in management recommendation.	No Management Full removal of the feature segment is proposed. Replication of function shall be achieved through applying the proposed lot level/conveyance controls and stormwater management. Features existing connection to the HDF 4C segment shall be maintained within the NHS.
HDF4B	**Limited Function:** standing water observed in early spring and dry conditions in late spring.	None	**Contributing Function**: the riparian corridor is dominated by lawn and there are no important or valued riparian functions.	**Contributing Function**: may contribute to the transport of allochthonous materials to downstream fish habitat.	**Limited Function:** no terrestrial habitat present.	No Management	No change in management recommendation.	No Management Full removal of the feature segment is proposed. Replication of function shall be achieved through applying the proposed lot level/conveyance controls and stormwater management. Features existing connection to the HDF 4C segment shall be maintained within the NHS.
HDF-4C	**Valued Function:** substantial flow in early spring transitioning to minimal flow by late spring. Channel was observed to be dry by summer	Small portion tiled upstream (HDF 4A).	**Important Function:** the riparian corridor is dominated by forest.	**Valued Function:** may provide seasonal fish habitat.	**Contributing Function**: no wetland habitat occurs within the corridor, but other vegetation may be present to facilitate wildlife movement.	Conservation	No change in management recommendation.	Conservation Feature segment shall be maintained within the NHS.
HDF-5	**Limited Function:** dry conditions observed in early spring.	Flows into irrigation pond.	**Contributing Function**: the riparian corridor is dominated by lawn and there are no important or valued riparian functions.	Not applicable due to modifier.	**Limited Function:** no terrestrial habitat present.	No Management	No change in management recommendation.	No Management Feature segment shall be maintained within the NHS.
HDF-6	**Limited Function:** dry conditions observed in early spring.	Tiled and flows into irrigation pond.	**Contributing Function:** the riparian corridor is dominated by lawn and there are no	Not applicable due to modifier.	**Limited Function:** no terrestrial habitat present	No Management	No change in management recommendation.	No Management Feature segment shall be maintained within the NHS.

Drainage Feature Segment	Step 1		Step 2	Step 3	Step 4	Management Recommendation per HDFA Guidelines	Rational	Final Management Recommendation
	Hydrology	Modifiers	Riparian	Fish Habitat	Terrestrial Habitat			
			important or valued riparian functions.					
HDF-7	**Limited Function**: dry conditions observed in early spring.	None	**Contributing Function:** the riparian corridor is dominated by lawn and there are no important or valued riparian functions.	**Contributing Function:** may contribute to the transport of allochthonous materials to downstream fish habitat.	**Limited Function:** no terrestrial habitat present	No Management	No change in management recommendation.	No Management Feature segment shall be maintained within the NHS.
HDF-8	**Contributing Function:** standing water with some areas of minimal flow observed in early spring and dry conditions in late spring.	None	**Important Function:** the riparian corridor is dominated by thicket and forest.	**Contributing Function:** may contribute to the transport of allochthonous materials to downstream fish habitat.	**Contributing Function**: no wetland habitat occurs within the corridor, but other vegetation may be present to facilitate wildlife movement.	Conservation	May provide ephemeral flow during early spring freshet and large precipitation events, woody riparian vegetation that is segmented by the golf cart path and manicured grass, no fish habitat, and no records of breeding amphibians.	Mitigation Feature segment shall be maintained within the NHS.
HDF-9	**Limited Function**: dry conditions observed in early spring.	None	**Important Function:** the riparian corridor is dominated by forest.	**Contributing Function:** may contribute to the transport of allochthonous materials to downstream fish habitat.	**Contributing Function**: no wetland habitat occurs within the corridor, but other vegetation may be present to facilitate wildlife movement.	Maintain/ Replicate Terrestrial – *Terrestrial Functions: i.e., features with no flow with woody riparian vegetation and connects two other natural features identified for protection.*	No change in management recommendation.	Maintain/ Replicate Terrestrial Feature segment shall be maintained within the NHS.
HDF-10	**Contributing Function:** dry conditions observed in early spring; however. wetland occurs upstream.	Flows into irrigation pond.	**Contributing Function:** the riparian corridor is dominated by lawn and there are no important or valued riparian functions.	Not applicable due to modifier.	**Contributing Function:** feature connects two other features upstream and downstream that have records of breeding amphibians.	Mitigation	No change in management recommendation.	Mitigation Full removal of the feature segment is proposed. Replication of function shall be achieved through applying the proposed lot level/conveyance controls and stormwater management.
HDF-11	**Limited Function:** standing water and dry conditions observed in early spring.	None	**Valued Function**: riparian corridor is dominated by meadow however there are no important riparian functions	**Contributing Function:** may contribute to the transport of allochthonous materials to downstream fish habitat	**Valued Function:** ponded area provides general amphibian habitat and has records of breeding amphibians.	No Management	No change in management recommendation.	No Management Feature segment shall be maintained.
HDF-12	**Limited Function**: standing water and dry conditions observed in early spring.	None	**Limited Function:** the riparian corridor is	**Contributing Function:** may contribute to the transport of	**Limited Function:** no terrestrial habitat present.	No Management	No change in management recommendation.	No Management Full removal of the feature segment is proposed. Replication of function shall

Drainage Feature Segment	Step 1		Step 2	Step 3	Step 4	Management Recommendation per HDFA Guidelines	Rational	Final Management Recommendation
	Hydrology	Modifiers	Riparian	Fish Habitat	Terrestrial Habitat			
			dominated by cropped land.	allochthonous materials to downstream fish habitat.				be achieved through applying the proposed lot level/conveyance controls and stormwater management.

Appendix D

Floral Survey Data

Appendix D

Scientific Name	Common Name	COSEWIC	SARO	SRank	Rank (TRCA April 2019)	PEEL (Varga 2005)	GTA (Varga 2005)	Nat Status
Acer campestre	Hedge Maple			SE1	L+			I
Acer negundo	Manitoba Maple			S5	L+?			N
Acer nigrum	Black Maple			S4?	L4			N
Acer platanoides	Norway Maple			SE5	L+			I
Acer saccharinum	Silver Maple			S5	L4			N
Acer saccharum	Sugar Maple			S5	L5			N
Acer x freemanii	Freeman's Maple			SNA	L4			N
Achillea millefolium	Common Yarrow			SE5?	L+			I
Actaea rubra	Red Baneberry			S5				N
Alisma subcordatum	Southern Water-plantain			S4?	L3			N
Alliaria petiolata	Garlic Mustard			SE5	L+			I
Ambrosia artemisiifolia	Common Ragweed			S5	L5			N
Amphicarpaea bracteata	American Hog-peanut			S5	L5			N
Anemonastrum canadense	Canada Anemone			S5	L5			N
Arctium lappa	Great Burdock			SE5	L+			I
Arctium minus	Common Burdock			SE5	L+			I
Arisaema triphyllum	Jack-in-the-pulpit			S5	L5			N
Asclepias syriaca	Common Milkweed			S5	L5			N
Betula papyrifera	Paper Birch			S5	L4			N
Borago officinalis	Common Borage			SEH	L+			I
Bromus inermis	Smooth Brome			SE5	L+			I
Carduus crispus	Curled Thistle			SE2?				I
Carex stricta	Tussock Sedge			S5	L4			N
Carex vulpinoidea	Fox Sedge			S5	L5			N
Carya cordiformis	Bitternut Hickory			S5	L4			N
Celtis occidentalis	Common Hackberry			S4	L+		R	N
Ceratophyllum demersum	Common Hornwort			S5	L4	R3	U	N
Cichorium intybus	Wild Chicory			SE5	L+			I
Circaea canadensis	Broad-leaved Enchanter's Nightshade			S5				N
Cirsium arvense	Canada Thistle			SE5	L+			I
Cirsium vulgare	Bull Thistle			SE5	L+			I
Clematis virginiana	Virginia Clematis			S5	L5			N
Convolvulus arvensis	Field Bindweed			SE5	L+			I
Coreopsis lanceolata	Lance-leaved Tickseed			S4	L+			N
Cornus alternifolia	Alternate-leaved Dogwood			S5	L5			N
Cornus sericea	Red-osier Dogwood			S5	L5			N
Crataegus monogyna	English Hawthorn			SE4	L+			I
Crataegus sp.	Hawthorn sp.			S5	L5			N
Cuscuta gronovii	Swamp Dodder			S5	L4	R5	U	N
Daucus carota	Wild Carrot			SE5	L+			I
Diervilla lonicera	Northern Bush-honeysuckle			S5	L5			N
Dipsacus fullonum	Common Teasel			SE5	L+			I
Dryopteris carthusiana	Spinulose Wood Fern			S5	L5			N
Echinocystis lobata	Wild Cucumber			S5	L5			N
Eleocharis erythropoda	Red-stemmed Spikerush			S5	L5			N
Elodea canadensis	Canada Waterweed			S5	L4	R3	U	N
Elymus canadensis	Canada Wildrye			S5	L4	E	R	N
Epipactis helleborine	Broad-leaved Helleborine			SE5	L+			I
Equisetum arvense	Field Horsetail			S5	L5			N

Scientific Name	Common Name	COSEWIC	SARO	SRank	Rank (TRCA April 2019)	PEEL (Varga 2005)	GTA (Varga 2005)	Nat Status
Erigeron annuus	Annual Fleabane			S5	L5			N
Erigeron philadelphicus	Philadelphia Fleabane			S5				N
Euonymus obovatus	Running Strawberry-bush			S4	L3			N
Euthamia graminifolia	Grass-leaved Goldenrod			S5	L5			N
Eutrochium maculatum var. maculatum	Spotted Joe Pye Weed			S5	L5			N
Festuca rubra	Red Fescue			S5				N
Fragaria vesca	Woodland Strawberry			S5				N
Fragaria virginiana	Wild Strawberry			S5	L5			N
Fraxinus americana	White Ash			S4	L5			N
Fraxinus pennsylvanica	Red Ash			S4	L5			N
Geranium robertianum	Herb-Robert			S5	L+?			N
Geum urbanum	Wood Avens			SE3	L+			I
Glechoma hederacea	Ground-ivy			SE5	L+			I
Helianthus tuberosus	Jerusalem Artichoke			SU	L5			N
Hemerocallis fulva	Orange Daylily			SE5	L+			I
Hydrophyllum virginianum	Virginia Waterleaf			S5	L5			N
Hypericum perforatum	Common St. John's-wort			SE5	L+			I
Impatiens capensis	Spotted Jewelweed			S5	L5			N
Inula helenium	Elecampane			SE5	L+			I
Juglans nigra	Black Walnut			S4?	L5			N
Larix laricina	Tamarack			S5	L3			N
Lathyrus latifolius	Everlasting Pea			SE4	L+			I
Leersia oryzoides	Rice Cutgrass			S5	L5			N
Lemna minor	Small Duckweed			S5?	L5			N
Leonurus cardiaca	Common Motherwort			SE5				I
Leucanthemum vulgare	Oxeye Daisy			SE5	L+			I
Lilium michiganense	Michigan Lily			S4	L3	U	U	N
Lolium perenne	Perennial Ryegrass			SE4	L+			I
Lonicera tatarica	Tatarian Honeysuckle			SE5	L+			I
Lotus corniculatus	Garden Bird's-foot Trefoil			SE5	L+			I
Lythrum salicaria	Purple Loosestrife			SE5	L+			I
Malus pumila	Common Apple			SE4	L+			I
Matricaria chamomilla	Wild Chamomile			SE3	L+			I
Matteuccia struthiopteris	Ostrich Fern			S5				N
Melilotus officinalis	Yellow Sweet-clover			SE5	L+			I
Morus alba	White Mulberry			SE5	L+			I
Myosotis stricta	Upright Forget-me-not			SE4	L+			I
Nasturtium officinale	Watercress			SE	L+?			I
Nepeta cataria	Catnip			SE5	L+			I
Ostrya virginiana	Eastern Hop-hornbeam			S5	L5			N
Oxalis stricta	Upright Yellow Wood-sorrel			S5	L5			N
Parthenocissus vitacea	Thicket Creeper			S5	L5			N
Persicaria maculosa	Spotted Lady's-thumb			SE5	L+			I
Phalaris arundinacea	Reed Canarygrass			S5	L+?			N
Phleum pratense	Common Timothy			SE5	L+			I
Phragmites australis	Common Reed			S4?				N
Picea glauca	White Spruce			S5	L3	R3		N
Picea pungens	Blue Spruce			SE1	L+			I
Pilosella caespitosa	Meadow Hawkweed			SE5	L+			I
Pinus nigra	Austrian Pine			SE3	L+			I
Pinus resinosa	Red Pine			S5	L1	R1	R	N
Pinus strobus	Eastern White Pine			S5	L4			N
Pinus sylvestris	Scots Pine			SE5	L+			I

Scientific Name	Common Name	COSEWIC	SARO	SRank	Rank (TRCA April 2019)	PEEL (Varga 2005)	GTA (Varga 2005)	Nat Status
Plantago lanceolata	English Plantain			SE5	L+			I
Plantago major	Common Plantain			SE5	L+			I
Poa pratensis	Kentucky Bluegrass			S5				N
Populus balsamifera	Balsam Poplar			S5	L5			N
Populus grandidentata	Large-toothed Aspen			S5	L4			N
Populus x canadensis	Carolina Poplar			SNA	L+			I
Potentilla recta	Sulphur Cinquefoil			SE5	L+			I
Prunus serotina	Black Cherry			S5	L5			N
Prunus virginiana	Chokecherry			S5				N
Pyrus communis	Common Pear			SE4	L+			I
Quercus rubra	Northern Red Oak			S5	L4			N
Ranunculus acris	Common Buttercup			SE5	L+			I
Rhamnus cathartica	European Buckthorn			SE5	L+			I
Rhus typhina	Staghorn Sumac			S5	L5			N
Ribes cynosbati	Eastern Prickly Gooseberry			S5	L5			N
Rubus idaeus	Red Raspberry			S5				N
Rumex britannica	Greater Water Dock			S5	L4	R2	U	N
Rumex crispus	Curled Dock			SE5	L+			I
Sagittaria latifolia	Broad-leaved Arrowhead			S5	L4			N
Salix alba	White Willow			SE4	L+			I
Salix discolor	Pussy Willow			S5	L4			N
Salix eriocephala	Cottony Willow			S5	L5			N
Salix interior	Sandbar Willow			S5	L5	R5		N
Salix nigra	Black Willow			S4	L3	R4	R	N
Salix x fragilis	Hybrid Crack Willow			SNA	L+			I
Salix x sepulcralis	Weeping Willow			SNA	L+			I
Sambucus canadensis	Common Elderberry			S5	L5			N
Sanguinaria canadensis	Bloodroot			S5	L5			N
Schoenoplectus tabernaemontani	Soft-stemmed Bulrush			S5	L4			N
Solanum dulcamara	Bittersweet Nightshade			SE5	L+			I
Solidago altissima	Tall Goldenrod			S5	L5			N
Solidago canadensis	Canada Goldenrod			S5				N
Solidago flexicaulis	Zigzag Goldenrod			S5	L5			N
Sonchus arvensis	Field Sow-thistle			SE5				I
Symphyotrichum cordifolium	Heart-leaved Aster			S5	L5			N
Symphyotrichum lanceolatum	Panicled Aster			S5				N
Symphyotrichum novae-angliae	New England Aster			S5	L5			N
Syringa vulgaris	Common Lilac			SE5	L+			I
Tanacetum vulgare	Common Tansy			SE5	L+			I
Taraxacum officinale	Common Dandelion			SE5	L+			I
Tilia americana	Basswood			S5	L5			N
Trifolium hybridum	Alsike Clover			SE5	L+			I
Trifolium pratense	Red Clover			SE5	L+			I
Trifolium repens	White Clover			SE5	L+			I
Tripleurospermum inodorum	Scentless Chamomile			SE	L+			I
Tussilago farfara	Coltsfoot			SE5	L+			I
Typha angustifolia	Narrow-leaved Cattail			SE5	L+			I
Typha latifolia	Broad-leaved Cattail			S5	L4			N
Typha x glauca	Hybrid Cattail			SNA	L+			N
Ulmus americana	White Elm			S5	L5			N
Urtica dioica	Stinging Nettle			S5				N
Verbascum thapsus	Common Mullein			SE5	L+			I
Verbena hastata	Blue Vervain			S5	L5			N

Scientific Name	Common Name	COSEWIC	SARO	SRank	Rank (TRCA April 2019)	PEEL (Varga 2005)	GTA (Varga 2005)	Nat Status
Viburnum opulus	Cranberry Viburnum			S5				N
Vicia cracca	Tufted Vetch			SE5	L+			I
Vincetoxicum rossicum	European Swallowwort			SE5	L+			I
Viola sororia	Woolly Blue Violet			S5	L5			N
Vitis riparia	Riverbank Grape			S5	L5			N

Provincial S-Rank

S1 – Critically Imperiled: Critically imperiled 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.
S2 – Imperiled: Imperiled 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.
S3 – Vulnerable: Vulnerable 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.
SNA – Not Applicable: A conservation status rank is not applicable because the species is not a suitable target for conservation activities (usually refers to non-native species).
SU – Unrankable: Currently unrankable due to lack of information or due to substantially conflicting information about status or trends.

TRCA RANK, Level of conservation concern in TRCA Region

L5 – Able to withstand high levels of disturbance; generally secure throughout the jurisdiction, including the urban matrix.
L4 – Able to withstand some disturbance; generally secure in rural matrix; of concern in urban matrix.
L3 – Able to withstand minor disturbance; generally secure in natural matrix; considered to be of regional concern.
L2 – Unable to withstand disturbance; some criteria are very limiting factors and generally, occur in high-quality natural areas, in natural matrix; probably rare in the TRCA jurisdiction; of concern regionally.
L1 – Unable to withstand disturbance; many criteria are limiting factors and generally occur in high-quality natural areas in natural matrix; almost certainly rare in the TRCA jurisdiction; of concern regionally.

COSEWIC = Committee on the Status of Endangered Wildlife in Canada

Species at Risk in Ontario List (as applies to ESA) as designated by COSSARO (Committee on the Status of Species at Risk in Ontario),

Appendix E

Breeding Bird Survey Data

Appendix E

Breeding Bird Data – North Parcel

Common Name	Scientific Name	Status					# Pairs/Territories
		National Species at Risk COSEWIC[1]	Species at Risk in Ontario Listing [2]	Provincial breeding season SRANK [3]	TRCA Status [4]	Area-sensitive (OMNR) [5]	
Great Blue Heron	*Ardea herodias*			S4	L3		foraging
Green Heron	*Butorides virescens*			S4	L4		1
Canada Goose	*Branta canadensis*			S5	L5		3
Wild Turkey	*Meleagris gallopavo*			S5	L3		1
Killdeer	*Charadrius vociferus*			S5	L4		3
Spotted Sandpiper	*Actitis macularia*			S5	L4		2
Rock Pigeon	*Columba livia*			SNA	L+		2
Mourning Dove	*Zenaida macroura*			S5	L5		3
Red-bellied Woodpecker	*Melanerpes carolinus*			S4	L4		3
Downy Woodpecker	*Dryobates pubescens*			S5	L5		2
Hairy Woodpecker	*Dryobates villosus*			S5	L4	A	1
Northern Flicker	*Colaptes auratus*			S4	L4		1
Eastern Wood-Pewee	*Contopus virens*	SC	SC	S4	L4		3
Willow Flycatcher	*Empidonax traillii*			S5	L4		4
Least Flycatcher	*Empidonax minimus*			S4	L3	A	1
Eastern Phoebe	*Sayornis phoebe*			S5	L5		1
Great Crested Flycatcher	*Myiarchus crinitus*			S4	L4		2
Eastern Kingbird	*Tyrannus tyrannus*			S4	L4		3
Horned Lark	*Eremophila alpestris*			S5	L3		3
Tree Swallow	*Tachycineta bicolor*			S4	L4		1
Barn Swallow	*Hirundo rustica*	SC	SC	S4	L4		4
Blue Jay	*Cyanocitta cristata*			S5	L5		2
American Crow	*Corvus brachyrhynchos*			S5	L5		1
Black-capped Chickadee	*Poecile atricapillus*			S5	L5		5
House Wren	*Troglodytes aedon*			S5	L5		2
American Robin	*Turdus migratorius*			S5	L5		11
Gray Catbird	*Dumetella carolinensis*			S4	L4		5

Common Name	Scientific Name	Status					# Pairs/Territories
		National Species at Risk COSEWIC[1]	Species at Risk in Ontario Listing [2]	Provincial breeding season SRANK [3]	TRCA Status [4]	Area-sensitive (OMNR) [5]	
Brown Thrasher	*Toxostoma rufum*			S4	L3		1
Cedar Waxwing	*Bombycilla cedrorum*			S5	L5		2
European Starling	*Sturnus vulgaris*			SE	L+		4
Warbling Vireo	*Vireo gilvus*			S5	L5		2
Red-eyed Vireo	*Vireo olivaceus*			S5	L4		3
Yellow Warbler	*Setophaga petechia*			S5	L5		7
American Redstart	*Setophaga ruticilla*			S5	L4	A	4
Common Yellowthroat	*Geothlyphis trichas*			S5	L4		3
Northern Cardinal	*Cardinalis cardinalis*			S5	L5		6
Rose-breasted Grosbeak	*Pheucticus ludovicianus*			S4	L4		1
Indigo Bunting	*Passerina cyanea*			S4	L4		3
Chipping Sparrow	*Spizella passerina*			S5	L5		8
Vesper Sparrow	*Pooecetes gramineus*			S4	L3		1
Savannah Sparrow	*Passerculus sandwichensis*			S4	L4	A	7
Song Sparrow	*Melospiza melodia*			S5	L5		11
Red-winged Blackbird	*Agelaius phoeniceus*			S4	L5		7
Eastern Meadowlark	*Sturnella magna*	THR	THR	S4	L3	A	1
Common Grackle	*Quiscalus quiscula*			S5	L5		2
Brown-headed Cowbird	*Molothrus ater*			S4	L5		1
Orchard Oriole	*Icterus spurius*			S4	L5		1
Baltimore Oriole	*Icterus galbula*			S4	L5		2
House Finch	*Haemorhous mexicanus*			SNA	L+		1
American Goldfinch	*Spinus tristis*			S5	L5		6
House Sparrow	*Passer domesticus*			SNA	L+		2

Field Work Conducted On: June 3 and July 11, 2022

Number of Species: 50 + 1 foraging
Number of (provincial and national) Species at Risk: Eastern Meadowlark (THR), Barn Swallow (SC) and Eastern Wood-pewee (SC)
Number of S1 to S3 Species: 3
Number of TRCA L1, L2 and L3 Species (Species of Concern): 0
Number of Area-sensitive Species: 0

Table Key
1) COSEWIC = Committee on the Status of Endangered Wildlife in Canada

2) Species at Risk in Ontario List (as applies to ESA) as designated by COSSARO (Committee on the Status of Species at Risk in Ontario); *END = Endangered, THR = Threatened and SC = Special Concern*.

3) SRANK (from Natural Heritage Information Centre) for breeding status if: *S1 (Critically Imperiled), S2 (Imperiled), S3 (Vulnerable), S4 (Apparently Secure), S5 (Secure), SNA (Not applicable…'because the species is not a suitable target for conservation activities'; includes non-native species).*

4) Ontario Ministry of Natural Resources (OMNR). 2000. Significant Wildlife Habitat Technical Guide (Appendix G). 151 p plus appendices.

5) Toronto and Region Conservation Authority L rank (2019): *L1 to L3 Regional species of concern from highest to lowest; L4 Urban concern; L5 Secure through region; L+ Non-native.*

Breeding Bird Data – South Parcel

Common Name	Scientific Name	Status					# Pairs/Territories
		National Species at Risk COSEWIC[1]	Species at Risk in Ontario Listing [2]	Provincial breeding season SRANK [3]	TRCA Status [4]	Area-sensitive (OMNR) [5]	
Mallard	*Anas platyrhynchos*			S5	L5		1
Killdeer	*Charadrius vociferus*			S5	L5		2
Mourning Dove	*Zenaida macroura*			S5	L5		1
Red-bellied Woodpecker	*Melanerpes carolinus*			S4	L4		1
Hairy Woodpecker	*Picoides villosus*			S5	L4	A	1
Eastern Wood-Pewee	*Contopus virens*	SC	SC	S4	L4		1
Eastern Kingbird	*Tyrannus tyrannus*			S4	L4		1
Tree Swallow	*Tachycineta bicolor*			S4	L4		2
Barn Swallow	*Hirundo rustica*	SC	SC	S4	L4		foraging
Blue Jay	*Cyanocitta cristata*			S5	L5		1
American Robin	*Turdus migratorius*			S5	L5		3
Gray Catbird	*Dumetella carolinensis*			S4	L4		1
Brown Thrasher	*Toxostoma rufum*			S4	L3		2
Cedar Waxwing	*Bombycilla cedrorum*			S5	L5		1
European Starling	*Sturnus vulgaris*			SE	L+		2
Yellow Warbler	*Setophaga petechia*			S5	L5		2
American Redstart	*Setophaga ruticilla*			S5	L3	A	1
Northern Cardinal	*Cardinalis cardinalis*			S5	L5		2
Eastern Towhee	*Pipilio erythrophthalmus*			S4	L3		1
Chipping Sparrow	*Spizella passerina*			S5	L5		1
Savannah Sparrow	*Passerculus sandwichensis*			S4	L4	A	6

Common Name	Scientific Name	Status					# Pairs/Territories
		National Species at Risk COSEWIC[1]	Species at Risk in Ontario Listing [2]	Provincial breeding season SRANK [3]	TRCA Status [4]	Area-sensitive (OMNR) [5]	
Song Sparrow	*Melospiza melodia*			S5	L5		4
Bobolink	*Dolichonyx oryzivorus*	THR	THR	S4	L2	A	7
Red-winged Blackbird	*Agelaius phoeniceus*			S4	L5		8
Common Grackle	*Quiscalus quiscula*			S5	L5		1
Brown-headed Cowbird	*Molothrus ater*			S4	L5		1
Orchard Oriole	*Icterus spurius*			S4	L5		1
Baltimore Oriole	*Icterus galbula*			S4	L5		2
American Goldfinch	*Spinus tristis*			S5	L5		2
House Sparrow	*Passer domesticus*			SNA	L+		2

Field Work Conducted On: June 3 & 27 and July 4, 2023

Number of Species: 29 + 1 foraging

Number of (provincial and national) Species at Risk: 2 – Bobolink (THR) and Eastern Wood-pewee (SC)

Number of S1 to S3 Species: 0

Number of Regionally Rare Species: 0

Number of TRCA L1, L2 and L3 Species (Species of Concern): 4

Number of Forest Area-sensitive Species: 2

Number of Grassland Area-sensitive Species: 2

Table Key

1) COSEWIC = Committee on the Status of Endangered Wildlife in Canada
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3) SRANK (from Natural Heritage Information Centre) for breeding status if: *S1 (Critically Imperiled), S2 (Imperiled), S3 (Vulnerable), S4 (Apparently Secure), S5 (Secure), SNA (Not applicable…'because the species is not a suitable target for conservation activities'; includes non-native species).*
4) Ontario Ministry of Natural Resources (OMNR). 2000. Significant Wildlife Habitat Technical Guide (Appendix G). 151 p plus appendices.
5) Toronto and Region Conservation Authority L rank (2019): *L1 to L3 Regional species of concern from highest to lowest; L4 Urban concern; L5 Secure through region; L+ Non-native.*

Appendix B4 – Feature Staking

SKETCH TO ILLUSTRATE STAKED TOP OF BANK, TREED LIMIT AND WETLAND MAYFIELD TULLAMORE LANDOWNER GROUP

SCALE 1:2000

0m 20m 40m 80m 120m 160 metres

R-PE SURVEYING LTD., O.L.S.

METRIC

CAUTION

THIS IS NOT A PLAN OF SURVEY AND SHALL NOT TO BE USED EXCEPT FOR THE PURPOSE INDICATED IN THE TITLE BLOCK.

LEGEND

- DENOTES STAKED TOP OF BANK (MAY 30, 31 AND JUNE 3, 2024)
- /TL DENOTES STAKED TREED LIMIT (MAY 30, 31 AND JUNE 3, 2024)
- DENOTES STAKED TOP OF BANK (OCTOBER 18, 2022 AND AUGUST 23, 2023)
- DENOTES STAKED TL (OCTOBER 18, 2022)
- /WL DENOTES STAKED WETLAND (JULY 4, 5 AND 8, 2022)

NOTES

BOUNDARIES ARE NOT CERTIFIED BY THIS PLAN, AND ARE SUBJECT TO CLARIFICATION UPON THE INCORPORATION OF ADDITIONAL DOCUMENTARY AND FIELD SURVEY EVIDENCE.

THE SURVEY WAS COMPLETED ON THE 8th DAY OF JULY 2024.

SKETCH IS AN ORIGINAL COPY IF EMBOSSED BY THE SURVEYOR.

OLD SCHOOL ROAD

BRAMALEA ROAD

TORBRAM ROAD

MAYFIELD ROAD

NON-PARTICIPATING PROPERTY

ANATOLIA

BROCCOLINI

TACC DEVELOPMENTS

SUNDIAL

DG GROUP

DG GROUP (SENTINEL HOLDINGS)

MAYFIELD GOLF COURSE INC.

TULLAMORE RESIDENTIAL LTD.

TORCHIA LANDS

R-PE SURVEYING LTD.
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DRAWN: S.A.
JOB No. 24-149 CAD FILE No.24149tp01b-UTM-CSRS

Technical Memorandum

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Via Email:	kbeckman@devcoll.com, jason.elliot@caledon.ca, mike.hynes@trca.ca
To:	Mayfield Tullamore Landowner Group, Town of Caledon, Toronto Region Conservation Authority (TRCA)
From:	Shelley Lohnes, Vice President, Senior Ecologist Russell Wiginton, P. Eng., Senior Geotechnical Engineer
cc:	nick.cascone@trca.ca; maria.parish@trca.ca; cassie.schembri@caledon.ca
Date:	July 24, 2024
Re:	June and July Feature Staking Summary Memo – Mayfield-Tullamore Landowner Group Properties, Caledon, Ontario
Project No.:	2400278

Introduction

This memo summarizes the key decisions and next steps regarding feature staking led by GEI Consultants Canada Ltd., (GEI) with SCS Consulting Group Ltd. (SCS), the Town of Caledon and the Toronto and Region Conservation Authority (TRCA) at Mayfield-Tullamore Landowner Group (MTLOG) properties on May 30, 31, and June 3, 2024 for treed limit and top of bank staking, and July 4, 5, and 8, 2024 for wetland staking. These surveyed limits have been overlaid on aerial imagery for review and comments (attached). The dripline has been denoted as the "Staked Treed Limit" as there are some areas that will require further study to ascertain the final dripline limit. These are described further below.

GEI was provided with the following drawing following the on-site field staking activities:

- *"Sketch to Illustrate Staked Top of Bank, Treed Limit and Wetland - Mayfield Tullamore Landowner Group,"* Job No. 24-149, dated July 8, 2024, by R-PE Surveying Ltd (attached)

The drawing shows the staked locations, denoted with "Bank – Top #" and the connected red linework showing the Top of Bank (TOB) location. GEI geotechnical engineering staff reviewed this drawing and added blue callout text (attached) that summarizes on-site discussions with TRCA staff during the TOB staking fieldwork pertaining to un-staked locations and areas for potential future study. The TOB linework will be used as part of the slope stability assessment to determine the Long-Term Stable Top of Slope (LTSTOS) location for the participating properties.

Staking was not completed within Properties 9 and 10 as this was completed by Beacon Environmental in 2022 and 2023 with the TRCA. As a result, the top of bank and treed limit for these properties will be incorporated into the Phase 1 Subwatershed Study.

As part of this staking exercise, the following assumptions were made:

- Where dripline staking was not completed (i.e., for invasive Buckthorn dominated areas), it was agreed that the boundaries of any woodlands within these thickets would be represented by GEI's ELC mapping.
- Areas where woodlands were present, but within the staked top of bank limits, the boundaries of these woodlands would be represented by GEI's ELC mapping; and
- Areas where wetland were present, but within the staked top of bank or treed limits, the boundaries of these wetlands would be represented by GEI's ELC mapping.

The following summary has been prepared for each land parcel/owner within the MTLOG, property numbers are identified in (**Figure 3, Appendix A**).

Property 1

Staked Tree Limits

- Following a review of the preliminary ELC completed by GEI, it was determined that the retired apple orchards on the Anatolia property do not meet the established 0.5-hectare woodland threshold (shown as "Orchard" on current ELC mapping). In accordance with the agreements reached during field assessments with the Town of Caledon, these areas will not be staked as woodlands. The Subwatershed Study (SWS) report will include additional text to support the decision made within the field to not stake these orchards based on the Town's policies.
- A community currently mapped as forest (FODM7-7) included two hedgerow features extending south along each side of the large pond (OAO). These hedgerows were staked as being part of the woodland/treed limit with the understanding that they will be further reviewed as part of the SWS as to whether they are considered "Woodlands" in accordance with the Town's Official Plan. Subsequent review will examine the length to width ratio of each feature, and/or consist of stem density plots to determine if they meet the definition of a woodland. These have been identified as future study areas (**Figure 1, Appendix A**).
- Woodlands in the southwest corner of the property contain forest and cultural woodland features, as well as European Buckthorn thickets. The point of transition from one feature to another – particularly where Buckthorn becomes dominant, may require additional surveys (e.g., stem density plots) to ensure the division between woodland/forest and shrub thicket reflects stem density data rather than visual interpretation. These have been identified as future study areas (**Figure 1, Appendix A**).

Staked Top of Bank (TOB)

- **Figure 2** (**Appendix A**) shows several locations where TOB staking was not required because the system was unconfined as discussed and confirmed with TRCA.
- TRCA did not require staking for the large pond through the middle of the property. TRCA confirmed that a TOB can be established for this area based on existing LiDAR data and GEI's discretion, as needed.
- The TOB could not be accessed for staking in several locations in the southern part of the property due to dense vegetation cover, barbed wire fence, or other access restrictions. TRCA confirmed that the existing LiDAR data and judgement will be used to determine the TOB

location in these locations, and the TOB will tie into the locations where physical staking occurred.

- The east side of the confined valley system at the northern extent of the property showed potential visual indications of some historic filling to create golf tee blocks. TRCA confirmed that the staked TOB could be re-visited in this area if additional study (e.g. location specific boreholes, review of historic aerial images, etc.) show evidence that the slope was altered by filling.
- Another staked area that TRCA confirmed could be discussed further is located near Bramalea Road, on the east side of the property and northeast of the golf clubhouse. In this location, the staked TOB could be part of the road cut where Bramalea Road extends down into the valley and across the watercourse to the south. The TOB specific to the confined valley system is potentially farther south. It is noted that the TOB is within or near staked dripline, so depending on the LTSTOS position relative to dripline setbacks, further discussion on the staked TOB in this location could be inconsequential.

Wetlands

- Three wetland communities were staked on this property; a SWT2-5 towards the southwestern portion of the property near the Greenbelt Plan Area boundary, a MAM2-2 near the southeast corner of the property within the Greenbelt Plan Area boundary, and a SAF1-3 community located in the northwest portion of the property. For the MAM2-2 and SAF1-3 community, only a small portion along the southeaster limits of the feature were staked, and the remainder of the feature was defined based on ELC based on confirmation of that approach with the TRCA.

Property 2

Staked Treed Limits

- Much of the southern edge of the naturalized valley land feature to the north consisted of European Buckthorn, which the Town agreed would not qualify as woodland; such features were not staked. However, portions of that feature contained associations of Hawthorn, which the Town treats as a woodland tree species. Therefore, those areas were staked with the understanding that future surveys (i.e., stem density surveys) might be completed to verify those boundaries. These have been identified as future study areas.
- A very deep north/south trench was observed within the valley near Bramalea Road, starting near the agricultural field. It appeared to be created by erosion.

Staked Top of Bank

- The TOB could not be accessed for staking in several locations along the northern extent of the Broccolini North property due to dense vegetation cover, barbed wire fence, or other access restrictions. TRCA confirmed that the existing LiDAR data and judgement will be used to determine the TOB location in these locations, and the TOB will tie into the locations where physical staking occurred.

- The TOB for the easternmost extent of the southern confined valley wall near Bramalea Road was similarly not staked due to access restrictions. This area is noted to contain an erosion gully, potentially formed by an outletting tile drain or from road runoff. This erosion gully is captured in the existing LiDAR data which will be used to establish the TOB.

Wetlands

- One MAMM1-12 community was staked that crosses between Property 2 and Property 3. No areas were identified for further discussion.

Property 3

Staked Treed Limits

- The woodland dripline in the southwest corner was generally agreed upon with a couple of points of contention:
    - A live Manitoba Maple was leaning to a position where it was nearly laying on the ground and therefore extended out a couple of meters beyond the rest of the dripline. GEI's position is that this is a deviation to the overall dripline and should be excluded, but the Town did not agree and included it in the staking.
    - The boundary where the woodland transitions into thicket (north end) could be subject to further additional studies if necessary (where property access allows).
    - These have been identified as future study areas.

Staked Top of Bank

- A small section of the watercourse in the southwestern corner of the property contains a confined valley system with distinct valley walls. TRCA did not stake the TOB in this location as the TOB was determined to be located within the woodlot limit. TRCA confirmed that the LiDAR data can be used to determine the TOB as needed for the slope stability assessment.
- The remaining part of the system in the southwestern corner was confirmed by TRCA to be unconfined, hence no TOB staking was required.

Wetlands

- One MAMM1-12 community was staked that crosses between Property 2 and Property 3. No areas were identified for further discussion.

Property 4

Staked Treed Limits

- The farm / residential area in the northwest part of the property contained coniferous plantations along each side of the watercourse. Portions of this woodland extended out as linear,

hedgerow-like features. While some of those features were excluded from dripline staking, others were included with recognition that further studies may be require to determine if it meets the woodland criteria (e.g. review the length vs width). These have been identified as future study areas.

- A small woodland in this farm / residential area was present along Old School Road; preliminary ELC mapping did not recognize this as a woodland due to its small size and association with the residential land use. The Town agreed, but commented on its value from a restoration perspective, being within the valley feature.

Staked Top of Bank

- TRCA confirmed that a small section of the system near the northern extent of the property was unconfined, hence a TOB was not staked.
- The TOB was staked for the eastern side of the system at the northern extent of the property. TRCA are open for further discussion about the TOB in this location should additional boreholes, aerial images, or other resources show that filling occurred as part of the adjacent residential development.
- The staked TOB extends out westward within the wooded area near the southern extent of the property. Some visual evidence of potential filling was observed in this area. TRCA is open to further discussion on the staked TOB in this location, if boreholes, aerial images, or similar information show evidence of historic filling.
- Physical property limits were unclear on site during the field staking. A section of the confined valley system at the southern extent of the property was not staked, so LiDAR data and GEI's discretion will be used to extend the TOB farther south to the property line.
- A watercourse meanders through the east side of the property, and transitions from a confined system (with a staked TOB) to an unconfined system (no TOB staking required) as confirmed with TRCA. A section of the confined valley system in the northeastern corner of the property could not be staked due to thick poison ivy covering the ground. The LiDAR data will be used to establish the remaining TOB north of the staked TOB.

Wetlands

- Riparian wetland features (MAM2-2) were staked within the valleyland feature on this property for areas that did not otherwise have treed limits or staked top of bank to define the greatest constraint of the valley.
- The western extent of the MAM2-2 within the Greenbelt Plan Area between property 4 and 7 was staked as well to identify the constraint limits within the valleyland feature.
- No areas were identified for further discussion.

Property 5

Staked Treed Limits

- No areas were identified for further discussion; dripline staking locations were agreed upon by GEI and the Town.

Staked Top of Bank

- The TOB was staked along one section of the confined valley where it is potentially the greater constraint relative to the staked dripline. LiDAR will be used to determine the TOB within the staked wooded areas, as needed.

Wetlands

- Three wetland features were staked on this property; this first is a MAMM1-2 along Bramalea Road to the west. The second is a MAM2-2 that straddles the southern property boundary; this wetland is mostly located within the Greenbelt Plan Boundary. The final wetland was identified along the northern property boundary, where only the participating portions of the wetland could be staked. No areas were identified for further discussion.

Property 6

Staked Tree Limits

- The dripline staking was restricted to the large woodland. No areas were identified for further discussion; dripline staking locations were agreed upon by GEI and the Town.

Staked Top of Bank

- No TOB staking was required for this property.

Wetlands

- One wetland feature (MAM2-2) was staked towards the northeastern portion of the property near the property boundary. No areas were identified for further discussion

Property 7

Staked Treed Limits

- The dripline staking was generally straightforward with minimal disagreement. A single mid-age tree was disputed along Torbram Road, the species of which was not consistent with species within the coniferous plantation and also occurred outside the general dripline of the plantation. GEI argued the tree should be excluded but the Town requested it be included. Of note, this tree may be located within the regional right-of-way which may be subject to disturbance through road widening activities proposed for Torbram Road.

Staked Top of Bank

- A watercourse meanders through the property, and transitions from a confined system (with a staked TOB) to an unconfined system (no TOB staking required) as confirmed with TRCA. Most of the system is unconfined on the property. A section of the confined valley system in the

northwestern corner of the property could not be staked due to thick poison ivy covering the ground. The LiDAR data will be used to establish the remaining TOB north of the staked TOB.

Wetlands

- All wetland features are located within the Greenbelt Plan Area – as such, only the outer limits were staked.
- This includes the MAM2-2 feature that follows the watercourse between property 4 and 7 – the eastern limits of this feature were staked within property 7.
- Three addition wetland limits were staked along the southern portion of the property, this includes an MAM2-2, SWD4-1, and SAF1-3.
- No areas were identified for further discussion.

Property 8

Staked Treed Limits

- The wooded area in the northeast corner contained Buckthorn thicket dominated portions, as well as treed woodland. Portions of the Buckthorn thickets were excluded from dripline staking, while other sections were included. Although GEI generally agrees with the staking, there was recognition that a stem density survey could potentially demonstrate absence of woodland. This was the case where the wooded area abuts Property 7 lands to the north (but occurs primarily on property 9 to the south). These have been identified as future study areas (**Figure 1, Appendix A**).

Staked Top of Bank

- The TOB for the confined valley system was staked in the northeastern corner of the property, within the staked wooded area. Two erosion gullies were observed and staked, appearing to be the result of outletting tile drains. TRCA is open to further discussion on the two gully features being staked as the TOB which extend into the tableland. However, it is noted that the provincial document *Technical Guide – River and Stream Systems: Erosion Hazard Limit* (MNR, 2002) discusses that erosion gullies formed from natural overland drainage or from human-made drainage such as farm field tiles are considered part of the confined valley system and process. As the gully widens over time, the slope crest recedes, and tableland is lost. Depending on the final setbacks required from the staked dripline, the LTSTOS may not be the greatest constraint in this area.

Wetlands

- While most wetland communities within this property will be protected as part of the Greenbelt Natural Heritage System, one MAM2-2 feature was staked along its western limits where there were no treed limits staked during previous staking dates.
- The MAM2-2 and MAS2-1 communities associated with a headwater drainage feature running north-south were staked.
- No areas were identified for further discussion

Property 11

Staked Tree Limits

- The lot containing the old farm foundation (shown as Disturbed in ELC mapping) was in the process of being removed; no trees were present.
- Portions of the wooded area within the valley were excluded from dripline staking due to a prevalence of Buckthorn, while other sections were included at the Towns request due to associations of Hawthorn and other sparsely scattered trees; those areas were staked with the understanding that it could be contested with additional studies (e.g., stem density surveys). These have been identified as future study areas (**Figure 1, Appendix A**).
- The woodland along the west edge of the property was generally agreed to occur along the property edge with little encroachment into DG-4 lands.

Staked Top of Bank

- The TOB was staked for the south side of the confined valley system in the northeastern corner of the property.
- An erosion gully was observed in one location and was staked as part of the TOB. The erosion gully was likely from a tile drain outlet. TRCA is open for further discussion about the gully being staked as the TOB, which extends back into the tableland. As previously mentioned, the provincial document *Technical Guide – River and Stream Systems: Erosion Hazard Limit* (MNR, 2002) discusses that erosion gullies formed from natural overland drainage or from human-made drainage such as farm field tiles are considered part of the confined valley system and process. As the gully widens over time, the slope crest recedes, and tableland is lost. Depending on the final setbacks required from the staked dripline in this location, the LTSTOS may not be the greatest constraint in this area.
- In the northeastern-most corner of the property on the north side of the confined valley, the TOB was not staked due to access restrictions including dense vegetation and fences. TRCA confirmed that LiDAR data will be used to determine the TOB in this location, and should tie into the TOB as staked by TRCA on August 28, 2023, on the adjacent property to the north.

Wetlands

- Two MAM2-2 communities were staked associated the drainage feature in the western portion of property 11.
- No areas were identified for further discussion.

Incidental Observations

The following wildlife observations were made incidentally during the staking process:

<u>May 30th, 31st, June 3rd</u>

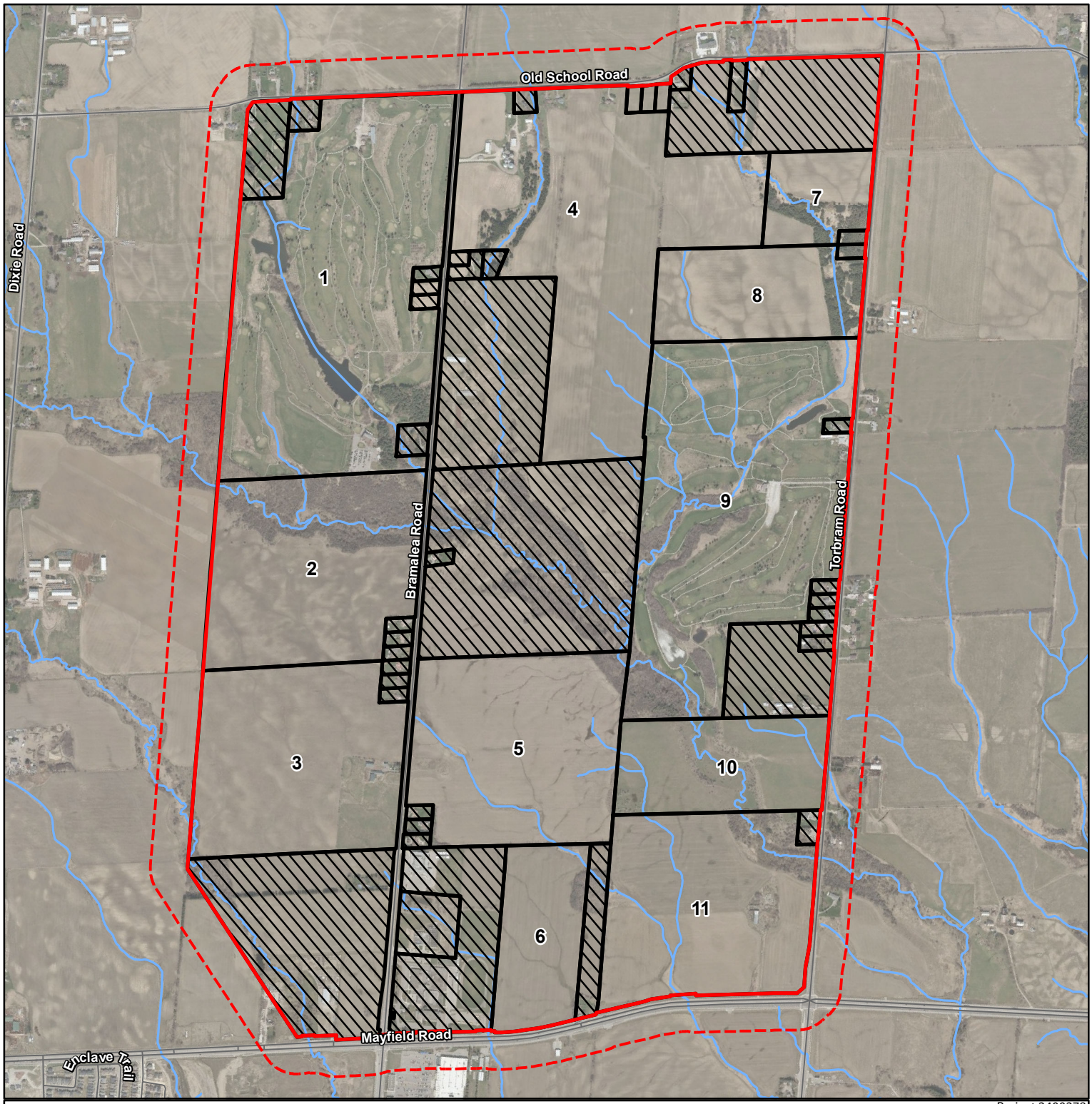
- Bobolink sightings near Property 11 (within West Humber Valleyland) and Property 3 (near fallow agricultural areas).
- Eastern Gartersnake near Property 11 (along outer limit of vegetated area).
- Snapping Turtle observations (nesting and basking) at Property 1.
- Eastern Meadowlark sightings at Property 1.
- Eastern-Wood Pewee sightings at Property 1 in multiple locations.
- American Toad toadlets at Property 6.

July 4th, 5th , and 8th

- Beaver sighting within Greenbelt Plan Area at Property 7.
- Snapping turtle sightings within Greenbelt Plan Area at Property 7.
- American Toad toadlets at Property 6.

Attachments

- Sketch to Illustrate Staked Top of Bank, Treed Limit and Wetland (R-PE)
- Figure 1-2: Participating Properties in the Local SWS Area
- Figure 3: Ecological Land Classification
- GEI Mark Up of Sketch to Illustrate Staked Top of Bank, Treed Limit and Wetland



Project 2400278

Mayfield Tullamore Landowner Group
Phase 1 - Subwatershed Characterization and Integration Report

Figure 1-2
Participating Properties in Local Subwatershed Study Area

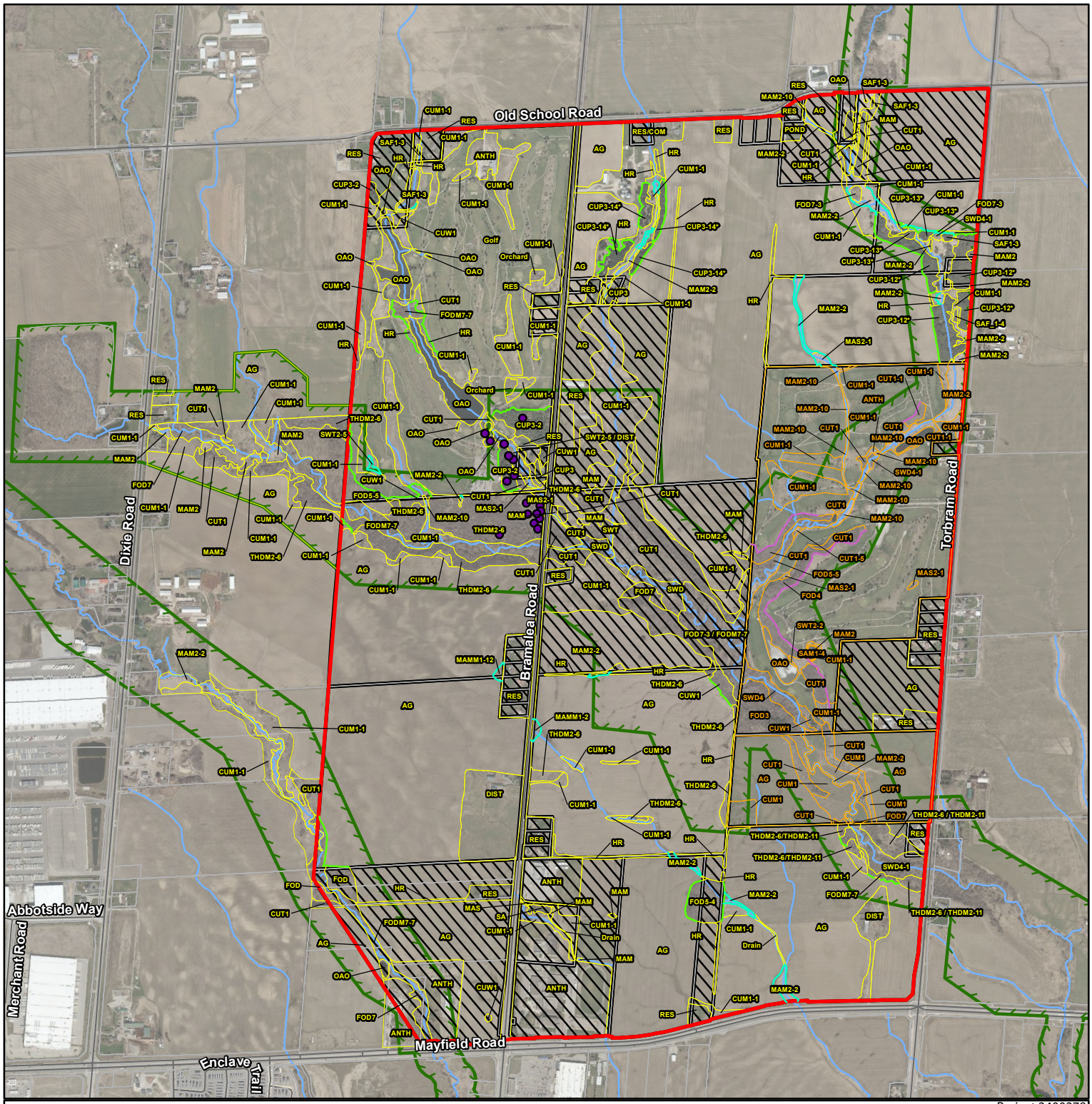
NOTES:
1. Coordinate System: NAD 1983 UTM Zone 17N.
2. Base features produced under license with the Ontario Ministry of Natural Resources and Forestry © King's Printer for Ontario, 2024, © Toronto and Region Conservation Authority, 2024.
3. Orthoimagery © First Base Solutions, 2024. Imagery taken in 2022.

Legend
- Study Area
- Study Area + 120m
- Watercourse (TRCA, 2022)
- Non-Participating Property
- Participating Property

Map #	Property Identifier	Ownership Entity
1	Banty's Roost Golf Course	ANATOLIA INVESTMENTS CORP.
2	Broccolini North	12442 BRAMALEA LIMITED PARTNERSHIP represented by its general partner 12442 BRAMALEA LIMITED PARTNERSHIP
3	Broccolini South	BRAMALEA ROAD LIMITED PARTNERSHIP represented by its general partner BRAMALEA ROAD ROAD BP INC. and BRAMALEA ROAD CONINVEST LIMITED PARTNERSHIP represented by its general partner BRAMALEA ROAD COINVEST GP INC.
4	TACC	TACC DEVELOPMENTS (ARMSTRONG) LTD.
5	DG-1	DG (CALEDON 1) INC.
6	Torchia	2052743 ONTARIO INC.
7	DG-2	SENTINEL (TORBRAM) HOLDINGS INC.
8	DG-3	SENTINEL (TORBRAM) HOLDINGS INC.
9	Mayfield Golf Course	MAYFIELD GOLF COURSE INC.
10	Rice	TULLAMORE INDUSTRIAL GP LIMITED
11	DG-4	MAYFIELD LANDING DEVELOPMENTS INC.

0 400 m
1:17,500

GEI Consultants



Project 2400278

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3. Orthoimagery © First Base Solutions, 2024. Imagery taken in 2022.

Legend

- Study Area
- Watercourse
- Greenbelt Plan Area
- Property Line (Town of Caledon)
- Non-Participating Property
- Participating Property
- Ecological Land Classification (GEI 2024)
- Ecological Land Classification (Beacon 2022,2023)
- Staked Wetland with TRCA (July 4,5,8, 2024)
- Staked Tree Limit with Town of Caledon (May 30, 31 and June 3, 2024)
- Staked Dripline with TRCA (Beacon 2023)
- Endangered Plant - Butternut (GEI 2024)

Mayfield Tullamore Landowner Group
Phase 1 - Subwatershed Characterization and Integration Report
Aquatic and Terrestrial Existing Conditions

Figure 3
Ecological Land Classification

0 390 m

1:18,000

GEI Consultants

SKETCH TO ILLUSTRATE STAKED TOP OF BANK AND TREED LIMITS MAYFIELD TULLAMORE LANDOWNER GROUP

SCALE 1:2000

0m 20m 40m 80m 120m 160 metres

R-PE SURVEYING LTD., O.L.S.

METRIC

CAUTION

THIS IS NOT A PLAN OF SURVEY AND SHALL NOT TO BE USED EXCEPT FOR THE PURPOSE INDICATED IN THE TITLE BLOCK.

THIS SKETCH IS PROTECTED BY COPYRIGHT ©R-PE SURVEYING LTD., O.L.S. 2024.

LEGEND

- DENOTES STAKED TOP OF BANK (MAY 30, 31 AND JUNE 3, 2024)
- DENOTES STAKED TREED LIMIT (MAY 30, 31 AND JUNE 3, 2024)
- DENOTES STAKED TOP OF BANK (OCTOBER 18, 2022 AND AUGUST 23, 2023)
- DENOTES STAKED TREED LIMIT (OCTOBER 18, 2022)

NOTES

BOUNDARIES ARE NOT CERTIFIED BY THIS PLAN, AND ARE SUBJECT TO CLARIFICATION UPON THE INCORPORATION OF ADDITIONAL DOCUMENTARY AND FIELD SURVEY EVIDENCE.

THE SURVEY WAS COMPLETED ON THE 5th DAY OF JUNE 2024.

SKETCH IS AN ORIGINAL COPY IF EMBOSSED BY THE SURVEYOR.

OLD SCHOOL ROAD

BRAMALEA ROAD

TORBRAM ROAD

MAYFIELD ROAD

NON-PARTICIPATING PROPERTY

SUNDIAL

TACC DEVELOPMENTS

DG GROUP (SENTINEL HOLDINGS)

DG GROUP

ANATOLIA

BROCCOLINI

MAYFIELD GOLF COURSE INC.

TULLAMORE RESIDENTIAL LTD.

TORCHIA LANDS

Some visual evidence of potential filling in this area related to the golf tee blocks. Future study including additional location-specific boreholes could potentially refine the TOB in this location (if filling can be shown). TRCA is open to future discussions and study.

Unstaked areas through here confirmed to be unconfined by TRCA

TRCA is open to further discussion on staked TOB in this area, if location-specific boreholes and aerial images show filling occurred through here.

Property limits were unclear during staking - LiDAR and discretion will be used to extend TOB to the property line.

TRCA is open to further discussion on staked TOB in this area, if location-specific boreholes and aerial images show filling occurred through here.

TRCA confirmed this area is unconfined

Remaining TOB to northern property line not staked due to access restrictions. TRCA confirmed LiDAR to be used for TOB here.

Unstaked areas through here confirmed to be unconfined system by TRCA

LiDAR to be used for TOB in areas where slope is within the dripline. Areas not staked.

TRCA confirmed TOB staking not required. TRCA confirmed LiDAR and our discrestion to be used for the TOB along here, as needed.

TOB in this area could potentially be related to the cut made for Bramalea Road through the valley, and the TOB for the actually valley system could potentially be further south. TRCA is open for further discussion based on borehole findings and review of historic aerial images.

TRCA confirmed LiDAR to be used for the TOB along here.

TRCA confirmed LiDAR to be used for the TOB along here.

TRCA confirmed LiDAR to be used for the TOB along here.

TRCA confirmed LiDAR to be used for the TOB along here.

TRCA staked the TOB along the erosion gullies. The gullies appear to have formed due to outletting tile drains. TRCA open to further discussion in these areas.

TRCA confirmed LiDAR to be used for the TOB along here, connecting the staked locations.

TOB within dripline and not staked by TRCA. Local area is confined and TOB will be established using LiDAR.

TRCA confirmed unconfined system in this area. No TOB staking required.

Remaining TOB not staked due to access restrictions. TRCA confirmed LiDAR to be used for TOB here.

TRCA staked the TOB along the erosion gully. The gully appears to have formed due to an outletting tile drain. TRCA open to further discussion in this area.

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JOB No. 24-149 CAD FILE No:24149tp01g-UTM-CSRS