871 Equestrian Court, Unit 1, Oakville ON L6L 6L7
Tel: 647-795-8153 | www.pecg.ca

Mayfield West Phase 2 – Stage 3 Comprehensive Environmental Impact Study and Management Plan

Part A: Existing Conditions and Characterization

Part B: Impact Assessment

Part C: Detailed Analysis and Implementation

Revised from July 14, 2022 Version

Palmer Project #
170164

Prepared For
Brookvalley Project Management Inc.

August 3, 2024

871 Equestrian Court, Unit 1, Oakville ON L6L 6L7
Tel: 647-795-8153 | www.pecg.ca

August 3, 2024

Caledon Development General Partner Ltd.,
School West Investments Inc.,
School Valley Developments Inc.,
School Valley South Ltd, and
Brookvalley Developments (HWY 10) Ltd.

c/o Frank Filippo
Brookvalley Project Management Inc.
137 Bowes Road
Concord, ON L4K 1H3

Dear Mr. Filippo:

Re: **Comprehensive Environmental Impact Study and Management Plan (CEISMP) Report for Mayfield West Phase 2, Stage 3 (MW2-3) Lands, Caledon, Region of Peel.**
Revised from June 4, 2024 Version
Project #: **170164**

Palmer is pleased to submit the attached report to Brookvalley Project Management Inc. (Brookvalley) describing the results of our Comprehensive Environmental Impact Study and Management Plan (CEISMP) Report for the Mayfield West Phase 2 Stage 3 lands (MW2-3). This report has been updated from the June 3, 2024 version of the CEISMP Report to address comments provided by the Town of Caledon, the Region of Peel and Toronto and Region Conservation Authority (TRCA) provided by email dated June 25, 2024 and follow up consultation meeting on July 22, 2024. In addition, new information collected for the MW2-3 Lands in 2023 and 2024 has been incorporated into the report.

Brookvalley is proposing an Official Plan Amendment to the Town of Caledon Official Plan to include the Mayfield West Phase 2 Stage 3 (MW2-3) Lands (which are the residual lands in the Mayfield West Study Area west of Hurontario Street) within the Mayfield West Rural Service Centre boundary and re-designate them for urban land uses within the Mayfield West Phase 2 Secondary Plan Area. The Official Plan Amendment application is required to determine land use designations, along with population, employment, and density targets for the MW2-3 Lands prior to the submission of development applications. The proposed amendment will designate the lands for a range of uses, including low and medium density residential, commercial, institutional, parks and open space uses and a public road network. The proposed Highway 413 EA recommended alignment has been added to the Concept Plan and considered as part of the environmental effects assessment and future management recommendations.

Beginning in 2017, Palmer began a multi-year technical assessment of the MW2-3 lands and the data presented in this report represent an integration of information collected between 2017 and 2024 by Palmer staff. This CEISMP Report has been prepared to utilize the multi-year site investigation results and to build

upon the information provided for the MW2-3 Lands in the previously completed Mayfield West Phase 2 Secondary Plan Comprehensive Environmental Impact Study and Management Plan (CEISMP) (AMEC, 2014) and the recently completed Scoped Subwatershed Study, Part A, Part B and Part C Reports for Settlement Area Boundary Expansion (SABE) (Wood, 2022). Candevcon has contributed information on hydrology, hydraulics and Stormwater Management (SWM) Planning to this CEISMP Report.

The MW2-3 CEISMP Report has been prepared based on the Subwatershed Study (SWS) requirements as outlined in the Caledon Subwatershed Study Terms of Reference (ToR) (May 2023). Minor deviations from the ToR are summarized in a Gap Analysis Memorandum (Palmer, 2024) prepared under a separate cover. This CEIMSP Report demonstrates how natural cover enhancement targets can be met through and wildlife linkages defined through naturalization of the Greenbelt NHS adjacent to the existing natural features and through locating less intensive and compatible land uses such as stormwater management facilities and parks in these lands. Water balance targets for recharge have been defined and areas where infiltration based Low Impact Development measures are recommended to both maintain infiltration and support groundwater supported features have been recommended. A preliminary feature based water balance risk assessment has been completed to assess risks to wetlands and provide recommendations for future monitoring and effects assessments.

Please let us know if you have any questions or comments on this submission.

Thank you for the opportunity to work with your team on this project.

Yours truly,

Jason Cole, M.Sc., P.Geo.
Technical Discipline Manager

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PART A: EXISTING CONDITIONS

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1. Introduction

Palmer was retained by Brookvalley Project Management Inc. (Brookvalley) to prepare a Comprehensive Environmental Impact Study and Management Plan (CEISMP) Report for the Mayfield West Phase 2 Stage 3 lands (MW2-3) as part of a submission for an Official Plan Amendment (OPA) application. This report has been updated from the original July 14, 2022 and June 3, 2024 version of the CEISMP Report to address comments provided by the Town of Caledon, the Region of Peel and Toronto and Region Conservation Authority (TRCA) provided by email dated June 25, 2024 and follow up consultation meeting on July 22, 2024. In addition, new information collected by Palmer in 2023 and 2024 regarding existing site conditions within the MW2-3 Lands has been collected and incorporated into this report.

The MW2-3 lands are identified as The Mayfield West Community Development Plan Study Area, established under Official Plan Amendment (OPA 114) and mapped on Region of Peel Official Plan Schedule D. The MW2-3 lands comprise approximately 403 hectares (ha), with 208 ha of tableland development area, bounded by Chinguacousy Road to the west, Hurontario Street to the east, Old School Road to the north and Etobicoke Creek to the south (**Figure 1**). The MW2-3 Study Area includes lands within 200 m of the MW2-3 Site as outlined on all figures. The proposed Land Use Plan (**Appendix A**) includes low density and medium density residential, commercial, schools, parks, roadways, stormwater management (SWM) facilities, Natural Heritage System (NHS) features and the Greenbelt Lands (MGP. 2024).

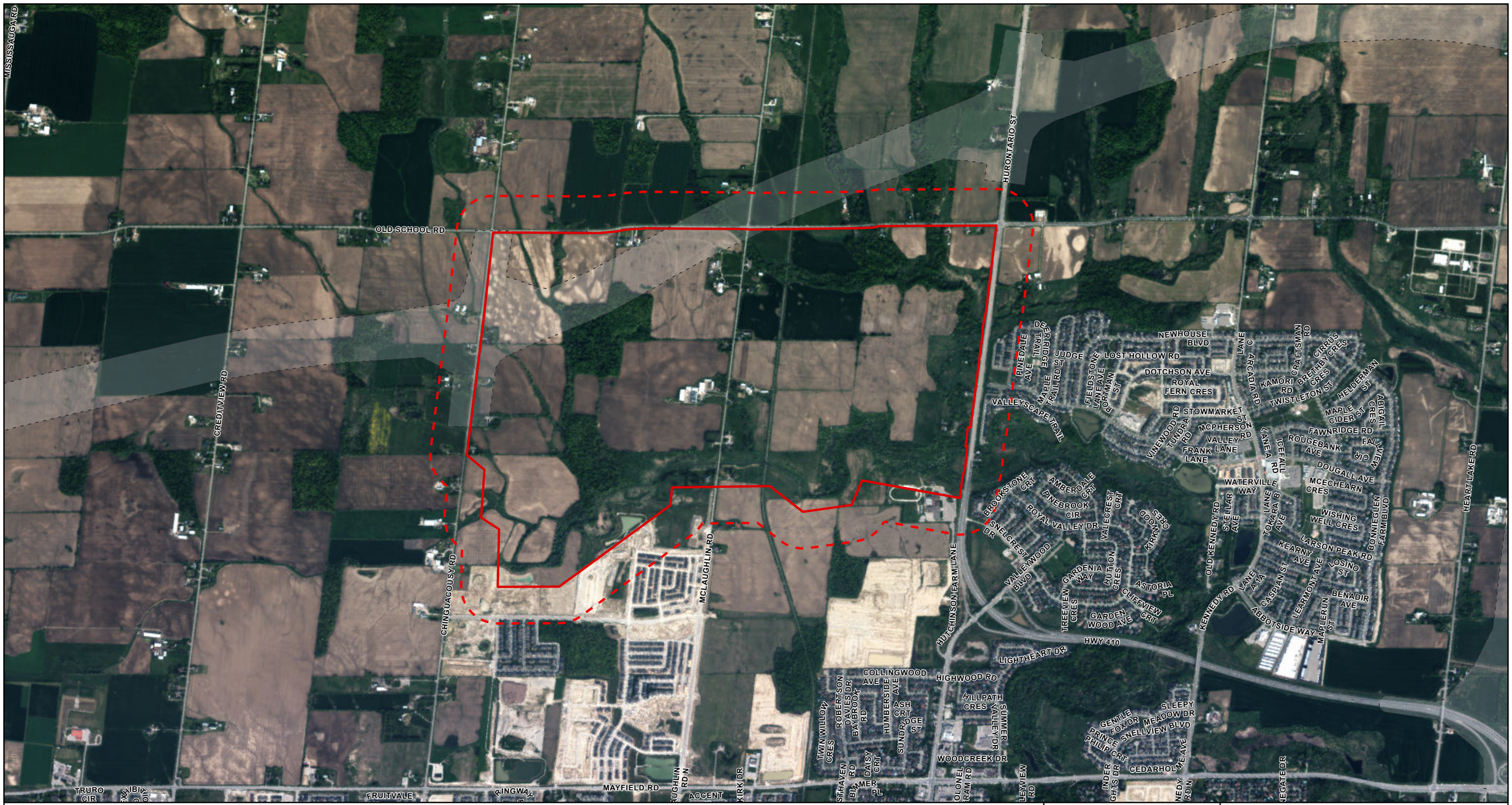
This study has been prepared based on the Subwatershed Study requirements as outlined in the Caledon Subwatershed Study Terms of Reference (ToR) (May 2023). Minor deviations from the ToR are summarized in a Gap Analysis Memorandum (Palmer, 2024) prepared under a separate cover.

The goal of this study is to provide the necessary technical background studies to fulfill the Growth Plan requirements for a settlement boundary expansion to Old School Road. This report will build upon the existing approved 2014 Mayfield West Phase 2 Secondary Plan CEISMP Report prepared by AMEC Foster Wheeler (formerly AMEC Environment and Infrastructure, now called WSP Wood) and the recently completed Scoped Subwatershed Study, Part A, Part B and Part C Reports for Settlement Area Boundary Expansion (SABE) (Wood, 2022) to provide the Town of Caledon and Peel Region with the necessary background information, effects assessment and implementation planning to bring the MW2-3 lands into the Settlement Area as part of their next MCR to implement the 2041 growth forecasts.

The MW2-1 and MW2-2 lands immediately to the south of the subject lands were recently approved for expansion into the urban boundary. This CEISMP, as well as the companion Functional Servicing Report (FSR) prepared by Candevcon, will have regard for the environmental protection, management and monitoring strategies and plans outlined in the ToR and Mayfield West Community Development Plan Area

The CEISMP reporting process is comprised of three (3) parts:

- Part A Report: Existing Conditions and Characterization,
- Part B Report: Subwatershed Impact Assessment, and



LEGEND

- Mayfield West Phase 2 Stage 3 Lands
- Study Area
- Proposed Highway ROW

0 100 200 300 400 500
METRE SCALE

North American Datum 1983
Universal Transverse Mercator Projection Zone 17

Scale: 1:20,000
Page Size: Tabloid (11 x 17 inches)

Drawn: RS/SM
Checked: JC
Date: Aug 2, 2024

NORTH

Source Notes: Imagery (2023) sourced from Caledon Maps.

CLIENT
Brookvalley Project Management Inc.

PROJECT
Mayfield West Phase 2 Stage 3

TITLE
Site Location

Palmer | PART OF SLR

REF. NO. 1701628-1-2

Figure 1

Document Path: G:\Shared drives\Projects 2017\17016 - Brook Valley Homes\1701628 - Mayfield West - Phase 2 - Stage 3\GIS\1_Workspace\Task 2 - Ecology Figures\(2024-07) CEIMSP Figures\1701628 - CEIMSP Figures.aprx

- Part C Report: Detailed Analysis and Implementation.

Beginning in 2017, Palmer began a multi-year technical assessment of the MW2-3 lands and the data presented in this report represent an integration of information collected between 2017 and 2024 by Palmer staff. This CEISMP Report has been prepared to utilize the multi-year site investigation results and to build upon available background information from previous studies including the Mayfield West Community Development Plan Area CEISMP, available field data and analyses collected to date, as well as site specific field data. This proposed approach allows for a land use plan to be developed that can be supported by the natural environmental constraints, relevant planning policies and preliminary SWM, site servicing, and grading plans.

As the MW2-3 Lands are located outside of the Urban Boundary, elements of the Scoped Subwatershed Study have been prepared alongside the CEISMP to support Caledon's growth plan objects through the protection of the natural and human environments. Guidance and targets from the Settlement Area Boundary Expansion Scoped Subwatershed Study (SABE), prepared by Wood Earth and Environment (Wood, December 2021). A copy of the Caledon Subwatershed Study ToR (May 2023) is provided in **Appendix B**.

The Scoped Subwatershed Study, includes the following key elements:

- Identify natural environmental features, constraints, movement corridors, and natural hazards;
- Identify opportunities and targets for enhancement within the MW2-3 Lands consistent with the SABE recommendations;
- Assess land use compatibility with natural features;
- Prepare an Impact Assessment based on the Land Use Concept Plan that can be refined as part of future development phased as an iterative process; and
- Provide implementation recommendations including the use of Best Management Practices (BMPs); and,
- Support an implementation and management strategy for the MW2-3 Lands as they move through future design and permitting phases.

1.1 Planning Context

1.1.1 Provincial Policy Statement

The *Provincial Policy Statement, 2020* (PPS) provides direction to regional and local municipalities regarding planning policies for the protection and management of natural heritage features and resources (Ontario Ministry of Municipal Affairs and Housing, 2020). Section 2.1 of the PPS defines ten Natural Heritage Features (NHF) and adjacent lands and provides planning policies for each. Of these NHF, development is not permitted in:

- Significant Coastal Wetlands;
- Significant Wetlands in Ecoregions 5E, 6E and 7E;
- Fish Habitat, except in accordance with provincial and federal requirements; or

- Habitat of species designated as Endangered and Threatened, except in accordance with provincial and federal requirements.

Additionally, unless it can be demonstrated through an Environmental Impact Study (EIS or NHE) that there will be no negative impacts on the natural features or their ecological functions, development and site alteration are also not permitted in:

- Significant Wetlands in the Canadian Shield north of Ecoregions 5E, 6E and 7E;
- Significant Woodlands in Ecoregions 6E and 7E (excluding islands in Lake Huron and the St. Mary's River);
- Significant Valleylands in Ecoregions 6E and 7E (excluding islands in Lake Huron and the St. Mary's River);
- Significant Wildlife Habitat;
- Significant Areas of Natural and Scientific Interest (ANSI);
- Other Coastal Wetlands in Ecoregions 5E, 6E and 7E; and
- Lands defined as *Adjacent Lands* to all the above natural heritage features.

Each of these natural heritage features is afforded varying levels of protection subject to guidelines, and in some cases, regulations.

The Provincial Policy Statement lists natural heritage features for which development and site alternation are not permitted under the policies of the PPS, or are not permitted *"unless it has been demonstrated that there will be no negative impacts on the natural features or their ecological functions*". Within the project study area, the following natural heritage features have been identified:

- Significant Woodlands;
- Significant Valleylands;
- Candidate Significant Wildlife Habitat;
- Fish habitat; and
- Potential Habitat of Endangered and Threatened species.

Woodlands, Provincially Significant Wetlands, potential habitat of Endangered or Threatened species, watercourses and fish habitat is present within the Study Area. However, the proposed development plan does not encroach into these features.

1.1.2 Region of Peel Official Plan

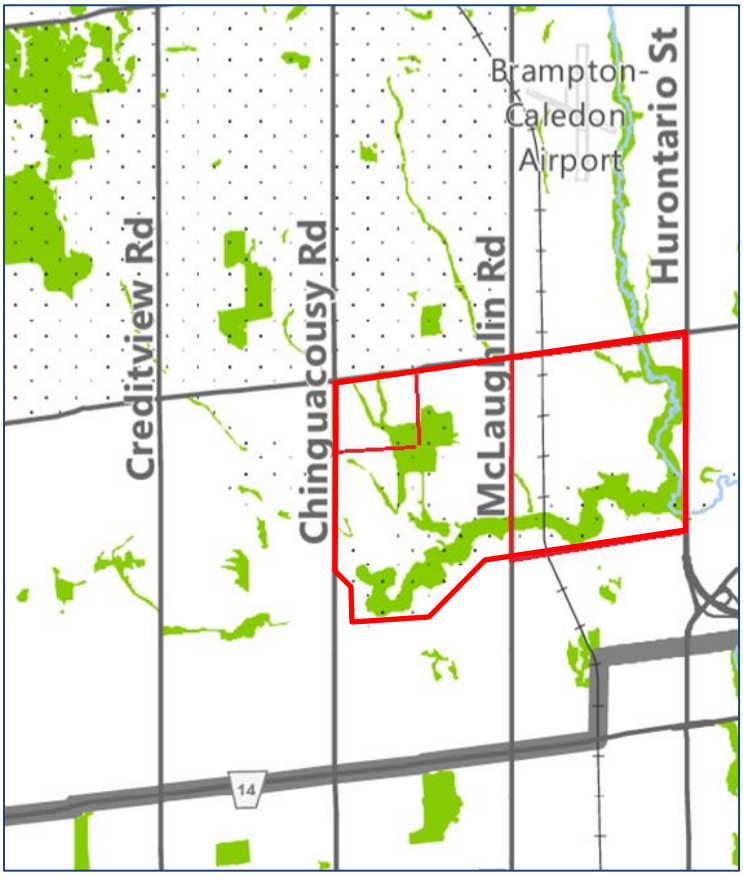
The new *Region of Peel Official Plan* (OP) was adopted by Regional Council on April 28, 2022. It was approved with modification by the Ontario Ministry of Municipal Affairs and Housing (OMMAH) in 2022 (Region of Peel, 2022). The decision of the Minister of Municipal Affairs and Housing regarding an OP is considered final and not subject to appeal (Region of Peel, 2022).

Natural heritage and water resource features in Peel Region are protected by its Greenlands System, which consists of Core Areas, Natural Areas and Corridors (NACs), and Potential Natural Areas and Corridors

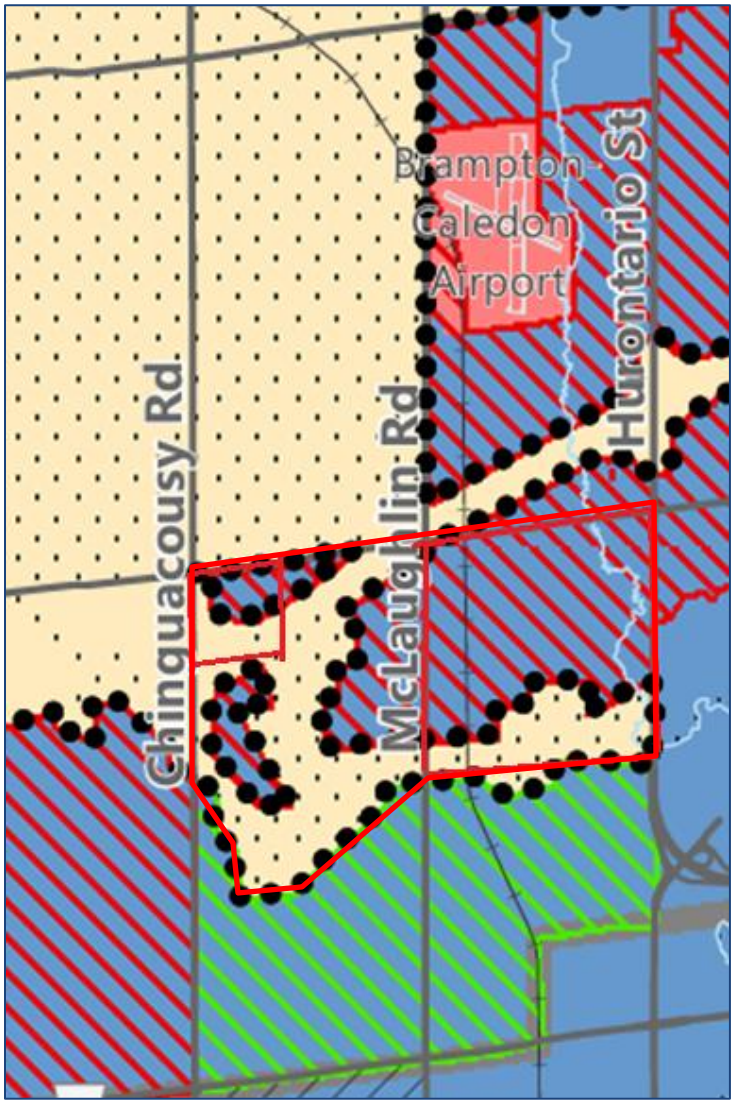
(PNACs). Core Areas are designated on Schedule C-2 of the Official Plan and are intended to represent the most important natural features in Peel, connected natural systems and high biodiversity as identified through the OP (**Map A**). NACs and PNACs are to be identified and protected in lower tier municipal official plans in accordance with the policies outlined in the Peel Official Plan. Criteria for these Core Areas, NACs, and PNACs are dependent on the Regional System that the Subject Lands are within (**Map B**).

According to Section 2.14.12 of the OP, Core Areas include significant wetlands, significant coastal wetlands, woodlands meeting one or more of the criteria for Core Area woodland in Table 1, Environmentally Sensitive or Significant Areas, Provincial Life Science Areas of Natural and Scientific Interest (ANSI), Escarpment Natural Areas of the Niagara Escarpment Plan, and valley and stream corridors meeting one of more of the criteria for Core Area valley and stream corridors in Table 2 and as shown on Schedule C-2. Development is generally prohibited within Core Areas.

As defined in the Region's OP, valley and stream corridors are the natural resources associated with the river systems characterized by their landform, features and functions, and include associated ravines. Valley and stream corridors are distinguished from ravines by the presence of a distinct landform. Additionally, Table 2 *(Criteria and Thresholds for the Identification of Core Valley and Stream Corridors*) of



Map A. The Region's OP Schedule C-2 Core Areas of the Greenlands System in Peel depicts the Study Area within the Core Areas of the Greenlands System (green layer) and Areas Subject to Provincial Plans (dotted layer).



Map B. The Region's OP Schedule E-1 Regional Structure depicts the Study Area within the rural system (yellow layer), urban system (blue layer), 2051 New Urban Area (diagonal red lines) and Areas Subject to Provincial Plans (dotted layer).

the Region's OP identifies the various feature and spatial criteria required for stream valleys or corridors to meet the threshold of Core Areas within the Region's Greenlands System. These features generally include main branches or major tributaries that have direct drainage into Lake Ontario, or other tributaries that provide habitat to a range of species that cross municipal boundaries and connect other Core Areas of the Greenlands System.

The natural heritage features in the Region of Peel are protected by its Greenlands System (Official Plan – Schedule A). The valleyland corridors within the MW2-3 Lands are designated as Core Areas of the Regional Greenlands System. These areas are designated as significant woodland and are protected as part of the development plan.

1.1.3 Town of Caledon Official Plan

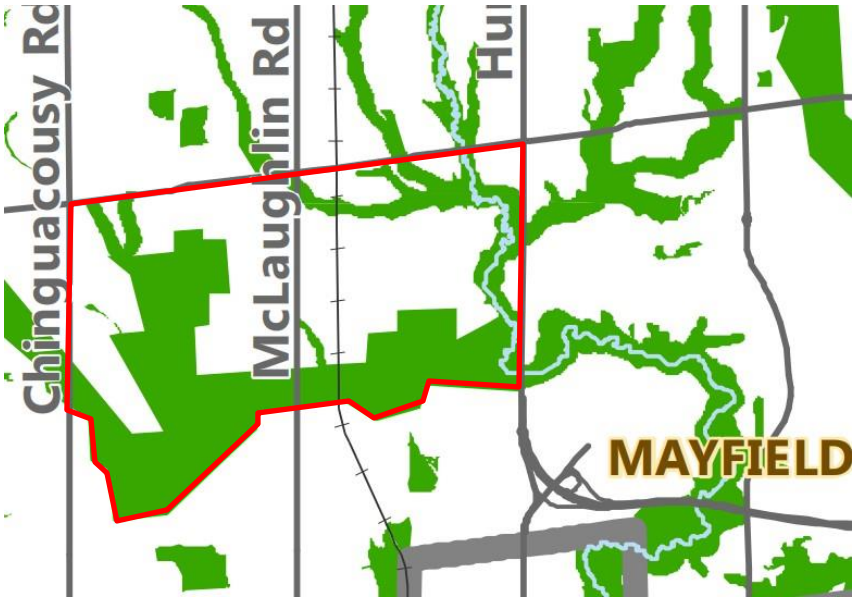
The Town of Caledon Official Plan (OP) underwent office consolidation in March 2024. The OP's Environmental Policy Area (EPA) designation includes all Natural Core Areas and Natural Corridors. As stated in the OP's Section 5.7.3.1.1, new development is prohibited within areas designated EPA on the OP Land Use Schedules, with the exception of the specified permitted uses. The uses permitted in EPA are 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 (Town of Caledon, 2024).

Schedule C of the Town of Caledon Official Plan identifies designated Environmental Policy Area (EPA) through the watercourses and wetlands onsite (Map C). EPAs within the Site are protected and appropriate buffers determined through the EIS that consider the ecological functions.

1.1.4 Toronto and Region Conservation Authority (TRCA)

The project Site falls within the jurisdiction of the TRCA. Watercourses and their associated flood limit within the Site, are regulated under the TRCA O. Reg. 166/06 – Regulation of Development, Interference with Wetlands and Alterations to Shorelines and Watercourses. TRCA Regulated Area lands exist within the limits of the Site, in association with watercourse, wetland and valleyland features. Development within these areas will be subject to approvals and permitting from the TRCA.

The proposed development plan conforms to the buffer requirements as stated in the Living City Policies (TRCA, 2014), for valley or stream corridors. The proposed plan provides for a *10 m buffer from the greater of the long-term stable top of slope/bank, stable toe of slope, Regulatory flood plain, meander belt and any contiguous natural features or areas*. A 30 m setback has been applied from PSW wetland communities and a 15 m setback from small (less than 2 ha), unevaluated wetland communities.



Map C. The Town's OP Schedule C-1 Mayfield West Land Use Plan depicts the Greenland System, including the Greenbelt Plan Area.

1.1.5 Natural Heritage Policies of the Greater Golden Horseshoe Growth Plan

The Growth Plan for the Greater Golden Horseshoe (GGH) 2019 was approved by the Council in 2019 and underwent office consolidation in 2020. The GGH directs growth and the development to ensure economic prosperity, environmental protection, and community support (Ministry of Municipal Affairs and Housing, 2020). This is intended to direct municipalities towards the establishment of appropriate policies to maintain, restore, or enhance biodiversity and connectivity of the system and long-term ecological function (MMAH, 2020).

The GGH was developed as a supplement to the PPS, and "builds upon the policy foundation provided by the PPS and provides additional and more specific land use planning policies to address issues facing specific geographic areas in Ontario. This Plan is to be read in conjunction with the PPS. The policies of this Plan take precedence over the policies of the PPS to the extent of any conflict, except where the relevant legislation provides otherwise."

The following proposed development guidelines of the Growth Plan are applicable:

Within the *Natural Heritage System*:

i. new development or site alteration will demonstrate that:
ii. there are no negative impacts on key natural heritage features or key hydrologic features or their functions;
iii. connectivity along the system and between key natural heritage features and key hydrologic features located within 240 metres of each other will be maintained or, where possible, enhanced for the movement of native plants and animals across the landscape;
iv. the removal of other natural features not identified as key natural heritage features and key hydrologic features is avoided, where possible. Such features should be incorporated into the planning and design of the proposed use wherever possible.

The portions of the NHS within subject properties that are not contained within the Greenbelt Area are located within the GGH Growth Plan Area.

1.1.6 Greenbelt Plan

The Greenbelt Plan builds on the PPS to identify limits to urbanization and to provide permanent protection to the agricultural land base and the ecological and hydrological feature areas and their functions occurring on the landscape of the Greater Golden Horseshoe (Ontario Ministry of Municipal Affairs and Housing, 2017). Within the Greenbelt Area there are Protected Countryside and Urban River Valley land designations. Additionally, Settlement Areas and a Natural Heritage System have been mapped within the Protected Countryside land designation. These areas within the Greenbelt Area are afforded varying protections through their applicable policies.

Under the Greenbelt Plan, lands along the southern Etobicoke Creek boundary and within the western portion of the MW2-3 Lands are designated as part of the Natural Heritage System of the Greenbelt Protected Countryside. Proposed development must demonstrate that there will be no negative impacts to key natural heritage features and key hydrologic features or their functions, as well as no negative impact

on biodiversity or connectivity of the Natural Heritage System. There are Rural Lands within the Greenbelt limits that do not support natural heritage features and are not part of the 30 m setbacks to natural features.

1.1.7 Endangered Species Act

Species designated as Endangered or Threatened by the Committee on the Status of Species at Risk in Ontario (COSSARO) are listed as Species at Risk (SAR) in Ontario (Government of Ontario, 2007). These SAR and their habitats (e.g., areas essential for breeding, rearing, feeding, hibernation, and migration) are afforded legal protection under the *Endangered Species Act, 2007* (ESA). This *Act* is administered by the Ministry of Environment, Conservation and Parks (MECP).

The protection provisions for species and their habitat within the ESA apply only to those species listed as Endangered or Threatened on the SARO list, being *Ontario Regulation 230/08* of the ESA. Species listed as Special Concern may be afforded protection through policy instruments respecting significant wildlife habitat (e.g., the PPS) as defined by the province, other relevant authority, or other protections contained in Official Plans.

1.1.8 Source Water Protection

The site is located within the CTC Source Protection Area. The CTC Source Water Protection Plan identifies four main regulatory factors under the Clean Water Act (2006) relating to local hydrogeology to consider for site development: Significant Groundwater Recharge Areas (SGRAs), Highly Vulnerable Aquifers (HVAs), and Wellhead Protection Areas (WHPAs), and Intake Protection Zones (IPZs).
A Wellhead Protection Area (WHPA) is the area around the wellhead where land use activities have the potential to affect the quality or quantity of water that flows into the well. These areas are delineated into zones of vulnerability (A, B, C, and D) based on the time of travel of water into the well, and zones around a surface water body influencing a Groundwater Under Direct Influence (GUDI) (E, F). Other zones (Q1, and Q2) are defined as the areas where new water takings or reduced recharge could impact the quantity of water available to municipal supply wells. IPZs are the area on the water and land surrounding a municipal surface water intake. HVAs are aquifers that are susceptible to contamination as a result of the soil structure/material or due its location near the ground surface. Lastly, SGRAs are areas where recharge is important to maintain the water level in a community drinking water aquifer.

EXISTING ENVIRONMENTAL CONDITIONS

2. Existing Environmental Conditions

2.1 Terrestrial and Wetland Ecosystems

2.1.1 Background Conditions

The inventory of flora and fauna completed by AMEC was reviewed and evaluated as part of this study and was used to establish the baseline existing conditions for the MW2-3 lands. The AMEC terrestrial field studies were initiated in spring 2008 and include seasonal observations of wildlife, botanical surveys and Ecological Land Classification (ELC) mapping to document and refine understanding of existing conditions and ecosystem functions. The 2008 data was supplemented using existing wildlife and vegetation data inventory data for the study area provided by the Toronto and Region Conservation Authority (TRCA) and the Ministry of Natural Resources and Forestry (MNRF) in 2018. Dougan and Associates provided additional ELC mapping in 2008 that will be relied upon for this report and is presented on **Figure 2**. Palmer ecologists have completed verification site visits, and generally agree with the Dougan ELC mapping, such that have proposed to utilize it for the CEISMP to be consistent with the overall Mayfield Stage 2 Lands work.

Vegetation Communities

The study area is dominated by agricultural and associated anthropogenic uses. The most extensive natural communities in the study area are associated with the Etobicoke Creek valleylands and adjacent uplands, most of which are within the limits of the Greenbelt Plan area. A secondary tributary valley feature, located in the northeast corner of the study area near Old School Road, contains substantial forest cover but is not contained within the Greenbelt. In general, the area of natural cover largely comprises forest, followed by cultural communities (such as meadows, thickets, and woodlands), and wetlands.

A total of 93 individual vegetation communities, categorized into 24 ecosites, were delineated within the study area (**Table 1**). The vegetation types with the most occurrences are the Mineral Meadow Marsh Ecosite and the Cultural Meadow Ecosite. A detailed ELC survey previously completed in 2007 and 2008 by Dougan and Associates remains relevant to the current site conditions (**Figure 2**).

A list of flora completed through the 2014 AMEC study is provided in **Appendix C**.

Table 1. Vegetation Communities

ELC code	Vegetation Type	Occurrences
CUH1	Treed Cultural Hedgerow	5
CUM1	Cultural Meadow Ecosite	12
CUP3	Coniferous Plantation	4

ELC code	Vegetation Type	Occurrences
CUS1	Mineral Cultural Savannah Ecosite	4
CUT1	Mineral Exotic Cultural Thicket Ecosite	3
CUW1	Mineral Cultural Woodland Ecosite	6
FOC3	Fresh-Moist Coniferous Forest Ecosite	1
FOD3	Dry-Fresh Poplar – White Birch Deciduous Forest	1
FOD4	Dry-Fresh Deciduous Forest Ecosite	3
FOD5	Dry-Fresh Sugar Maple – Deciduous Forest Ecosite	8
FOD6	Fresh-Moist Sugar Maple – Deciduous Forest Ecosite	3
FOD7	Fresh-Moist Lowland Deciduous Forest Ecosite	9
FODM4	Dry-Fresh White Ash – Hardwood Deciduous Forest	1
FOM6	Fresh-Moist Hemlock Mixed Forest Ecosite	1
FOMM9	Fresh-Moist White Pine Hardwood Forest Ecosite	1
WODM5	Fresh-Moist Ash Deciduous Woodland	1
MAM2	Mineral Meadow Marsh Ecosite	15
MAS2	Mineral Shallow Marsh	3
SAS1	Submerged Shallow Aquatic Ecosite	2
SWD2	Ash Mineral Deciduous Swamp Ecosite	1
SWD3	Maple Mineral Deciduous Swamp Ecosite	2
SWD4	Mineral Deciduous Swamp Ecosite	3
SWT2	Mineral Thicket Swamp Ecosite	3
SWT3	Organic Thicket Swamp Ecosite	1

Flora

Flora data was documented by Dougan and Associates in 2006-2007 and by the TRCA for the Mayfield West Phase 2 (AMEC 2010). In total 344 vascular plants were recorded, of which 117 (34%) are introduced or exotic plant species. The largest number of species belong to the Asteraceae, Cyperaceae, Poaceae and Rosaceae families. It was found that upland plants dominated the study area.

Provincial status rankings (S ranking) of species ranked S1-S3 are considered to be rare in Ontario. Sharp-leaved Goldenrod (*Solidago arguta* var. *arguta*), a Imperiled species (S3) was recorded. A cultivated variety of Honey Locust (*Gleditsia triacanthos*) was noted but the specimen is not considered the be a vulnerable native sepcies (S2). A large number of species recorded are considered uncommon or rare in Peel Region and many species are also considered of regional concerns according to TRCA's local ranking (L-Rank) .

ELC LEGEND

AGR - Agricultural
ANTH - Anthropogenic
CUH1 - Treed Cultural Hedgerow
(26, 49, 51, 89, 96, 99)
CUM1 - Cultural Meadow Ecosite
(39, 59, 60, 70, 71, 75, 77, 78, 86, 95, 113, 119, 120, 125, 126)
CUP3 - Coniferous Plantation
(38, 100, 101)
CUS1 - Mineral Cultural Savannah
(40, 69, 73, 74, 93)
CUT1 - Mineral Exotic Cultural Thicket Ecosite
(61, 92, 127, 128)
CUW1 - Mineral Cultural Woodland Ecosite
(52, 55, 65, 72, 90, 92, 104, 124)
FOC3 - Fresh-Moist Coniferous Forest Exosite
(33)
FOD3 - Dry-Fresh Poplar - White Birch Deciduous Forest Ecosite
(37)
FOD4 - Dry-Fresh Deciduous Forest Ecosite
(68, 82, 114, 118)
FOD5 - Dry-Fresh Sugar Maple Deciduous Forest Ecosite
(29, 30, 31, 34, 43, 79, 83, 88)
FOD6 - Fresh-Moist Sugar Maple - Deciduous Forest Ecosite
(32, 44, 115)
FOD7 - Fresh-Moist Lowland Deciduous Forest Ecosite
(18, 19, 66, 67, 80, 84, 87, 112, 116)
FODM4 - Dry-Fresh White Ash - Hardwood Deciduous Forest
(45)
FOM6 - Fresh-Moist Hemlock Mixed Forest Ecosite
(91)
FOMM9 - Fresh-Moist White Pine Hardwood Forest Ecosite
(42)
HR - Hedgerow
MAM2 - Mineral Meadow Marsh Ecosite
(17, 28, 36, 62, 64, 76, 103, 106, 108, 109, 110, 111, 121, 122)
MAS2 - Mineral Shallow Marsh Ecosite
(47, 85, 105)
SAS1 - Submerged Shallow Aquatic Ecosite
(48, 59)
SWD - Deciduous Swamp Ecosite
(107)
SWD2 -Ash Mineral Deciduous Swamp Ecosite
(50)
SWD3 - Maple Mineral Deciduous Swamp Ecosite
(46, 35)
SWD4 -Mineral Deciduous Swamp Ecosite
(27, 54, 81)
SWT2 - Mineral Thicket Swamp Ecosite
(53, 57, 58)
SWT3 - Organic Thicket Swamp Ecosite
(63)
WODM5 - Fresh-Moist Ash Deciduous Woodland
(41)

LEGEND

- Watercourse[1]
- Wetland - Evaluated Provincial[1]
- Ecological Land Classification (ELC)
- ELC Outside of Subject SIte[2]
- ELC Wetland
- Greenbelt NHS [2]
- Proposed Highway ROW
- Mayfield West Phase 2 Stage 3 Lands
- Study Area

1 - Land Information Ontario (LIO)
2 - Toronto and Region Conservation Authority (TRCA)

0 100 200 300 400 500
METRE SCALE

North American Datum 1983
Universal Transverse Mercator Projection Zone 17

Scale: 1:12,000
Page Size: Tabloid (11 x 17 inches)

Drawn: RS
Checked: CH
Date: Aug 2, 2024

NORTH

Source Notes: Imagery (2023) sourced from Caledon Maps.

CLIENT
Brookvalley Project Management Inc.

PROJECT
Mayfield West Phase 2 Stage 3

TITLE
Existing Terrestrial Environment

Palmer PART OF SLR

REF. NO. 1701628-2-2

Figure 2

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2.1.2 Wildlife

Breeding Amphibians

Nocturnal amphibian calling surveys were previously conducted in spring of 2005 – 2008 by Dougan and Associates. Previous surveys were conducted in April and May, missing the final survey in June. Locations of survey stations are unknown. One round of amphibian surveys was completed by Palmer June 7, 2022, at ten roadside stations throughout the Study Area.

Additional amphibian breeding surveys were completed by Palmer following Marsh Monitoring Program protocols, conducting three (3) surveys during April – June of 2024. The surveys were completed following the protocols of Bird Studies Canada Marsh Monitoring Program (2012). Surveys were conducted during ideal conditions to the best extent possible, aiming for a night with high evening temperatures, low wind and low precipitation.

The goal of the survey(s) is to help inform overall wetland quality. The survey method provides an indication of amphibian abundance during the breeding season. Species were identified by call, and an abundance code for each species heard calling was assessed by the following the Amphibian Monitoring protocol:

- Code 0: No calls heard.
- Code 1: Calls not overlapping or simultaneous, number of individual frogs can be counted.
- Code 2: Calls overlapping or simultaneous, number of individuals can still be distinguished, number of individual frogs cannot be counted, but a reliable estimate of numbers can be made based on location and call voices.
- Code 3: Full chorus, calls simultaneous and overlapping, numbers of calling males cannot be reasonably counted or estimated.

Dougan and Associates' breeding amphibian surveys identified two species American Toad (*Anaxyrus americanus*) and Spring Peeper (*Pseudacris crucifer*) during breeding surveys within the Study Area. Suitable amphibian breeding habitat may be limited due to the low amphibian abundance observed during previous surveys. Gray Treefrog (*Hyla versicolor*), Northern Leopard Frog (*Lithobates pipiens*) and Wood Frog (*Lithobates sylvaticus*) were recorded as incidentals. No breeding amphibians were heard during the Palmer roadside survey in June 2022. During the 2024 surveys conducted by Palmer, Wood Frog and Gray Treefrog were recorded in low abundance within the west side.

American Toad was the most commonly heard species. Species were generally distributed across the Study Area but closely linked with waterbodies and uplands with existing natural features. All amphibians recorded with the exception of American Toad are considered locally significant according to TRCA.

Breeding Birds

An Ontario Breeding Bird Atlas query found 109 species of breeding birds are documented in the general vicinity (Birds Canada, 2023). Breeding bird surveys were completed by Dougan and Associates between 2005 and 2008. A total of 72 species were recorded with 64 showing breeding evidence. Abundances were not provided. Open country birds present in agricultural areas were generally widespread and common

within the Study Area. The abundance and diversity of forest birds were mostly characteristic of smaller habitat patches and species tolerant of forest edges.

Eighteen of the observed bird species are considered locally significant according to TRCA, thirteen area-sensitive bird species, and six Species at Risk (**Appendix D**). Additionally, one Short-eared Owl (Threatened) was observed on April 18, 2008, by Dougan & Associates.

Two standard breeding bird surveys will be completed in the summer of 2024, as per accepted Bird Studies Canada protocols (Bird Studies Canada, 2001). Following these two standard breeding bird surveys and botanical surveys, an additional breeding bird survey may be required to confirm the absence/presence of SAR birds (i.e., Bobolink and Eastern Meadowlark), as per protocols for these species.

Incidental Wildlife

Observations by Dougan and Associates and/or Palmer 2023/2024 include Beaver (*Castor canadensis*), Coyote (*Canis latrans*), Eastern Chipmunk (*Tamias striatus*), Eastern Cottontail (*Sylvilagus floridanus*), Gray Squirrel (*Sciurus carolinensis*), Meadow Jumping Mouse (*Zapus hudsonius*), Raccoon (*Procyon lotor*), White-tailed Deer (*Odocoileus virginianus*), shrew species and bat species. Meadow Jumping Mouse is considered locally significant according to TRCA. This species was observed by TRCA staff in riparian habitat along Etobicoke Creek west of Hurontario Street.

General reptile observations by Dougan and Associates include two observations of both DeKay's Brownsnake (*Storeria dekayi*) and Red-bellied Snake (*Storeria occipitomaculata*). Red-bellied Snake is considered locally significant according to TRCA. Common Gartersnake (*Thamnophis sirtalis*) may also be present within the Study Area.

An Atlas of Mammals of Ontario query found 15 species within the general vicinity, including bats, rodents and carnivores. All species are regarded as common, however, Meadow Jumping Mouse (*Zapus hudsonius*) and Porcupine (*Erethizon dorsatum*) which are both considered as locally significant according to TRCA (AMEC 2010).

Odonate (dragonflies and damselflies) and butterfly field surveys completed by Dougan and Associates between 2005 and 2008 include records of 14 provincially common odonates and 12 provincially common butterflies (AMEC 2010).

Species at Risk

Prior to conducting field work, existing SAR records were queried with the NHIC database and other online resources (**Appendix E**). Habitat opportunities for SAR on the site were then assessed by comparing habitat preferences of species deemed to have potential to occur against current site conditions. The species noted during the NHIC search and others known through professional experience to have potential to occur were considered in the assessment.

Significant Wildlife Habitat

Palmer has developed a screening tool for Significant Wildlife Habitat (SWH) for Ecoregion 6E, following the relevant criteria established by the province (Ontario Ministry of Natural Resources, 2015). This is based on information collected by Dougan as part of the AMEC CEISMP Report (2010) and supplemented by additional analysis, field observations, and mapping completed by Palmer to determine if candidate SWH types exist and/or can be confirmed for the MW2-3 Lands.

2.1.3 Aquatics

The MW2-3 lands are situated within the Etobicoke Creek watershed, a system which drains a total of 224 km^2. Etobicoke Creek arises from headwaters along the southern edge of the Oak Ridges Moraine, within the Town of Caledon, before flowing through the cities of Brampton, Mississauga, and finally, Toronto, where it empties into Lake Ontario (TRCA, 2021). The landscape within the Etobicoke Creek watershed is noted to be heavily urbanized with approximately 60% of the watershed composed of urban land uses. Only 12.3% of the watershed remains as natural cover. As a result of these land uses, there are issues related to flooding and erosion, water quality, low natural cover, and degraded terrestrial and aquatic habitat with the Etobicoke Creek watershed (TRCA, 2021).

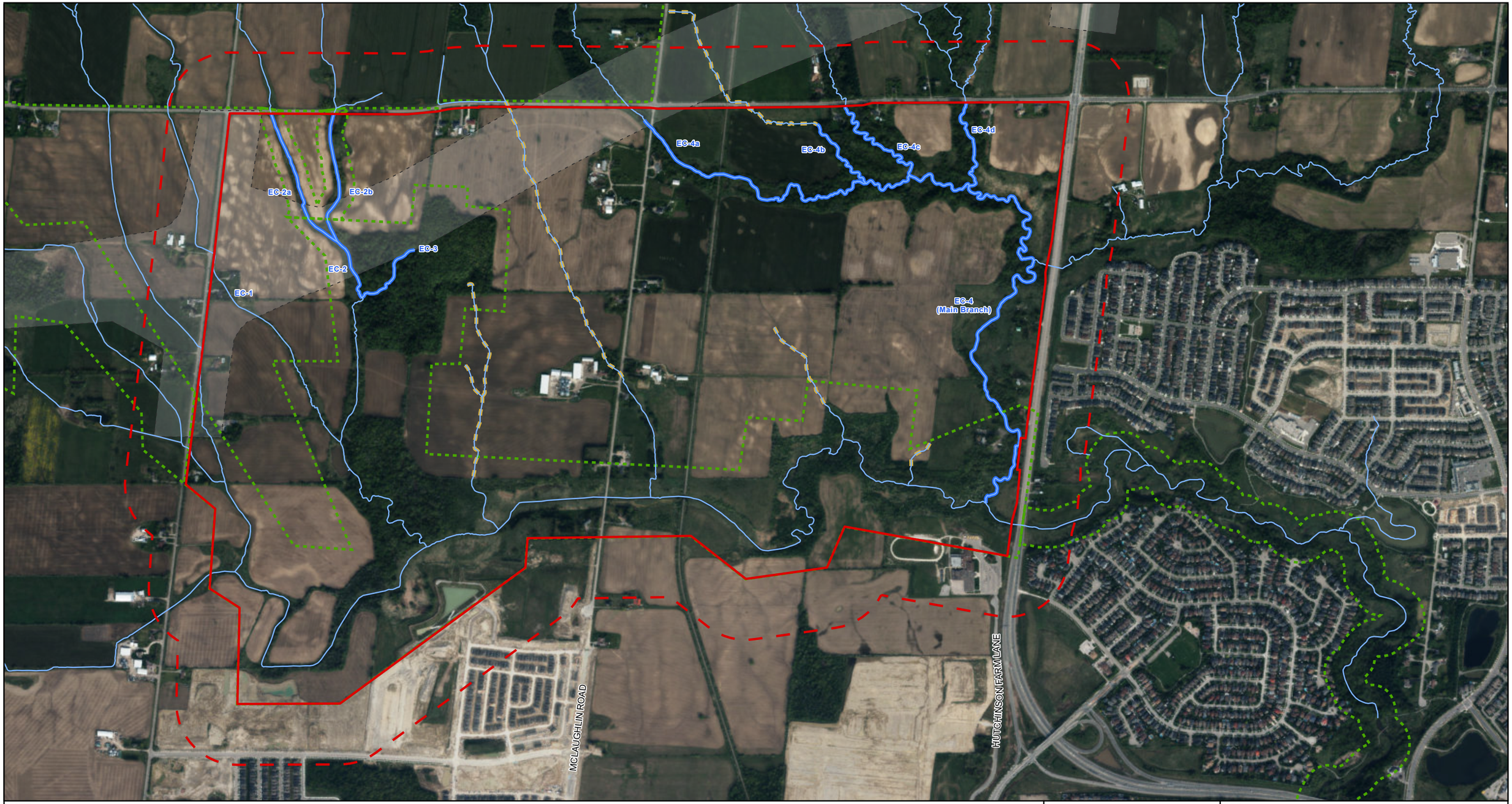
Where the MW2-3 lands are situated within the Etobicoke Creek watershed, the predominant land use is agricultural, with some residential areas. Similar to urban influences, degradation in water quality and overall stream health may be experienced within agricultural lands due to unmitigated storm runoff, high organic and nutrient inputs, and lack of robust natural cover and stream buffer areas (TRCA, 2021). The main aquatic resources, including permanent and intermittent watercourses, within the MW2-3 Lands outlined on **Figure 3** were surveyed on February 1, 2024.

EC-1

The EC-1 channel is located at the far west of the MW2-3 lands (**Figure 3**). The EC-1 watercourse passes beneath the Chinguacousy Road corridor within a large concrete culvert. Channel roughness is high with an abundance of Cattails (*Typha sp*.) and other vegetation noted within the active channel. During the February 2024 survey, the watercourse area was observed flowing west of the road corridor but was stagnant along the eastern side of the road corridor where in-stream vegetation was densest. The channel area appears to have been historically straightened and functionally altered to accommodate nearby residential and agricultural land uses. Channel banks appeared uniform, and well vegetated with grasses.

EC-2

The EC-2 channel area exists within the central portion of the western MW2-3 property parcel (**Figure 3**), located downstream of the confluence of EC-2a and EC-2b channel segments. During the February 2024 site survey, the EC-2 channel was found flowing within the dense vegetation associated with the existing mineral meadow marsh (ELC unit MAM2). Flow was noted diffusing through the existing portions, with portions of braided channel flow also noted. Within the MAM2 area, the channel morphology is generally



LEGEND

- Watercourse[1]
- Headwater Drainage Feature [2]
- Surveyed Reach
- Greenbelt NHS [3]
- Proposed Highway ROW
- Mayfield West Phase 2 Stage 3 Lands
- Study Area

1 - Land Information Ontario
2 - See figures 10-12 and Tables 7 and 8 for HDF Classification
3 - Toronto and Region Conservation Authority (TRCA)

0 100 200 300 400
METRE SCALE

North American Datum 1983
Universal Transverse Mercator Projection Zone 17

Scale: 1:12,000
Page Size: Tabloid (11 x 17 inches)

Drawn: RS
Checked: CH
Date: Aug 2, 2024

NORTH

Source Notes: Imagery (2023) sourced from Caledon Maps.

CLIENT
Brookvalley Project Management Inc.

PROJECT
Mayfield West Phase 2 Stage 3

TITLE
Existing Aquatic Environment

Palmer PART OF SLR

REF. NO. 1701618-3-1

Figure 3

Document Path: G:\Shared drives\Projects 2017\17016 - Brook Valley Homes\1701628 - Mayfield West - Phase 2 - Stage 3\GIS\1_Workspace\Task 2 - Ecology Figures\(2024-07) CEIMSP Figures\1701628 - CEIMSP Figures.aprx

straight with a gentle gradient. Near its downstream extent, near the western parcel's southern extent, the EC-2 channel gradient increases, with a series of tight meanders being noted.

EC-2a

The EC-2a channel comprises the western upstream tributary of EC-2 (**Figure 3**), crossing the Old School Road corridor immediately east of Chinguacousy Road. Similar to the EC-2 channel, EC-2a was observed flowing during the February 2024 site visit, with flows generally diffusing through thick Vegetation. The riparian corridor of the EC-2a channel is identified as mineral meadow marsh within its upstream and downstream portions (ELC unit MAM2) and mineral thicket swamp (ELC unit SWT2) along its central portion (**Figure 2** and **3**).

EC-2b

The EC-2b channel comprises the eastern upstream tributary of EC-2 (**Figure 3**). The feature was observed flowing beneath Old School Road during the February 2024 site visit. At the roadway, flow enters a dense area of Common Reed. Downstream of the Old School Road corridor, the EC-2b channel traverses a similar vegetation community as the EC-2a channel.

EC-3

Within the southeast portion of the MW2-3 western parcel is the EC-3 channel (**Figure 3**). The channel area, through aerial interpretation, arises within the agricultural lands to the east, and enters the wooded portions of the MW2-3 lands as a narrow, defined channel with a relatively steep gradient. From review of existing vegetation community information, the EC-3 channel traverses an area predominantly identified as mineral deciduous swamp (ELC unit SWD4). Due to existing snowpack during the February 2024 site visit, portions of the channel area were obscured from the detailed survey.

EC-4 (Etobicoke Creek Main Branch)

At the eastern extent of the MW2-3 lands, adjacent to the Highway 10 (Hurontario Street) corridor exists the main branch of Etobicoke Creek. Due to the presence of steep embankments, and private landownership not associated with the subject development, the entirety of this reach was not surveyed. For surveyed areas, the EC-4 channel area was found to be a tightly meandering river system that traversed several vegetation communities including Dry-Fresh Sugar Maple Deciduous Forests (ELC unit FOD5), Fresh-Moist Lowland Deciduous Forests (ELC unit FOD7), and Cultural Meadows (ELC unit CUM1-1). The in-stream habitat consisted primarily of elongated pools and runs, with riffle habitat being limited. Due to winter conditions, and turbid water conditions, in-stream substrates, vegetation, and cover was not fully quantified. Bank conditions were mostly stable with good, vegetated cover. In certain areas, undercut banks were noted.

EC-4a

The EC-4a channel forms the western-most tributary to the main branch of Etobicoke Creek (EC-4), entering the MW2-3 lands south of the intersection of Old School Road and McLaughlin Road (**Figure 3**). Approximately 300 m into the MW2-3 lands, the EC-4a channel passes beneath the existing railway line through a large, stone arched culvert. From there, the EC-4a channel is intersected by an existing farm crossing, before meandering through several vegetation communities including a Mineral Cultural Savannah (ELC unit CUS1), Cultural Meadow (CUM1), Dry-Fresh Deciduous Forest (ELC unit FOD4), and Mineral Cultural Woodlands (CUW1). Depending on the vegetation, and anthropogenic influences, the EC-4a channel fluctuates heavily from a broad, relatively slow-flowing channel, to a narrow, quickly flowing channel area.

EC-4b

East of the EC-4 channel is EC-4b, which enters the MW2-3 lands across Old School Road (**Figure 3**). The channel enters the property within a Cultural Meadow vegetation community, and tightly meanders through dense vegetation, with occasional fallen trees. The channel braids in areas and includes small cascades leading to several deepened pools. At its downstream extent, the channel gradient steepens as the watercourse enters a wooded valley area. The channel then meanders tightly within an existing wooded valley area, identified generally a Fresh-Moist Lowland Deciduous Forest (ELC unit FOD7).

EC-4c

The EC-4c channel enters the MW2-3 lands between two residential properties located along Old School Road (**Figure 3**). The channel morphology is similar to conditions found within the downstream half of the EC-4b channel, where the channel meanders tightly through an existing lowland wooded valley.

EC-4d

The EC-4d channel enters the MW2-3 lands southeast of the intersection of Old School Road and Highway 10 (Hurontario Street) (**Figure 3**). Surveyed conditions were similar to those observed along the EC-4c channel where an existing channel tightly meanders through a lowland wooded valley.

Fish Community

From review of historical fisheries records retrieved from the MNRF's Aquatic Resource Area (ARA) point count database (MNRF, 2023), sampling records completed within, and adjacent to the surveyed channels found the presence of the following species (**Table 2**).

Table 2. Fish Community Records

Scientific Name	Common Name	Thermal Preference	Tolerance
Rhinichthys atratulus	Blacknose Dace	Coolwater	Intermediate
Pimephales notatus	Bluntnose Minnow	Warmwater	Intermediate
Culaea inconstans	Brook Stickleback	Coolwater	Intermediate

Scientific Name	Common Name	Thermal Preference	Tolerance
Cyprinus carpio	Common Carp	Warmwater	Tolerant
Luxilus cornutus	Common Shiner	Coolwater	Intermediate
Semotilus atromaculatus	Creek Chub	Coolwater	Intermediate
Etheostoma flabellare	Fantail Darter	Coolwater	Intolerant
Pimephales promelas	Fathead Minnow	Warmwater	Tolerant
Notemigonus crysoleucas	Golden Shiner	Coolwater	Intermediate
Etheostoma nigrum	Johnny Darter	Coolwater	Tolerant
Rhinichthys cataractae	Longnose Dace	Coolwater	Intermediate
Lepomis gibbosus	Pumpkinseed	Warmwater	Intermediate
Ambloplites rupestris	Rock Bass	Coolwater	Intermediate
Hudsonius hudsonius	Spottail Shiner	Coolwater	Intermediate
Catostomus commersonii	White Sucker	Coolwater	Tolerant

2.2 Significant Natural Heritage Features

2.2.1 Species at Risk

The ESA provides protection for species listed as Endangered or Threatened in Ontario, including their habitat. The Species at Risk in Ontario (SARO) List also identifies species of Special Concern that may become Threatened or Endangered in the future. Species of Special Concern and their habitats are not protected under the ESA, rather through designation of Significant Wildlife Habitat.

Prior to the December 2023 field investigation, a background review was completed for potential SAR habitat opportunities. The NHIC database and other relevant sources were reviewed for SAR records. The study area was screened for potential SAR habitat opportunities by comparing habitat preferences of the species identified from the background and site records against current site conditions. This SAR habitat assessment can be found in **Appendix F**, providing a detailed description of each species' habitat, as well as a discussion of habitat suitability within and surrounding the study area. The following nine SAR were previously confirmed within the Study Area (all of which are older records to be confirmed):

- Vascular Plant (1)
  - Butternut (*Juglans cinerea*), Endangered
- Birds (7)
  - Barn Swallow (*Hirundo rustica*), Special Concern
  - Bobolink (*Dolichonyx oryzivorus*), Threatened
  - Eastern Meadowlark (*Sturnella magna*), Threatened
  - Eastern Wood-pewee (*Contopus virens*), Special Concern
  - Grasshopper Sparrow (Ammodramus savannarum), Special Concern
  - Short-eared Owl (*Asio flammeus*), Endangered
  - Wood Thrush (*Hylocichla mustelina*), Special Concern
- Insect (1)

- Monarch (*Danaus plexippus*), Special Concern

Additional SAR including one vascular plant, four birds, four reptiles and four mammals have potential to occur within the Study Area (**Appendix D**).

2.3 Significant Wildlife Habitat

Significant Wildlife Habitat (SWH) assessments must incorporate site-specific information as well as information from a wide geographic area, and consider other factors such as regional resource patterns and landscape effects. To help with site level assessments was completed based on a draft criteria and thresholds developed by the Region of Peel and Town of Caledon (NSE *et al.,* 2009) based on the MNRF's *Significant Wildlife Habitat Criteria Schedules for Ecoregion 6E* (Ontario Ministry of Natural Resources, 2015).

SWH is defined by the MNRF in the Significant Wildlife Habitat Technical Guide (Ontario Ministry of Natural Resources, 2000) and Natural Heritage Reference Manual (Ontario Ministry of Natural Resources, 2010) and includes the following categories:

- Seasonal Concentration Areas of Animals;
- Rare Vegetation Communities or Specialized Habitats for Wildlife;
- Habitats of Species of Conservation Concern; and
- Animal Movement Corridors.

Criteria for the identification of these features are also provided in the Significant Wildlife Habitat Criteria Schedules for Ecoregion 6E (MNRF, 2015). These criteria were used to provide an initial screening for wildlife habitat within the study area and immediately adjacent to the subject lands. The following is a preliminary summary which discusses the SWH components and Candidate SWH that were identified as having the potential to occur within the study area limits. Based on the high-level background review completed by Palmer staff, the western and eastern Study Area has been identified to have the potential to support several SWH. The majority of these potential SWH areas would be expected to be associated with the larger areas of contiguous upland forests and some of the associated wetlands. These results are likely contained within the established NHS and/or Greenbelt Lands as similarly concluded by previous ecological studies (AMEC, 2010)

West Side Potential Significant Wildlife Habitat:

- Old Growth Forest
  - Localized old growth forest may occur within the forest block
- Colonially - Nesting Bird Breeding Habitat (Tree/Shrubs)
  - Swamp habitat types will be searched for suitable habitat (nests in live or dead standing trees in wetlands)
- Bat Maternity Roosts
  - Mature deciduous or mixed forest stands with trees >25cm dbh (diameter at breast height) are present, which may provide maternity roosting habitat

- Forests Providing a High Diversity of Habitats
    - Potential for all Significant Woodlands within the Region of Peel
- Seeps and Springs
    - Forested areas within headwaters of Etobicoke Creek
- Amphibian Breeding Habitat (Forested Sites - vernal pools)
    - Forests may contain wetlands, ponds, or pools suitable for amphibian breeding habitat
- Turtle Nesting and Turtle Overwintering Areas
    - It is unlikely that waterbodies are deep enough to provide overwintering, however nesting locations may be present along Etobicoke Creek
- Habitat for Area Sensitive Forest Interior Breeding Bird Species
    - Large forest block may provide suitable habitat
- Raptor Nesting Habitat
    - Stick nests found in a variety of intermediate-aged to mature conifer, deciduous or mixed forests
- Species Identified as Special Concern – SARO
    - Special Concern wildlife species were recorded within the Study Area
- Species that are Rare within Peel/Caledon
    - Rare plant and wildlife species to Peel Region were recorded within the Study Area

East Side Potential Significant Wildlife Habitat:

- Colonially - Nesting Bird Breeding Habitat (Tree/Shrubs)
    - Swamp habitat types will be searched for suitable habitat (nests in live or dead standing trees in wetlands)
- Snake Hibernacula
    - Two snake species were recorded within the Study Area, specific locations are unknown. Rock piles or slopes, old stone fences, and abandoned crumbling foundations may be present. Dougan and Associates (2014) previously flagged the CUS1 (Polygon 69 – Figure 2) in the eastern corner as potential hibernacula.
- Bat Maternity Roosts
    - Mature deciduous or mixed forest stands with trees >25cm DBH are present, which may provide maternity roosting habitat
- Forests Providing a High Diversity of Habitats
    - Potential for all Significant Woodlands within the Region of Peel
- Seeps and Springs
    - Forested areas within headwaters of Etobicoke Creek
- Turtle Nesting and Turtle Overwintering Areas
    - It is unlikely that waterbodies are deep enough to provide overwintering, however nesting locations may be present along Etobicoke Creek
- Habitat of Open Country & Early Successional Breeding Birds
    - Large meadows and pastures present
- Raptor Nesting Habitat
    - Stick nests found in a variety of intermediate-aged to mature conifer, deciduous or mixed forests

- Nationally Endangered or Threatened by COESWIC (but not ESA)
    - Butternut (END), Bobolink (THR) and Eastern Meadowlark (THR) have been identified in the eastern portion of the Study Area.
- Species Identified as Special Concern – SARO
    - Special Concern wildlife species were recorded within the Study Area
- Species that are Rare within Peel/Caledon
    - Rare plant and wildlife species to Peel Region were recorded within the Study Area

2.4 Woodland Assessment

The MW2-3 site supports several woodland areas of varying sizes and community types. An assessment of the significance of on-site woodlands has been completed and will be subject to refinement following further spring and summer field investigations, and detailed features and functions assessment. As depicted on **Figure 2**, several larger woodland units (many comprised of several individual ELC communities) have been identified for reference use in this assessment. Note, several smaller woodland units/fragments also exist and will be discussed collectively. As aforementioned and reiterated below, the Town of Caledon considers significant woodlands as part of their Natural Heritage System however, detailed criteria for significant woodland assessment are not stated. To assess whether these features may be considered significant, the policies outlined in the Greenbelt Plan, the Region of Peel Official Plan (Table 1) and the Natural Heritage Reference Manual (Ontario Ministry of Natural Resources, 2010) have been reviewed.

Region of Peel OP

As per the Region's OP, significant woodlands are considered components of the Core Areas of the Greenlands System. Woodlands that are included as part of the Core Area, and considered 'significant', are mapped in the OP's Schedule A and are considered "ecologically important in terms of features such as species composition, age of trees and stand history; functionally important due to its contribution to the broader landscape because of its location, size or due to the amount of forest cover in the planning area; or economically important due to site quality, species composition, or past management history". The Region OP defines relevant criteria and thresholds for the identification of Core, Natural Areas and Corridors (NAC) Woodlands in Table 1.

The recommended criteria / standards for the evaluation of significant woodlands are the following:

1. Woodland Size (based on the total forested area in the regional landscape)
2. Woodland Age (based on both woodland size and presence of native trees older than 100 years);
3. Significant Linkage function (based on woodland linkage to other significant features in the regional landscape);
4. Woodland Proximity (based on both woodland size and proximity to other significant features that support significant ecological relationships);
5. Surface Water Quality (based on woodland size and proximity to a watercourse, surface water feature, or wetland that can be identified with the Ontario Wetland Evaluation System);

6. Significant Species and Communities (based on woodland size, as well as GRANKS or SRANKS species, species at risk identified by COSEWIC or COSSARO, and/or specific forested communities)

Town of Caledon Official Plan, Consolidated in March 2024

Under Section 190. Woodland Core Area, shall mean:

a) Within the Oak Ridges Moraine Conservation Plan Area, areas defined and identified as Significant Woodlands in accordance with Oak Ridges Moraine Conservation Plan Technical Paper 7 – Identification and Protection of Significant Woodlands, published by the Province of Ontario in 2007, or any successor thereto;
b) Within and west of the Niagara Escarpment Plan Area, areas meeting one or more of the criteria for Core Woodlands in Table 1 of the Region of Peel Official Plan; or,
c) South and East of the Niagara Escarpment and Oak Ridges Moraine Conservation Plan 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.

Section 191. Woodlands shall mean ecosystems comprised of treed areas and the immediate biotic and abiotic environmental conditions on which they depend. Woodlands provide environmental and economic benefits to both the private landowner and the general public, such as erosion prevention, hydrological and nutrient cycling, the provision of clean air and the long-term storage of carbon, the provision of wildlife habitat, outdoor recreational opportunities, and the sustainable harvest of a wide range of woodland products. Woodlands include woodlots, cultural woodlands, cultural savannahs, plantations and forested areas and may also contain remnants of old growth forests.

Woodlands are further defined as any area greater than 0.5 hectares that has:

a) A tree crown cover of over 60% of the 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, or

ii) 750 trees measuring over five centimetres in diameter at breast height (1.37m), per hectare, or

iii) 500 trees measuring over 12 centimetres in diameter at breast height (1.37m), per hectare, or

iv) 250 trees measuring over 20 centimetres 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 metres or more measured to crown edges.

Exclusions may be considered for treed communities which are considered plantantions, dominated by invasive non-native tree species such as buckthorn (*Rhamnus species)* and Norway maple (*Acer plantanoides*), or others deemed to be highly invasive, that threaten the ecological functions or biodiversity of native communities. Such exceptions should be supported by site-specific studies that consider 1) the degree of threat posed; 2) any potential positive and/or negative impact on the

ecological functions or biodiversity of nearby or adjacent native communities; and 3) the projected natural succession of the community. Communities where native tree species comprise approximately 10 percent or less of the tree crown cover and approximately 100 or fewer stems of native tree species of any size per hectare would be candidates for exclusion.

Section 192. Woodlands (Other) shall mean all other woodlands within the Town of Caledon that do not meet the definition of Woodland Core Area.

Section 3.2.5.3.2 New development will not be permitted in Other Woodlands unless it can be demonstrated that such development will not result in the degradation of ecosystem integrity, to the satisfaction of the Town and Ministry of Natural Resources and Forestry, or other delegated approval authority.

Section 3.2.5.3.5 Management and restoration of Woodland Core Areas and Other Woodlands shall adhere to the Town's ecosystem principle, goal, objectives, policies and performance measures, as well as any relevant policies or guidelines established by the Ministry of Natural Resources and Forestry, the Conservation Authority, the Niagara Escarpment Plan, where applicable, or other delegated Authority. Management and restoration of woodlands shall generally be implemented through an approved Forest Management Plan, or comparable document, and shall be guided by the principles of Good Forestry Practices.

Greenbelt Plan and MNRF's Natural Heritage Reference Manual

The determination of significant woodlands in the Greenbelt Plan is generally consistent with the MNRF's Natural Heritage Reference Manual.

In the absence of specific woodland significance assessment criteria from the Town's OP, the Natural Heritage Reference Manual (Ontario Ministry of Natural Resources, 2010) has been reviewed to provide further guidance in determining significant woodlands within the Subject Property. This document provides the province's recommended technical criteria / approaches in protecting the natural heritage features in Ontario while being consistent with the PPS. These are provided for municipalities to use when they are developing municipally specific criteria for the identification of significant woodlands.

The recommended criteria / standards for the evaluation of significant woodlands are the following:

1. Woodland Size (based on the percent forest cover in the regional landscape or planning area, should account for landscape-level physiographic differences);
2. Ecological Functions (woodland interior, shape and proximity, linkages, water protection, woodland diversity);
3. Uncommon Characteristics (rare communities, unique species composition, quality, older woodlands); and
4. Economic and Social Values (high economic productivity and social value).

Based on the manual guidelines, woodlands that meet the standards for any one of the criteria listed above may be considered significant. For woodlands that do not meet the simple size criterion #1, other criteria

(based on ecological functions and characteristics) can be considered. For criteria #2-4, when the simple size criterion is not met, a range of size thresholds for significance is provided, where relevant.

Based on AMEC's report, all forested valleylands are considered significant woodlands and three tableland woodlands are also considered as significant woodlands (i.e. northeast segment of the subject area directly south of Old School Rd, southeast segment of subject area west of Hurontario Street, and west segment of the study area between Chinguacousy Road and McLaughlin Road).

The assessment of significance in this report is subject to refinement and confirmation as part of further field surveys and assessment in 2024. One woodland block is present in the western Study Area (southeast portion). Based on previous surveys the woodland the feature is identified as a mix of upland and lowland forest communities and wetland areas.

2.5 Wetlands

As identified on **Figures 2** and **3**, wetlands were identified within the Study Area, including PSW and other wetlands identified as part of previous TRCA and AMEC background information. The presence of these wetlands was documented by Palmer during 2023 and 2024 field investigations.

2.5.1 Provincially Significant Wetlands

The Etobicoke Creek Headwater Provincially Significant Wetland (PSW) Complex occurs within the east and west portions of the study area. Wetland units of this complex are found both within the Greenbelt and outside of Greenbelt lands (**Figure 3**). This PSW complex was mapped and refined by MNRF (between 2008 and 2014).

2.5.2 Other Wetlands

There are other wetlands that have been identified within the Study Area from the background information including TRCA and Dougan ELC mapping (**Figure 3**). Other wetland areas that overlap with and potentially extend beyond the PSW areas were reviewed as part of the 2024 updated ELC mapping.

2.6 Valleylands

Based on AMEC's report, valleylands associated with Etobicoke Creek (i.e. northeast segment of the subject area directly south of Old School Rd, southeast segment of subject area west of Hurontario Street, and the southwest segment of the study area between Chinguacousy Road and McLaughlin Road) are all considered Significant Valleylands. Most of these Significant Valleylands are naturally vegetated and with a well-defined and district landform, with the exception of the southwestern segment of the study area where the valleylands have shallow slopes and agricultural lands extend to the edge of Etobicoke Creek.

Terraprobe completed detailed slope assessments of the Long-Term Stable Top of Slope (LTSTOS) for the Etobicoke Creek valleylands as part of the AMEC CEISMP (2010). The results are provided in **Appendix F**. If required, additional assessments on the limits of the LTSTOS will be confirmed as part of Detailed Design for the project.

2.7 Aquatic Habitat

2.7.1 Background Conditions

For the purposes of this study, the aquatic ecosystem is considered to include fish, fish habitat and benthic invertebrates. Each are important natural heritage components and are valuable indicators of ecosystem health.

The AMEC (2010) report relied on existing fisheries information collected up to 2008 with some reconnaissance level fish sampling at four locations. The TRCA undertakes an aquatic sampling program in Etobicoke Creek at two stations that are part of the TRCA Regional Watershed Monitoring Program, ECOWM14 (at Mclaughlin Road) and ECOWM13 (just upstream of Hurontario Street), where fish are sampled every three years. Fish sampling has also been taking place at the Mayfield 3 station on 2013 and 2016 (**Figure 4**).

Fish and Fish Habitat

Twenty species of fish have been identified in the general study area (**Table 2**) (EC013WM, EC014WM, and Mayfield 3 in **Figure 4**). The main branch of Etobicoke Creek and its associated tributaries consists of species such as White Sucker (*Catostomus commersoni*), Blacknose Dace (*Rhinichthys atratulus*), Longnose Dace (*Rhinichthys cataractae*), and Creek Chub (*Semotilus atromaculatus*). These species are common, secure in status and not sensitive to environmental perturbations. An online pond located in the southwestern portion of the study area (Pond #3 in **Figure 4**) has records for 4 species of fish; Blacknose Shiner (*Notropis heterolepis*), Brook Stickleback (*Culaea inconstans*), Common Shiner (*Luxilus cornutus*), and Golden Shiner (*Notemigonus crysoleucas*).

These fish species recorded within the study area are indicative of a warmwater community, consistent with the thermal mapping. In general, 3rd and 4th order watercourses within the study area are categorized as intermediate riverine warm water and the 1st and 2nd order watercourses are categorized as small riverine warm water (AMEC, 2010). The thermal region within the study is all warmwater due to the temperature of the water. Groundwater discharge is known to be limited within the Etobicoke Creek Headwater subwatershed due to the clay soils and surficial geology of the area (TRCA, 2008).

The TRCA have identified two fish species in the study area as Species of Conservation Concern; Bluntnose Minnow (*Pimephales notatus*) and Blackchin Shiner (*Notropis heterodon*). These species are considered more sensitivity to habitat alteration, chemical pollution, siltation and increased flow velocities.

No fish species listed as Endangered, Threatened or Special Concern under either the provincial *Endangered Species Act* (ESA) or federal *Species at Risk Act* (SARA) are present within the study area. There are historical records of Redside Dace (*Clinostomus elongates*) in the Etobicoke Creek Watershed prior to 1950 (TRCA, 2006) but this species has not been recorded within the study area for over 20 years and none of the watercourses within the study area have been identified as occupied, recovery or contributing Redside Dace habitat.

Table 3. Fish Species of the Mayfield West Study Area

Scientific Name	Common Name	TRCA	AMEC 2008	G-rank	S-rank	SARA	ESA
Catostomus commersoni	White Sucker	X	X	G5	S5		
Ambloplites rupestris	Rock Bass	X	X	G5	S5		
Lepomis gibbosus	Pumpkinseed	X		G5	S5		
Luxilus cornutus	Common Shiner	X		G5	S5		
Margariscus margarita	Pearl Dace	X		G5	S5		
Notemigonus crysoleucas	Golden Shiner	X		G5	S5		
Notropis heterodon	Blackchin Shiner	X		G5	S4	NAR	NAR
Notropis heterolepis	Blacknose Shiner	X		G4	S5		
Notropis hudsonius	Spottail Shiner	X		G5	S5		
Phoxinus eos	Northern Redbelly Dace	X		G5	S5		
Pimephales notatus	Bluntnose Minnow	X		G5	S5	NAR	NAR
Pimephales promelas	Fathead Minnow	X		G5	S5		
Rhinichthys atratulus	Blacknose Dace	X	X	G5	S5		
Rhinichthys cataractae	Longnose Dace	X		G5	S5		
Semotilus atromaculatus	Creek Chub	X	X	G5	S5		
Culaea inconstans	Brook Stickleback	X	X	G5	S5		
Ameiurus nebulosus	Brown Bullhead	X		G5	S4		
Etheostoma flabellare	Fantail Darter	X	X	G5	S5		
Etheostoma nigrum	Johnny Darter	X	X	G5	S5		
Umbra limi	Central Mudminnow	X		G5	S5		

ESA – Endangered Species Act SRank – Provincial Rank
SARA – Species at Risk Act GRank – Global Rank

Benthic Invertebrates

Benthic invertebrate data was collected by TRCA at two sites within the study area in 2008 (AMEC 2010). The overall results indicate that water quality within Etobicoke Creek ranges between poor, fairly poor and very poor, as indicated by the very limited presence EPT (*Ephmeroptera, Plecoptera, Trichoptera*) benthic taxa which are sensitive to habitat quality (AMEC 2010).

2.7.2 Aquatic Conditions – Field Investigations

All permanent and intermittent streams were surveyed within the western and eastern property parcels associated with the MW2-3 lands on February 1, 2024. Headwater Drainage Features (HDFs) area being completed in 2024.

The ecological significance of certain catchments is outlined in the following subsections, one describing the aquatic resources features pertaining to the western land parcel, and the other describing the eastern aquatic resource features.

Within the western land parcel, all features were identified as flowing during the February 2024 site visit, indicating that the features at least serve some ephemeral drainage function, facilitating overland runoff to downstream reaches within the Etobicoke Creek watershed. During the February 2024 site visit, it was noted that recent mild temperatures and remaining snowpack was likely contributing to 'spring freshet' like conditions as snowmelt drained from local catchment areas.

The majority of aquatic resources within the western MW2-3 land parcel exhibit high levels of channel roughness due to the presence of thick, overhanging and instream vegetation. High channel roughness, combined with areas of steeper channel gradient, particularly along the EC-2 channel, may limit fish passage into the EC-2a and EC-2b channel areas.

From review of fish species records within and adjacent to the western aquatic resource features (**Table 3**), the fish community is composed of mostly warm and coolwater species, that are, at a minimum, intermediately tolerant to environmental perturbations. MNRF records indicate that the segments of Etobicoke Creek that traverse the western MW2-3 lands are warmwater systems (MNRF, 2023).

Within the eastern land parcel area, all features were identified as flowing during the February 2024 site visit, indicating that all watercourse features at least serve some ephemeral drainage function, facilitating overland runoff to downstream reaches within the Etobicoke Creek watershed.

Divergent from the western aquatic resource features, the majority of the eastern watercourses exhibited low channel roughness and appeared to generally be larger in wetted depth and width. However, certain areas, particularly those immediately adjacent to Old School Road exhibited steep channel gradients. At a preliminary level, the larger, deeper watercourses observed within the eastern MW2-3 lands likely provide more substantial, permanent potential than their counterparts in the western MW2-3 lands.

This is reflected in the historical fisheries records outlined in **Table 3**, which shows a wider variety of fish species, including larger bodied fish species such as Common Carp. From review of fish species records within and adjacent to the eastern aquatic resource features, the fish community within the eastern MW2-3 lands is composed of mostly warm and coolwater species, that are, for the most part, intermediately tolerant to environmental perturbations. MNRF records indicate that the segments of Etobicoke Creek that traverse the eastern MW2-3 lands are warmwater systems (MNRF, 2023).

Benthic Invertebrates

Benthic invertebrate data was collected by TRCA at two sites within the study area in 2008 (AMEC 2010). The overall results indicate that water quality within Etobicoke Creek ranges between poor, fairly poor and very poor, as indicated by the very limited presence EPT (Ephmeroptera, Plecoptera, Trichoptera) benthic taxa which are sensitive to habitat quality (AMEC 2010).

LEGEND

- TRCA Fish Data Collection Station

Watercourses

- Thermal Regime - Warm
- Thermal Regime - No Data
- Headwater Drainage Feature [2]
- Greenbelt NHS [2]
- Proposed Highway ROW
- Mayfield West Phase 2 Stage 3 lands
- Study Area

1 - Thermal regime data from Aquatic Resource Area (ARA) Line segment data.
2 - See figures 10-12 and Tables 7 and 8 for HDF Classification
3 - Toronto and Region Conservation Authority (TRCA)

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METRE SCALE

North American Datum 1983
Universal Transverse Mercator Projection Zone 17

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Source Notes: Imagery (2023) sourced from Caledon Maps.

CLIENT
Brookvalley Project Management Inc.

PROJECT
Mayfield West Phase 2 Stage 3

TITLE
Fish and Fish Habitat

Palmer PART OF SLR

REF. NO. 1701618-4-1

Figure 4

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2.8 Hydrogeology

2.8.1 Background Conditions

A hydrogeological assessment was completed by Terraprobe Inc. as part of the AMEC (2010) CEISMP Part A Report. The factual hydrogeological data from this report was used as part of this study. However, since 2010, the expectations of review agencies for hydrogeological studies have increased significantly and now must integrate aspects of groundwater, surface water and wetland hydrology into the analysis.

Beginning in November 2017, Palmer initiated a detailed hydrogeological assessment to build upon the existing monitoring well network while focusing on characterizing the groundwater recharge and discharge relationships within the MW2-3 study area. Working with the ecology team, a series of wetland and watercourse mini-piezometers (MPs) were installed to measure the flow conditions and wetland hydroperiod of these features.

Regional Geological and Hydrogeological Conditions

The site is located within the South Slope physiographic region (Chapman and Putnam, 1984), which lies between the Oak Ridges Moraine and the Peel Plain. The South Slope was formed along the shorelines of the Iroquois Plain, and is characterized by predominately clay till soils derived from former glacial lakes. The South Slope begins on the south side of the Niagara Escarpment, and slopes downwards towards Lake Ontario. Local to the site, topography slopes towards Etobicoke Creek and its tributaries. Surface elevation varies between 255 meters above sea level (masl) and 270 masl.

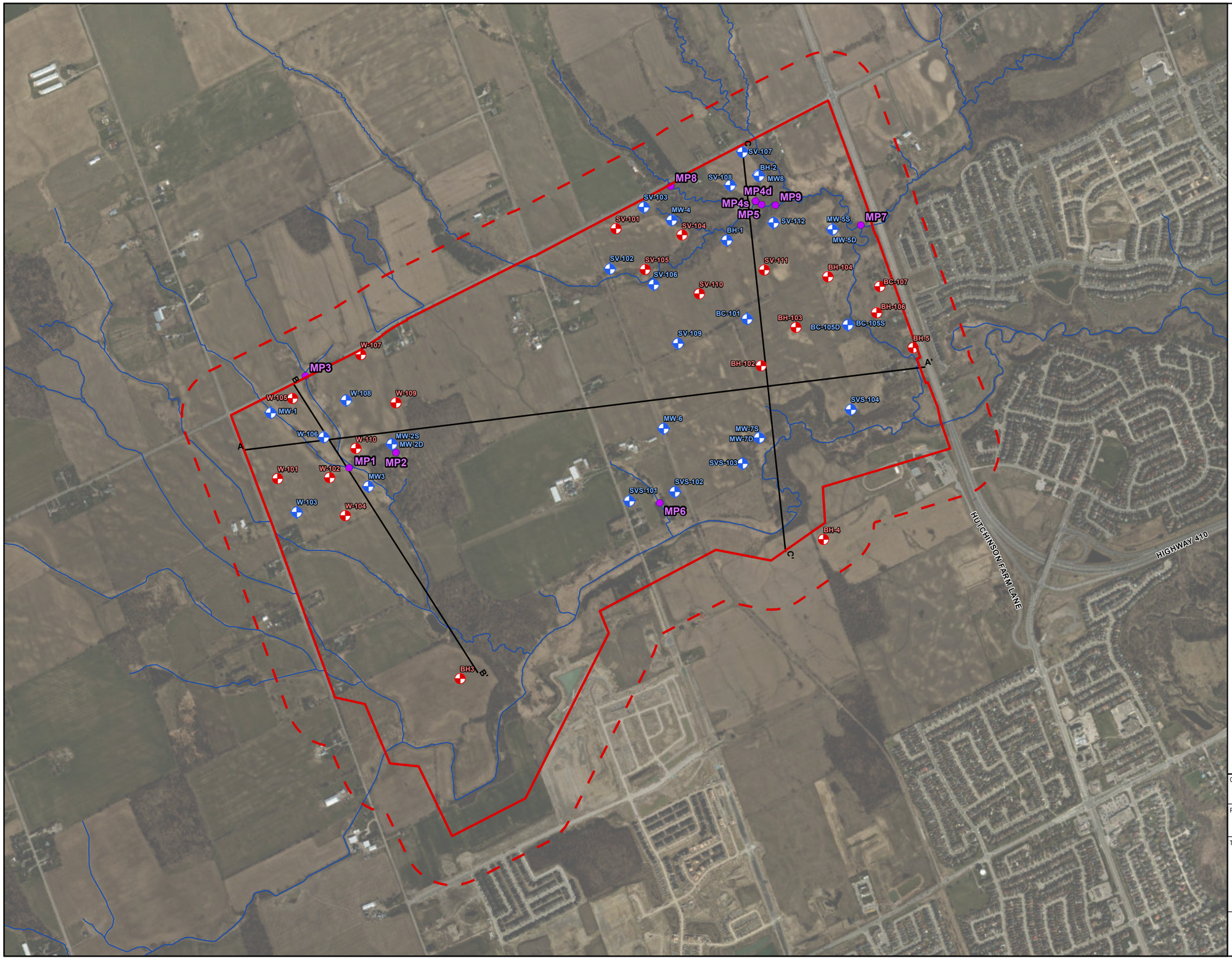
The bedrock geology and surficial geology for the MW2-3 Lands as described by OGS mapping and site observations is presented on **Figures 5** and **6** and described in detail below. The Bedrock Geology in **Figure 5** is presented in a more regional scale, whereas the Surficial Geology mapping in **Figure 6** has been modified from the OGS mapping based on site specific results and is presented for the MW2-3 Lands.

Modern Alluvium

Recent deposits of alluvial silts, sands, and gravels are found in the Etobicoke Creek Valley (**Figure 6**). The Etobicoke Creek follows an ancestral valley system which has subsequently infilled with modern and historical alluvium (TRCA, 2010). These soils have been described as undifferentiated gravels, sands, silts, and muck (Karrow, 2005).

Fine Grained Glaciolacustrine Deposits

Fine grained glaciolacustrine sediments (silt and clay) are located within small regions of the site along Etobicoke Creek (**Figure 6**). These soils were deposited in former glacial lakes in calm, offshore environments, and are generally less than 1 m in thickness. The soil textures range from near shore sand and beach deposits from the shoreline of Lake Iroquois, to fine sand, silts, and clay deposits of glaciolacustrine ponding.



LEGEND

- Monitoring Well
- Borehole
- Mini-Piezometer
- Cross Section Location
- Watercourse[1]
- Mayfield West Phase 2 Stage 3 Lands
- Study Area

1. LIO/Field confirmed at site areas

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METRE SCALE

North American Datum 1983
Universal Transverse Mercator Projection Zone 17

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CLIENT
Brookvalley Project Management Inc.

PROJECT
Mayfield West - Phase 2 - Stage 3

TITLE
Monitoring Well and Mini-Piezometer Location Plan

Palmer PART OF SLR

REF. NO. 1701628-5-1

Figure 5

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LEGEND

- Mayfield West Phase 2 Stage 3 Lands
- Study Area
- Watercourse[1]

Surficial Geology[2]

Phanerozoic / Cenozoic / Quaternary / Recent

- 20: Organic deposits *(peat, muck, marl)*
- 19: Modern alluvial deposits *(clay, silt, sand, gravel, may contain organic remains)*

Phanerozoic / Cenozoic / Quaternary / Pleistocene

- 12: Older alluvial deposits *(clay, silt, sand, gravel, may contain organic remains)*
- 9c: Coarse-textured glaciolacustrine deposits *(Foreshore and basinal deposits)*
- 8a: Fine-textured glaciolacustrine deposits *(Massive-well laminated)*
- 8b: Fine-textured glaciolacustrine deposits *(Interbedded silt and clay and gritty, pebbly flow till and rainout deposits)*
- 7: Glaciofluvial deposits *(river deposits and delta topset facies)*
- 7a: Glaciofluvial deposits *(Sandy deposits)*
- 7b: Glaciofluvial deposits *(Gravelly deposits)*
- 6: Ice-contact stratified deposits *(sand and gravel, minor silt, clay and till)*
- 5b: Tilll *(Stone-poor, sandy silt to silty sand-textured till on Paleozoic terrain)*
- 5d: Tilll *(Clay to silt-textured till [derived from glaciolacustrine deposits or shale])*

Phanerozoic / Paleozoic

- 4: Bedrock-drift complex in Paleozoic terrain
- 3: Paleozoic bedrock

1. LIO/Field confirmed at site areas
2. Ontario Geological Survey 2010 (Mapped at 1:50,000). Surficial geology of southern Ontario; Ontario Geological Survey. Miscellaneous Release- Data 128 - Revised

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PROJECT
Mayfield West - Phase 2 - Stage 3

TITLE
Surficial Geology

Palmer | PART OF SLR

REF. NO. 1701628-6-1

Figure 6

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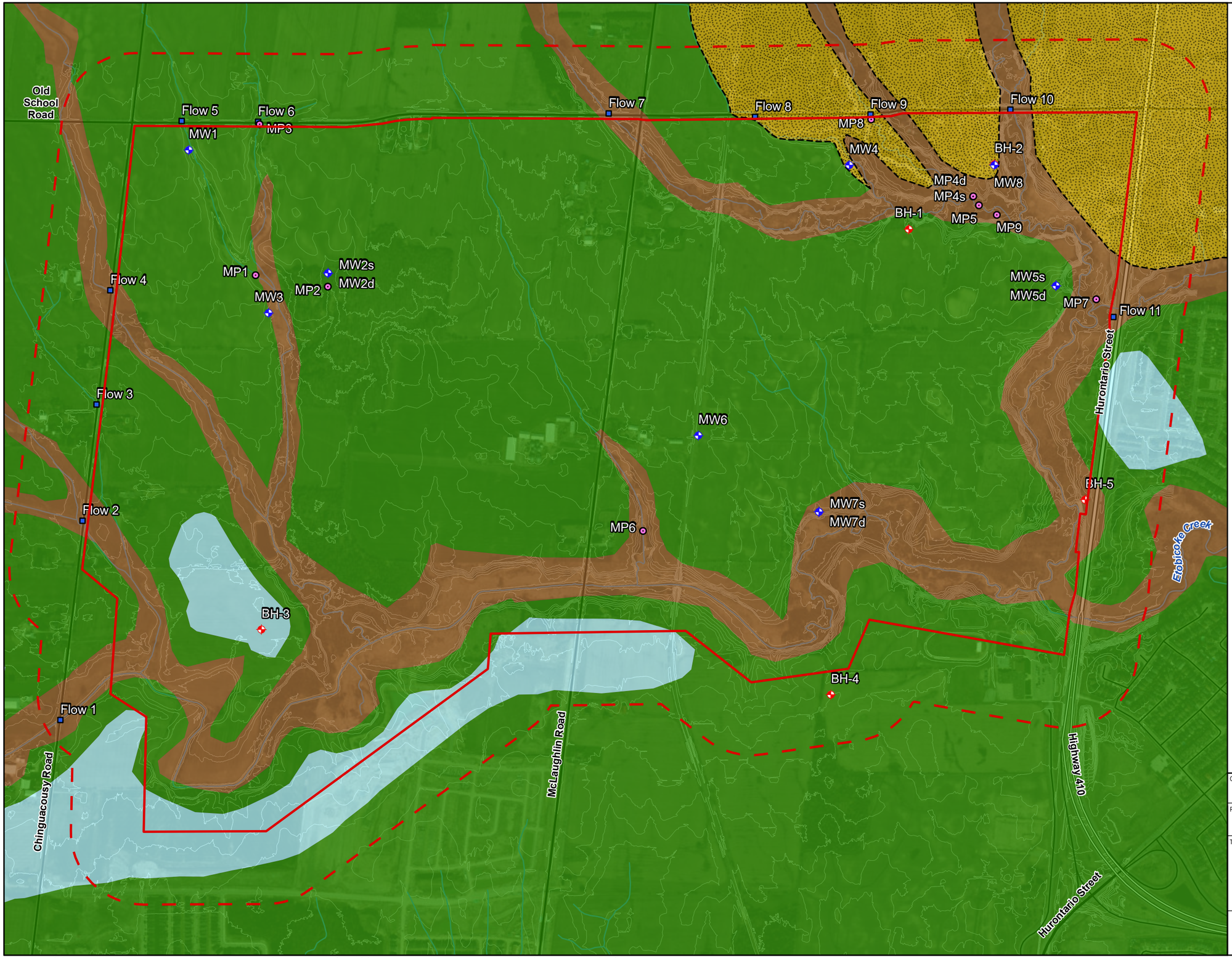

LEGEND

- Monitoring Well (PECG, 2017)
- Monitoring Well (AMEC, 2010)
- Mini-Piezometer
- Surface Water Flow Station
- Mayfield West Phase 2 Stage 3 Lands
- Study Area
- Watercourse
- Contours (1 m interval)

Surficial Geology:

- **Oak Ridge Moraine Formation (or Equivalent):** Fine to medium sand and silt *(interpreted from borehole drilling data)*
- **Halton Till:** glaciolacustrine-derived silty to clayey till
- **Glaciolacustrine Deposits:** interbedded flow till, rainout deposits and silt and clay
- **Modern Alluvial Deposits:** undifferentiated gravel, sand, silt, clay, muck

1. LIO/Field confirmed at site areas
2. Ontario Geological Survey 2010 (Mapped at 1:50,000). Surficial geology of southern Ontario; Ontario Geological Survey. Miscellaneous Release- Data 128 - Revised

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Brookvalley Project Management Inc.

PROJECT
Mayfield West - Phase 2 - Stage 3

TITLE
Surficial Geology

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Figure 6a

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Halton Till

The Halton Till overlies the majority of the study area, and consists of clayey silt to silty clay textured till representing the final advance of ice at the end of the Wisconsinan glaciations (**Figure 6**). Typically, this unit is between 3 and 6 m in thickness, however locally can exceed 15 to 30 m west of Brampton. It has a predominantly silty clay to silt matrix, and contains isolated lenses of laminated sand, silt, and clay. Regionally the unit acts as a surficial aquitard, with hydraulic conductivities ranging from 10^{-10} m/sec to 10^{-6} m/sec (Interim Waste Authority, 1994), however can often provide sufficient water for residential use where isolated sand lenses occur. Within the till soils, groundwater flow is typically downwards towards

the more permeable bedrock aquifer. The water table is commonly high within the till due to the poorly drained nature of the soil.

Oak Ridges Moraine Formation (or equivalent)

The Oak Ridges Moraine sand and gravel deposits formed approximately 13,000 ybp and is a significant regional aquifer unit in Southern Ontario. Although the Oak Ridges Moraine (ORM) landform lies approximately 12 km north of the study area, “finger-like” protrusions of highly permeable ORM sediments are known to extend southward below the South Slope physiographic region in the vicinity of the study area, and pinch out beneath the Halton Till south of Mayfield Road. Some ORM sediments are also present at surface within the headwaters of Etobicoke Creek north of Mayfield Road (**Figure 6**). These deposits are generally less than 30 m thick, and thin out south of Etobicoke Creek.

Where low-lying watercourse or wetland features encounter permeable ORM sand and gravel deposits below the Halton Till, groundwater discharge is expected, which can support wetland function and stream baseflow.

Newmarket Till

The Newmarket Till is a regionally extensive subglacial till which underlies the ORM and most of south central Ontario (Sharpe et al., 1997). Typically, this unit is characterized by a dense, over-consolidated till deposit, which ranges in thickness from 1 to 50 m. Sediments in the till are comprised of sandy silt to silt with trace gravel. Generally it is massive, however coarser textured features, such as interbeds and sand dykes, are common.

Bedrock Geology

Regional bedrock geology is presented on **Figure 5**. Bedrock at the site is characterized as Queenston Shale, and is described as Upper Ordovician aged, dark red, hematic shale interbedded with grey to green limestone and occasionally sandstone. Shale of the Queenston Formation does not fracture readily and is reportedly compact and dense with relatively poor interconnectivity of pore spaces (Singer et al., 2003). It is expected that the depth to bedrock at the site approximately 40 mbgs.

Hydrostratigraphy

Hydrostratigraphic units can be subdivided into two distinct groups based on their capacity to permit groundwater movement: an aquifer or an aquitard. An aquifer is classically defined as a layer of soil permeable enough to permit a usable supply of water to be extracted. Conversely, an aquitard is a layer of soil that inhibits groundwater movement due to its low permeability. The major regional hydrostratigraphic units at the site are described below.

The ***Halton Till*** consists of clayey silt to silt textured till, and forms a regional aquitard at the site. Generally, groundwater flow through these soils is predominantly downwards (vertical), providing recharge (albeit limited) to deeper aquifers. Shallow groundwater flow is expected to mimic site topography and generally flow towards major creek valleys (i.e., Etobicoke Creek). The hydraulic conductivity of the Halton Till ranges between 10^{-10} m/sec to 10^{-6} m/sec (Interim Waste Authority, 1994). More permeable sand and gravel lenses are known to occur within the Halton Till, which can provide sufficient water for domestic supply and provide localized areas of groundwater discharge to support streams and wetlands.

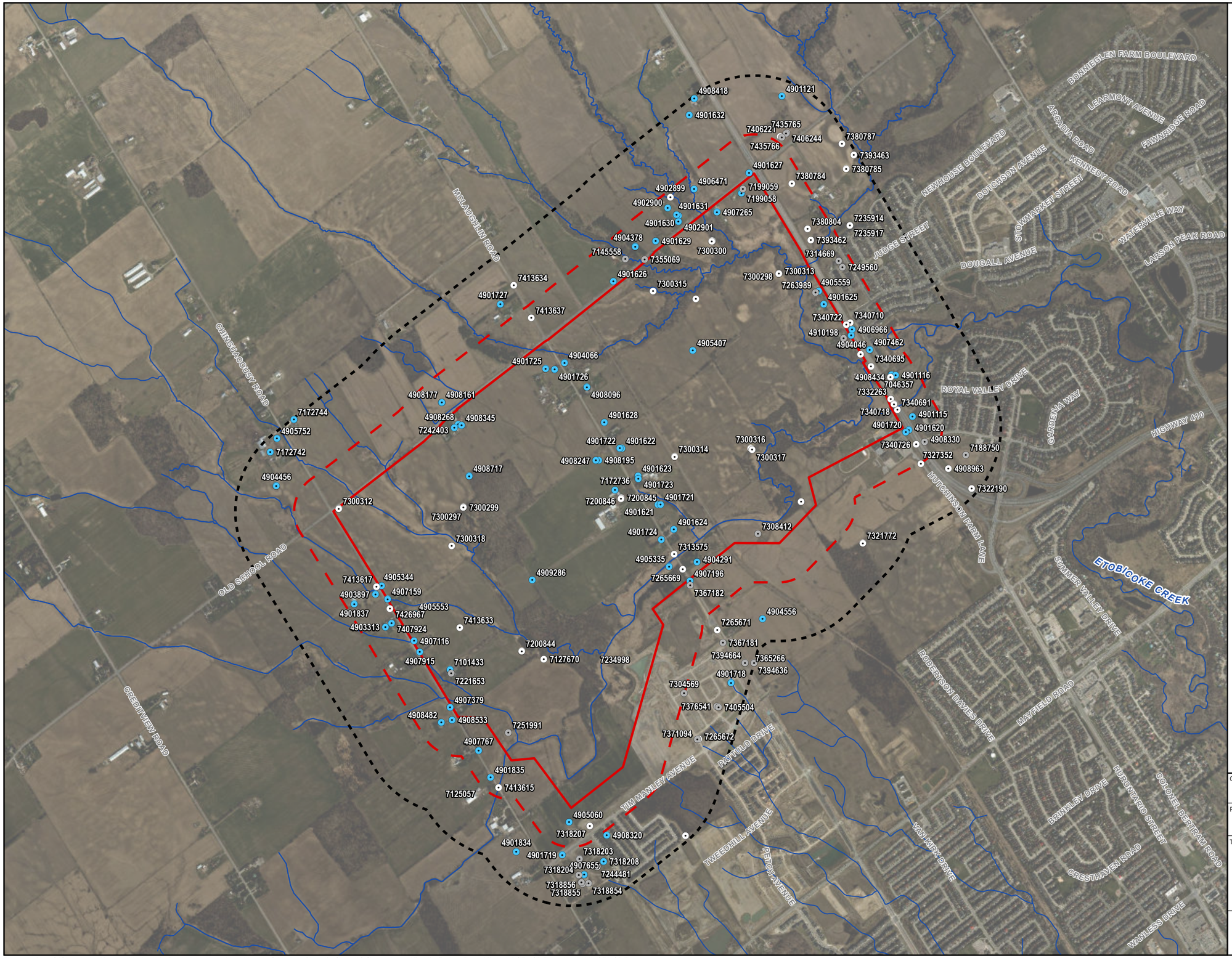
The ***Oak Ridges Moraine (ORM)*** is a significant regional aquifer in Southern Ontario due to its predominantly sandy surface soils and hummocky topography. It is identified by OGS mapping to occur approximately 12 km north of the site, however ORM sediments that have extended south were identified within the project boundary (**Figure 6**). These sediments were observed at surface near Etobicoke Creek where Halton Till was absent or thin (less than 1 m), and beneath the Halton Till through the rest of the site. South of Etobicoke Creek these sediments tend to thin and pinch out. The hydraulic conductivity of the ORM sediments is generally in the range of $3x10^{-6}$ m/sec to $7x10^{-3}$ m/sec (Sharpe et al., 2003), and is tapped by numerous private wells and several municipal supply wells.

The ***Newmarket Till*** acts as a significant regional aquitard at the study area. It is a poorly sorted sandy silt to sand till that forms a thick aquitard unit of fine textured sediments. This limits groundwater recharge and contaminant migration, however thin discontinuous sand layers present in the till cause some heterogeneity. The hydraulic conductivity of the till generally ranges between 10^{-8} to 10^{-6} m/sec.

The ***Queenston Shale bedrock*** is present underlying the site and surrounding region, including much of the Caledon and Brampton area. Generally, the bedrock forms a regional confining unit that limits groundwater movement to deeper bedrock aquifers, however the upper 3 – 6 m can be more highly weathered and can provide significant water for groundwater supplies. The hydraulic conductivity of the shale bedrock is typically in the range of 10^{-5} to 10^{-8} m/sec (Lee and ESG International, 2002). The well yield from the weathered zone is typically low.

MECP Water Wells

Based on a review of the MECP water well records, a total of 34 water wells are present within a 500 m radius of the MW2-3 (**Figure 7**). Of these wells, two wells are abandoned, 28 are used for domestic water supply, and 4 are used for livestock water supply. Generally, these wells have shallow depths (ranging from 6.10 mbgs to 45.72 mbgs) and are screened either within the Oak Ridges Moraine Aquifer, or within the shallow weathered zone of the Queenston Formation.



LEGEND

- Mayfield West Phase 2 Stage 3 Lands
- Study Area
- 500m Site Buffer
- Watercourse[1]

Water Well within 500m[2]

by Well Use

- Water Supply
- Test Well/Monitoring Well
- N/A

1. LIO/Field confirmed at site areas
2. MECP

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North American Datum 1983
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CLIENT
Brookvalley Project Management Inc.

PROJECT
Mayfield West - Phase 2 - Stage 3

TITLE
MECP Water Well Records within 500m of Site

Palmer PART OF SLR

REF. NO. 1701628-7-1

Figure 7

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Source Water Protection

Both TRCA and CVC have Source Water Protection Plan policies that encompass the Toronto and Region Source Protection Area and the Credit Valley Conservation Source Protection Area. The CVC Source Protection Plan was updated and approved in July 2015, and the TRCA Source Protection Plan was approved in 2015. Based on the results of these reports (**Figure 8**), it is concluded that the MW2-3 Study Area is not located within a wellhead protection zone (WPZ) or within a significant groundwater recharge area (SGRA). Small portions of the study area are identified as a Highly Vulnerable Aquifer (HVA). A Contaminant Management Plan may be required for areas identified as HVA. This includes the areas for the storage and handling of chemicals, but no other restrictions on land use.

2.8.2 Field Investigations

Monitoring Well Installations

Borehole drilling investigations at the site for hydrogeological purposes was conducted from November 13 – 15, 2017. Eleven boreholes (MW-1, MW-2s/d, MW-3, MW-4, MW-5s/d, MW-6, MW-7s/d, MW-8) were drilled by DrillTech Ltd. under the supervision of Palmer staff, to depths ranging from 7.85 mbgs to 12.80 mbgs. Borehole drilling was completed using solid stem auger methods, and soil samples were collected using a 0.61 m long split spoon. Each borehole was completed as a 51 mm diameter monitoring well using schedule 52 PVC pipe and a 1.5 m long screen. The location of each borehole is presented on **Figure 6**, and the details of the installed monitoring wells are provided on **Table 4**. Nested wells, which consisted of one deep and one shallow monitoring well, were installed at MW-2s/d, MW-5s/d, and MW-7s/d. Borehole logs are presented in the Palmer Hydrogeology Report (Palmer, 2022).

In addition, monitoring wells that were previously installed by AMEC as part of the Mayfield West Phase 2 Secondary Plan Environmental Impact Study (AMEC, 2010) where utilized as part of this study. The locations of all AMEC wells (BH1 to BH6) are shown on **Figure 6**.

Table 4. Monitoring Well Installation Details (Palmer, AMEC)

MW ID	Approximate Elevation (masl)	UTM Coordinates		Stick Up (m)	Borehole Depth (mbgs)	Screened Interval (mbgs)	Screened Geology
		Easting	Northing				
MW-1	268	590927	4843009	0.65	7.90	4.57 – 6.09	(ORM or Equivalent) Sand and silt
MW-2s	268	591429	4843102	0.66	9.22	3.35 – 4.88	(Newmarket Till) Clayey silt to silty clay till
MW-2d	268	591429	4843102	0.75	9.22	5.79 – 8.84	(Newmarket Till) Clayey silt to silty clay till
MW-3	263	591415	4842905	0.75	7.92	4.57 – 7.62	(Newmarket Till) Silty sand to silty clay till
MW-4	266	592077	4844413	0.68	10.91	6.40 – 7.92	(ORM or Equivalent) Fine to medium sand and silt
MW-5s	260	592688	4844656	0.71	12.32	4.57 – 6.10	(ORM or Equivalent) Silt and fine sand

MW ID	Approximate Elevation (masl)	UTM Coordinates		Stick Up (m)	Borehole Depth (mbgs)	Screened Interval (mbgs)	Screened Geology
		Easting	Northing				
MW-5d	260	592688	4844656	0.62	12.32	9.14 – 10.67	(ORM or Equivalent) Silt and fine sand
MW-6	263	592407	4843628	0.68	7.85	3.66 – 5.18	(ORM or Equivalent) Fine sand and silt, some clay
MW-7s	259	592776	4843760	0.81	11.13	4.57 – 6.10	(ORM or Equivalent) Fine sand, silt, some clay
MW-7d	259	592776	4843760	0.84	11.13	9.14 – 10.67	(Newmarket Till) Clayey silt till, some sand, some gravel
MW-8	263.24	592323	4844727	0.73	12.80	9.75 – 11.28	(ORM or Equivalent) Fine to coarse sand, some silt
BH1	263.24	592316	4844433	0.51	9.60	6.05 – 9.10	(ORM or Equivalent) Sandy silt, trace gravel, trace clay
BH2	264.14	592320	4844728	0.92	9.60	6.05 – 9.10	(ORM or Equivalent) Sandy silt, trace gravel, trace clay
BH3	259.30	592088	4842354	-	9.60	6.05 – 9.10	(ORM or Equivalent) Silt, some sand, trace clay
BH4s	259.50	593192	4843477	-	30.50	7.20 – 10.25	(ORM or Equivalent) Silt, some sand, trace clay
BH4d	259.50	593192	4843477	-	30.50	27.3 – 30.45	(Newmarket Till) Silt and sand, gravelly, trace clay
BH5	258.91	593200	4844357	0.55	9.60	6.05 – 9.10	(ORM or Equivalent) Sandy silt, trace gravel, trace clay
BH6	261.0	592942	4841754	-	9.60	6.05 – 9.10	(Newmarket Till) Clayey Silt till, embedded sand and gravel

Note: "-" indicates specifications are unknown.

The results of the borehole drilling investigations were generally consistent with the regional OGS surficial geology mapping. Three hydrostratigraphic cross sections through the site were interpreted based on borehole drilling investigations by Palmer, as well as drilling results reported by AMEC (2010). These cross sections are provided in Palmer (2022).

Hydrogeological Conditions

Groundwater levels were monitored by Palmer staff between November 2017 and August 2018, and again in May 2022. The monitoring data collected to date is provided in **Table 5**. Generally, these results indicate shallow groundwater depths ranging between 0.06 mbgs (MW-3) and 9.14 mbgs (MW-8). Groundwater flow for the MW2-3 Lands is presented on **Figure 9**.

It is expected that local shallow groundwater flow follows topography and is directed towards the valleylands of Etobicoke Creek and its associated tributaries. Previous water level data collected and reported by AMEC (2010) at monitoring wells BH-1 to BH-6 from April 23, 2009 to October 22, 2009 is also included for reference.

LEGEND

- Mayfield West Phase 2 Stage 3 Lands
- Study Area
- Watercourse[1]

Source Water Protection[2]

- Highly Vulnerable Aquifer

1. LIO/Field confirmed at site areas
2. *Source Protection Information Atlas*, MECP © King's Printer for Ontario 2024

0 200 400 600 800 1,000
METRE SCALE

North American Datum 1983
Universal Transverse Mercator Projection Zone 17

Scale: 1:20,000
Page Size: Tabloid (11 x 17 inches)

Drawn: CV
Checked: ZK
Date: Aug 2, 2024

Source Notes:
Imagery (2022) provided by Esri basemap service.
Contains information licensed under the Open Government Licence – Ontario.

NORTH

CLIENT
Brookvalley Project Management Inc.

PROJECT
Mayfield West - Phase 2 - Stage 3

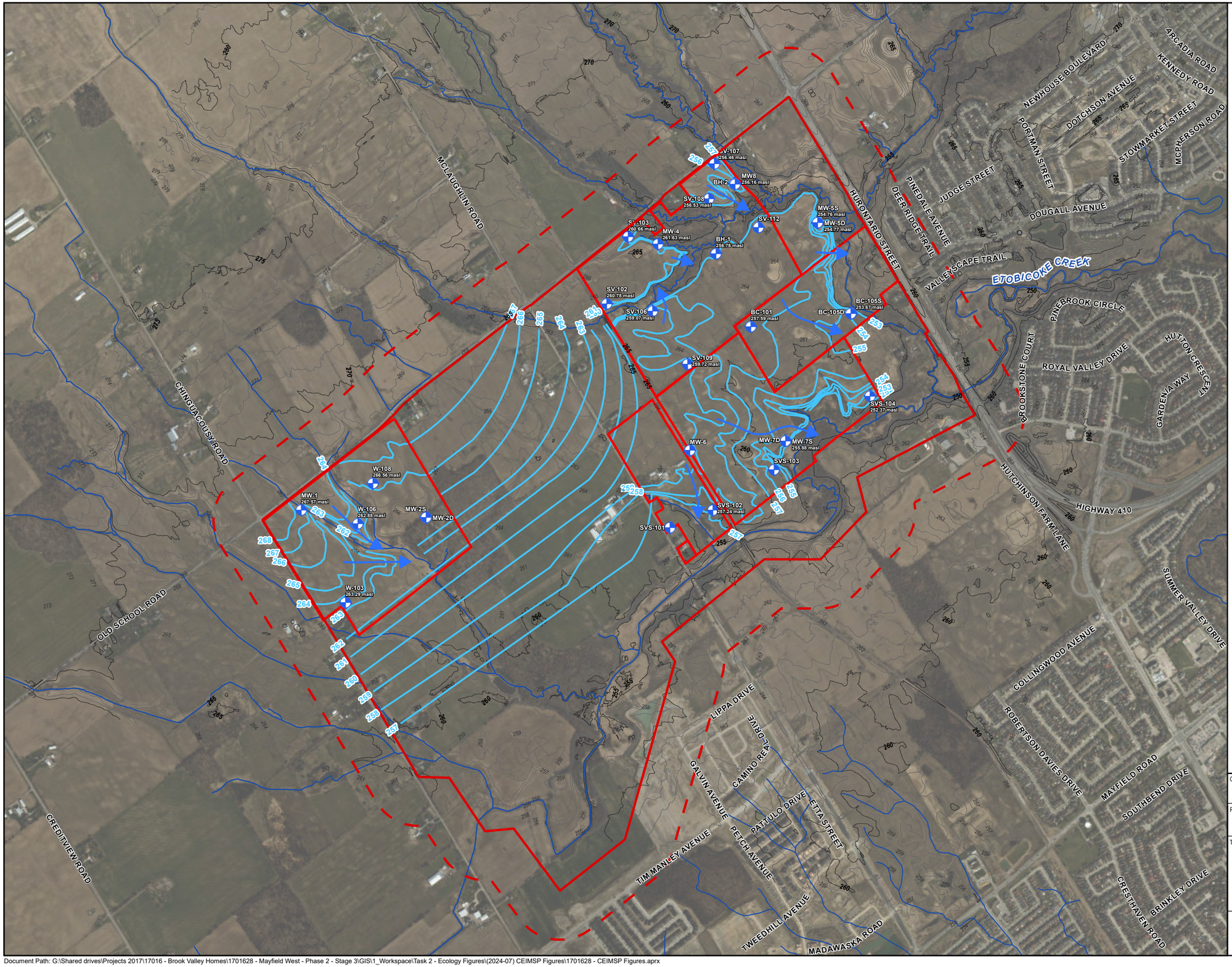
TITLE
Source Water Protection Areas

Palmer™ | PART OF SLR

REF. NO. 1701628-8-1

Figure 8

Document Path: G:\Shared drives\Projects 2017\17016 - Brook Valley Homes\1701628 - Mayfield West - Phase 2 - Stage 3\GIS\1_Workspace\Task 2 - Ecology Figures\(2024-07) CEIMSP Figures\1701628 - CEIMSP Figures.aprx



LEGEND

- Monitoring Well
- Watercourse[1]
- Shallow Groundwater Elevation Contour (masl)[2]
- Groundwater Flow Direction
- Surface Elevation Contour (1m)

1. LIO/Field confirmed at site areas
2. Water levels measured on Jan 24, 2024

0 100 200 300 400 500
METRE SCALE

North American Datum 1983
Universal Transverse Mercator Projection Zone 17

Scale: 1:15,000
Page Size: Tabloid (11 x 17 inches)

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Checked: ZK
Date: Aug 2, 2024

NORTH

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CLIENT
Brookvalley Project Management Inc.

PROJECT
Mayfield West - Phase 2 - Stage 3

TITLE
Shallow Groundwater Contours

Palmer PART OF SLR

REF. NO. 1701628-10-1

Figure 10

Document Path: G:\Shared drives\Projects 2017\17016 - Brook Valley Homes\1701628 - Mayfield West - Phase 2 - Stage 3\GIS\1_Workspace\Task 2 - Ecology Figures\(2024-07) CEIMSP Figures\1701628 - CEIMSP Figures.aprx

The hydraulic conductivity of the hydrostratigraphic units were determined based on completing single well response testing and grain size analyses. Based upon these analyses, the geometric mean hydraulic conductivity of the Halton Till is approximately $5.3x10^{-8}$ m/sec, the ORM is approximately $4.2x10^{-6}$ m/sec, and the Newmarket Till is approximately $3.9x10^{-7}$ m/sec. It should be noted that sand and gravel layers may exist within the Newmarket Till, such as the ones encountered at MW-2s/d and BH-4, that could increase the bulk hydraulic conductivity of the unit. Based on the results of slug testing completed at MW2s and the Hazen analysis on BH-4, the geometric mean K value of this layer is approximately $1.2x10^{-6}$ m/sec.

Deeper vertical groundwater movement at the site is hydraulically influenced by the higher permeability sand and silt soils of the ORM, and the upper weathered zone of the Queenston Shale bedrock compared with the Halton and Newmarket Till units. The vertical hydraulic gradient was noted at the three nested monitoring wells installed on site (MW-2s/d, MW-5s/d, and MW-7s/d). At MW-7s/d, the shallow and deep wells were installed within the ORM and the Newmarket Till units, respectively. The upwards gradient suggests groundwater flowing from the Newmarket Till towards the higher permeability ORM. A similar upwards gradient was noted at monitoring completed at BH-4s/d on April 23, 2009, by AMEC (2010) which also has wells screened in the Newmarket Till and ORM sediments. At MW-2s/d, both the shallow and deep screened zones were installed within the Newmarket Till, and a downwards gradient was identified. This is potentially reflective of groundwater flowing downwards towards the higher permeability upper weathered zone of Queenston Shale bedrock.

Within the ORM Aquifer, it is expected that groundwater will flow laterally towards groundwater discharge areas. At MW-5s/d, both wells are screened within silt and fine to medium sand of the ORM. The near neutral gradient in these wells is therefore reflective of screening within the same geological unit and the predominance of lateral vs. vertical groundwater flow.

Groundwater/Surface Water Interaction at Etobicoke Creek

Identified wetlands, and portions of Etobicoke Creek and its tributaries were instrumented with shallow mini-piezometers on October 23-24, and October 31, 2017, to measure groundwater and surface water interactions and hydraulic gradients at these features. A total of 9 mini-piezometers (MP-1 – MP-9) were installed at the locations shown on **Figure 6**. Five of the MPs were installed within headwater tributaries/ riparian marsh communities leading to Etobicoke Creek (MP-1, MP-2, MP-3, MP-6, and MP-8), and the remaining four were installed within the main branches of Etobicoke Creek (MP-4, MP-5, MP-7, and MP-9). MP-4s/d was installed in an online submerged aquatic wetland created by recent beaver dam activity.

Groundwater and surface water levels were monitored manually over a period of 1-year from December 2017 to October 2018, and continuously with Solinst Leveloggers for an 18-month period between November 2017 and April 2019. Leveloggers set to record water levels in hourly intervals. The details of the water level measurements and calculated vertical hydraulic gradients from the mini-piezometers are summarized in **Table 6**. A full discussion of the MP monitoring results is provided in Palmer's Hydrogeological Investigation Report (2022).

Palmer

Table 5. Groundwater Level Measurements

MW ID	Screened Geology	Water Level Measurement (mbgs)														
		23-Apr-2009*	30-Jul-2009*	6-Aug-2009*	10-Sept-2009*	9-Oct-2009*	22-Oct-2009*	5-Dec-2017	10-Jan-2018	26-Feb-2018	26-Mar-2018	17-May-2018	13-Jun-2018	19-Jul-2018	27-Aug-2018	25-May-2022
MW1	ORM or Equivalent	-	-	-	-	-	-	1.38	1.49	0.66	0.82	0.41	0.88	1.22	1.40	0.48
MW2s	Newmarket Till	-	-	-	-	-	-	1.66	1.83	0.67	1.21	0.28	0.98	1.18	1.61	0.73
MW2d	Newmarket Till	-	-	-	-	-	-	1.74	1.98	0.84	1.32	0.41	1.12	0.94	1.73	0.77
MW3	Newmarket Till	-	-	-	-	-	-	0.59	0.7	0.06	0.34	0.12	0.49	0.8	0.89	0.17
MW4	ORM or Equivalent	-	-	-	-	-	-	4.53	4.6	4.32	4.44	4.29	4.35	4.48	4.51	4.41
MW5s	ORM or Equivalent	-	-	-	-	-	-	5.74	5.79	5.34	5.56	5.23	5.5	5.76	5.84	5.33
MW5d	ORM or Equivalent	-	-	-	-	-	-	5.77	5.8	5.38	5.62	5.29	5.56	5.79	5.86	5.38
MW6	ORM or Equivalent	-	-	-	-	-	-	2.24	2.44	0.61	1.07	0.51	1.12	1.44	1.64	0.96
MW7s	ORM or Equivalent	-	-	-	-	-	-	3.91	4.02	2.33	3.57	3.01	3.65	4.33	4.33	3.26
MW7d	Newmarket Till	-	-	-	-	-	-	3.63	3.84	2.09	3.32	2.66	3.51	4.47	4.05	2.91
MW8	ORM or Equivalent	-	-	-	-	-	-	8.97	9.04	8.7	9.01	8.89	-	9.14	9.08	8.98
BH1	ORM or Equivalent	6.23	6.31	6.33	6.40	6.41	6.42	6.57	6.66	6.59	6.64	6.44	5.845	6.57	6.60	-
BH2	ORM or Equivalent	8.56	dry	-	dry	8.76	8.72	8.66	dry	8.37	8.68	8.56	dry	dry	dry	8.84
BH3	ORM or Equivalent	1.98	2.50	2.59	2.55	2.76	-	-	-	-	-	-	-	-	-	-
BH4s	ORM or Equivalent	3.10	3.53	3.64	3.63	3.68	3.65	-	-	-	-	-	-	-	-	-
BH4d	Newmarket Till	1.21	1.65	1.73	1.75	1.77	1.80	-	-	-	-	-	-	-	-	-
BH5	ORM or Equivalent	6.46	7.42	-	7.55	7.47	7.38	7.43	7.44	6.49	7.18	6.82	7.34	7.64	7.49	-
BH6	Newmarket Till	2.12	2.68	-	2.92	3.16	3.40	-	-	-	-	-	-	-	-	-

**Note: April 23, 2009 – October 22, 2009 groundwater levels were reported by AMEC (2010).*

Table 6. Mini-Piezometer Water Level Measurements and Calculated Hydraulic Gradients

MP ID	Location within Etobicoke Creek	Measurement	Water Level (*meters below ground surface*)								
			5-Dec-2017	10-Jan-2018	26-Feb-2018	26-Mar-2018	17-May-2018	13-Jun-2018	19-Jul-2018	27-Aug-2018	25-May-2022
MP-1	Tributary/ Riparian Wetland	GW	0.075	0.705	-0.245	0.075	-0.095	0.425	0.665	0.75	-
		SW	dry	dry	-0.225	-0.045	-0.105	dry	dry	dry	-
		Gradient	**-**	**-**	***0.02***	***-0.13***	***-0.01***	**-**	**-**	**-**	**-**
MP-2	Marsh Wetland	GW	dry	0.49	0	0.76	0	dry	dry	dry	0.22
		SW	dry	dry	-0.07	dry	-0.02	dry	dry	dry	dry
		Gradient	**-**	**-**	***-0.09***	**-**	***-0.03***	**-**	**-**	**-**	**-**
MP-3	Tributary	GW	0.94	0.89	-0.36	-0.04	-0.02	0.32	0.53	0.42	-0.25
		SW	dry	dry	-0.36	-0.16	0.07	dry	dry	dry	-0.25
		Gradient	**-**	**-**	***0.00***	***-0.12***	***0.09***	**-**	**-**	**-**	***0.04***
MP-4s	Etobicoke Creek/ Submerged Aquatic Wetland	GW	-0.12	-0.07	-0.26	-0.2	-0.3	-0.04	-0.15	-0.335	dry
		SW	-0.12	-0.06	-0.26	-0.19	-0.32	-0.05	-0.15	-0.33	dry
		Gradient	***0.00***	***0.03***	***0.00***	***0.03***	***-0.06***	***-0.03***	***0***	***0.02***	**-**
MP-4d	Etobicoke Creek/ Submerged Aquatic Wetland	GW	-0.365	-0.425	-0.695	-0.675	-0.725	-0.545	-0.59	-0.715	-0.02
		SW	-0.405	-0.425	-0.575	-0.525	-0.605	-0.355	-0.455	-0.63	dry
		Gradient	***-0.04***	***0.00***	***0.13***	***0.17***	***0.13***	***0.21***	***0.15***	***0.09***	**-**
MP-5	Etobicoke Creek	GW	-0.205	-0.115	-0.115	0.175	0.085	0.565	0.13	-0.095	-
		SW	-0.205	-0.165	-0.035	-0.005	0.025	dry	dry	-0.1	-
		Gradient	***0.00***	***-0.05***	***0.08***	***-0.18***	***-0.06***	**-**	**-**	***-0.01***	**-**
MP-6	Tributary/ Mineral Meadow Marsh	GW	-0.07	-0.07	-0.19	0.04	-0.11	0.22	0.41	-0.07	-0.04
		SW	-0.06	dry	-0.16	0.04	-0.09	dry	dry	-0.05	-0.01
		Gradient	***0.01***	**-**	***0.04***	***0***	***0.03***	**-**	**-**	***0.03***	***0.03***
MP-7	Etobicoke Creek	GW	-0.12	-0.11	-0.44	-0.09	-0.65	-0.42	-0.3	-0.26	damaged
		SW	-0.12	-0.11	-0.27	0	0	dry	dry	0.02	
		Gradient	***0.00***	***0.00***	***0.18***	***0.10***	***0.71***	**-**	**-**	***0.30***	
MP-8	Tributary	GW	-0.115	-0.115	-0.645	0.005	-0.285	-0.265	-0.185	-0.285	damaged
		SW	-0.105	-0.135	-0.185	-0.055	-0.125	dry	dry	-0.06	
		Gradient	***0.01***	***-0.02***	***0.45***	***-0.06***	***0.16***	**-**	**-**	***0.22***	
MP-9	Etobicoke Creek	GW	-0.12	-0.19	-0.28	0.06	-0.18	-0.1	-0.055	-0.15	0.48
		SW	-0.06	-0.23	-0.35	-0.04	-0.11	-0.1	0	-0.035	dry
		Gradient	***0.06***	***-0.04***	***-0.07***	***-0.10***	***0.07***	***0***	***0.05***	***0.11***	**-**

Notes: - negative gradient indicates groundwater recharge, and a positive gradient indicates groundwater discharge.

Groundwater and surface water results from the smaller tributaries of Etobicoke Creek suggest that these features are ephemeral to intermittent, and are primarily surface water supported. At the tributaries near Chinguacousy Road (MP-1, MP-2, and MP-3), the hydraulic gradients calculated were mainly neutral to negative, and the surface water levels were observed dry at each monitoring event except February, March, and May 2018. This indicates the tributaries in this part of the creek are likely ephemeral and are surface water supported throughout the year. In comparison, the central tributary which crosses McLaughlin Road (MP-6) was slightly more inundated through the year, and surface water levels were observed above ground at all monitoring events except in January, June, and July 2018. Additionally, the hydraulic gradients were generally neutral to slightly positive indicating that this portion of the tributary is likely intermittent and may receive some seasonal groundwater discharge. Lastly, the tributary near Hurontario Street (MP-8) had surface water present through the full monitoring period and the upwards hydraulic gradients indicate the presence of seasonal groundwater discharge.

Within the main branch (MP-7 and MP-9), preliminary results indicate a permanent flow regime. The hydraulic gradients measured at MP-9 fluctuate from negative to positive through the year suggesting seasonal groundwater discharge and recharge, whereas at MP-7 the gradients are positive indicating groundwater discharge. This assessment corresponds with the presence of the confined to unconfined ORM Formation present throughout the site, that is likely intercepted by Etobicoke Creek within the valleylands.

MP4s/d is installed within a shallow aquatic marsh wetland formed through recent beaver activity. It is likely this feature is fed through groundwater discharge as surface water levels were always present, ranging from 0.36 mags (June 2018) to 0.63 mags (August 2018), and hydraulic gradients in the deep mini piezometer were positive, ranging from +0.09 (August 2018) to +0.21 (June 2018). MP-5 is installed in a small tributary connecting the submerged aquatic wetland to the larger tributary containing MP-9. In contrast to the shallow aquatic marsh, this feature is likely not connected to the water table as water levels ranged from dry (June and July 2018) to 0.21 mags (December 2017), and the hydraulic gradients were generally negative or neutral.

2.9 Water Balance

2.9.1 Water Balance Methodology

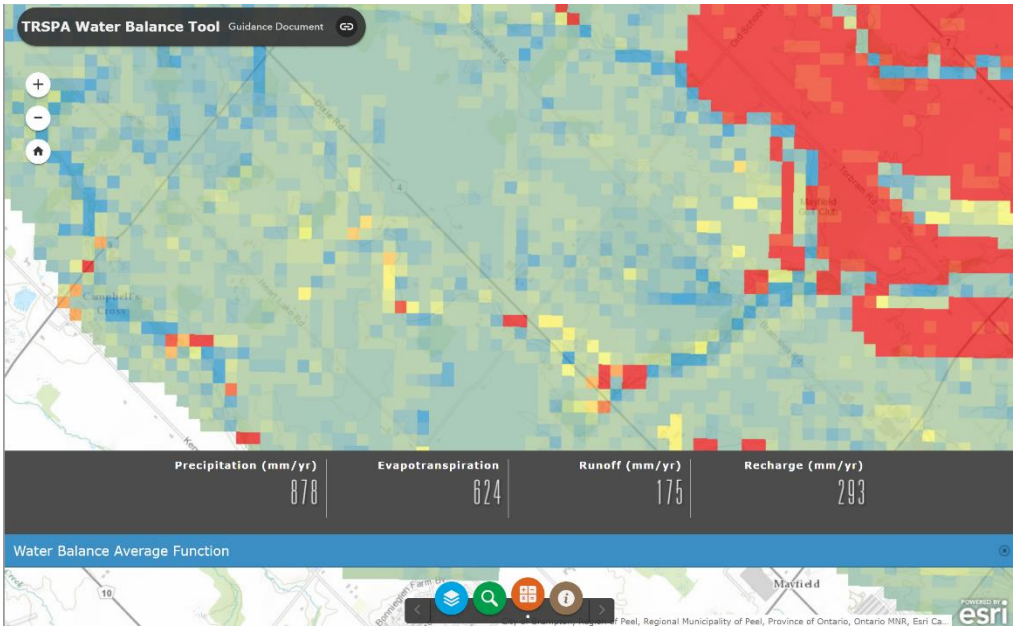
TRCA has utilized a continuous modelling approach with the TRSPA Online Water Balance Tool to quantify the water balance parameters of Precipitation, Evapotranspiration, Recharge and Runoff within their jurisdiction. Unfortunately, while the MW2-3 Lands are within TRCA jurisdiction, the TRSPA Online Water Balance Tool results do no extend into the study area. As such, it is proposed to use the TRSPA water balance parameters from a nearby surrogate site with similar geological and hydrogeological conditions, and apply these values to the MW2-3 Lands.

As presented on **Figure 6**, a similarly sized land parcel located to the east of the MW2-3 Lands was selected as the surrogate lands for the MW2-3 water balance. These lands have the same underlying geology (low permeability Halton Till with small areas of higher permeability glaciolacustrine or glaciofluvial sands and silts), alluvial soils along river valley corridors, similar topography and are in a rural setting. The precipitation trends, as mapped by the TRSPA Online Water Balance Tool are also expected

to be similar. The surrogate lands are also within the SABE area. As such, these lands are considered suitable to be used to define the pre-development water balance.

2.9.2 Preliminary Pre- to Post-Development Water Balance

Map D, presents the water balance values from the surrogate site for the MW2-3 Lands.



Map D. Results from the TRSPA Water Balance Tool.

Therefore, assuming an annual recharge of 293 mm/yr, over a site area of 403 ha, the total annual recharge is estimated to be 1,180,790 m^3/yr. It is expected that the area in the northeast corner of the study area where higher permeability ORMAC or equivalent deposits are found, along with a deep groundwater, will contribute more than 293 mm/yr of recharge, whereas tableland area underlain by dense Halton Till with a high water level due to poor drainage, will infiltrate less.

The table land area is approximately 208 ha (52% of the total land area). Assuming a post-development imperviousness of 0.79 for the tableland areas, the post-development recharge volume is estimated to be approximately 700,270 m^3/yr. This represents a reduction of 480,520 m^3/yr or -41% from the pre-development condition. The overall change in pre-to-post development infiltration has been buffered by the change from agricultural land use to Greenbelt Lands of MW2-3 area. Over time, this large land area is expected to naturalize which will reduce runoff and increase recharge over the existing condition.

The MW2-3 Lands are not located within any Source Water Protection policy areas that would require fully maintaining the pre- to post-development infiltration rates, so the use of best practices and best efforts to support groundwater recharge are recommended for these lands. However, areas have been identified within the MW2-3 Lands where local groundwater recharge supports baseflow to Etobicoke Creek and on-site wetlands. This includes the northeast corner of the site near the Etobicoke Creek valley and Old School Road, where ORMAC deposits are shown at or near surface on **Figure 6a**, there is a

deep groundwater table, as well as areas that are adjacent to valleylands. The use of infiltration-based LID is recommended for these areas. Further discission of LID options is discussed in Section 4.3.1.

2.10 Geotechnical

2.10.1 Background Conditions

A Preliminary Geotechnical Investigation was completed by Terraprobe Inc. for the overall Mayfield West Phase 2 Lands as part of the AMEC (2010) CEISMP Part A report. The purpose of this report was to document existing soil and groundwater information, as well as to assess potential areas of erosion, bank over steepening, and long-term movement. These data were used to define a preliminary stable top of slope as a development constraint line. An updated Geotechnical Investigation Report for the MW2-3 study area was prepared by Soil Engineers (2022). This report focused on soil and groundwater conditions for the MW2-3 lands to support the planned development as well as confirmation of the stable top of slope development limits.

2.10.2 Slope Stability Toe Erosion Assessment, and Long-Term Stable Slope Summary

The AMEC (2010) report provides a detailed summary of the geotechnical investigations completed within the study area to determine the LTSTOS along the Etobicoke Creek valley (**Appendix F**). Boreholes BH1 to BH5 were completed by Terraprobe between February 9 to 12, 2009 within the MW2-3 study area. These boreholes ranged in depth from between approximately 9.6 m to 30.5 m. Each of these boreholes were located in the vicinity of the Etobicoke Creek slope crests. The soils generally consist of hard to very hard, competent clayey silt till overlying cohesionless, dense sands and silts.

Based on the results of the slope stability analysis, completed by Terraprobe, concluded that the slopes within the study area are generally stable, with some isolated areas of toe erosion. The slope height ranges from 5 to 10 m, with an inclination towards the Etobicoke Creek valley ranging between 1.3 H:1 V and 2.9 H:1 V. The borehole drilling program identified many of the same stratigraphic units as the hydrogeological investigations (Palmer, 2018) and there is a frequent transition from surficial glacial till to confined sands/ silts within the study area. This transition is interpreted to range from 252 masl to 263 masl. A factor of safely (FOS) of greater than 1.4 was determined for all but one investigated slope, which meets MNRF Policy Guidelines of 1.4 or greater FOS for residential construction.

In addition to slope stability setbacks, a toe erosion allowance was estimated for areas where a watercourse is located within 15 m of the slope toe. Within the study area, the watercourses generally range from 0 to 50 m from the slope toe and are confined within well vegetated and defined valleylands. Over the majority of the site, Terraprobe concluded that there was no obvious evidence of active slope toe erosion. However, some localized areas within the Etobicoke Creek valley had minor evidence bank undercutting, exposed roots and bare areas associated with toe erosion. Based upon the geotechnical assessment, the recommended toe erosion allowance setbacks were between 1 and 8 m, dependent upon the slope and specific soil types encountered. Based on the results of the geotechnical study, the majority of the slopes within the MW2-3 study area are expected to be stable and that the existing top of slope is considered to be the long-term stable slope crest for the establishment of development limit setbacks. The only areas where an additional setback is required are the slopes west of Hurontario Street and South of Old School Road where cohesionless sands and silts were found near surface (**Figure 6**).

2.11 Hydrology and Hydraulics

2.11.1 Background Conditions

The study area lies within the Etobicoke Creek Headwaters Subwatershed, where Etobicoke Creek first appears as many small tributaries, groundwater springs, and wetland pockets. The drainage area of the subwatershed is roughly 6,300 ha and occupies portions of the Town of Caledon and the City of Brampton. The land use where Etobicoke Creek appears is primarily agricultural. The overall groundwater and surface water flow within the watershed is directed southeast towards Lake Ontario.

There are two main branches of Etobicoke Creek within the MW2-3 lands. The first is present flowing from east to west immediately south of the study area, and the second flowing north to south along the eastern boundary of the site (**Figure 5**). These branches ultimately converge at a culvert flowing beneath Highway 410/ Hurontario Street immediately south of the study area boundary. The main branches are characterized by permanently flowing warn water channels situated within a relatively defined valley setting. Several tributaries to Etobicoke Creek are also present throughout the site which are headwaters to the creek. These tributaries are characterized as undefined drainage features which are primarily surface water supported (see discussion below).

2.11.2 Headwater Drainage Features

As part of continuing field surveys within 2024, Headwater Drainage Features (HDFs) within both the western and eastern land parcels were surveyed as per requirements and timing outlined in the *Evaluation, Classification and Management of Headwater Drainage Features Guideline* (TRCA and CVC, 2014). HDF surveys were completed on March 20, and May 3, 2024 for both the eastern and western portions of the MW2-3 Lands. **Figures 10, 11, and 12** present the findings of the HDF surveys.

A summary of the results for the western portion of the MW2-3 Lands where access was granted is provided in **Table 7** below.

Table 7. HDF Summary – West Side

HDF Segment	Hydrologic Function	Modifiers	Riparian Function	Fish Habitat Function	Terrestrial Function	Management Recommendation
W1	Contributing, FC-4 (1st Visit), FC-1 (2nd Visit)	Agriculture	Cropland, Limited	Contributing	Limited	No Management
W2	Contributing, FC-4 (1st Visit), FC-1 (2nd Visit)	Agriculture	Cropland, Limited	Contributing	Limited	No Management
W3	Contributing, FC-4 (1st Visit), FC-1 (2nd Visit)	Agriculture	Cropland, Limited	Contributing	Limited	No Management
W4	Contributing, FC-4 (1st Visit), FC-1 (2nd Visit)	Agriculture	Cropland, Limited	Contributing	Limited	No Management

HDF Segment	Hydrologic Function	Modifiers	Riparian Function	Fish Habitat Function	Terrestrial Function	Management Recommendation
W5	Contributing, FC-4 (1st Visit), FC-1 (2nd Visit)	Agriculture	Cropland, Limited	Contributing	Limited	No Management
W6	Contributing, FC-4 (1st Visit), FC-1 (2nd Visit)	Agriculture	Cropland, Limited	Contributing	Limited	No Management
W7	Contributing, FC-4 (1st Visit), FC-1 (2nd Visit)	Agriculture	Cropland, Limited	Contributing	Limited	No Management

FC – Flow Condition, FC-1 = No flow (dry), FC-2 = stagnant, FC-4 = Minimal Flow (<0.5 L/s), FC-5 = Flow (>0.5L/s). Riparian vegetation and fish habitat codes derived from TRCA/CVC HDF guidelines (2014). Vegetation codes: Limited=cropland, Contributing=lawn, Valued=meadow, Important=forest. Fish habitat codes: Contributing= water and sediment transfer, Valued= Seasonal fish usage (no spawning), Important= spring-mid summer usage, SAR present, spawning habitat.

During 2024 field surveys, seven (7) HDF segments were identified within the western parcel that conveyed surface flow during early spring melt. These features all contained no surface water during the second visit. The ecological functions of these HDFs is considered limited due to the cropland surrounding the features and contributing only early spring runoff flows and allochthonous materials downstream. No terrestrial habitat function was identified for any of these features due to their traversing cropland. As a result, each HDF segment identified within the western study area parcel is assigned a management recommendation of No Management indicating that these features do not provide significant hydrologic or ecological function within the landscape or to receiving terrestrial or aquatic ecosites downstream.

A summary of the results for the eastern portion of the MW2-3 Lands where access was granted is provided in **Table 8** below.

Table 8. HDF Summary – East Side

HDF Segment	Hydrologic Function	Modifiers	Riparian Function	Fish Habitat Function	Terrestrial Function	Management Recommendation
E1	Limited, FC-4 (1st Visit), FC-1 (2nd Visit)	Agriculture	Cropland, Limited	Contributing	Limited	No Management
E2	Contributing, FC-4 (1st Visit), FC-1 (2nd Visit)	Agriculture	Cropland, Limited	Contributing	Valued	No Management
E3	Limited, FC-1 (1st Visit), FC-1 (2nd Visit)	Agriculture	Cropland, Limited	Contributing	Valued	No Management

HDF Segment	Hydrologic Function	Modifiers	Riparian Function	Fish Habitat Function	Terrestrial Function	Management Recommendation
E4	Limited, FC-1 (1st Visit), FC-1 (2nd Visit)	Agriculture	Cropland, Limited	Contributing	Valued	No Management
E5	Limited, FC-1 (1st Visit), FC-1 (2nd Visit)	Agriculture	Cropland, Limited	Contributing	Limited	No Management
E6	Limited, FC-1 (1st Visit), FC-1 (2nd Visit)	Agriculture	Cropland, Limited	Contributing	Limited	No Management
E7	Contributing, FC-1 (1st Visit), FC-1 (2nd Visit)	Agriculture	Cropland, Limited	Contributing	Valued	No Management
E8	Contributing, FC-4 (1st Visit), FC-1 (2nd Visit)	Agriculture	Cropland, Limited	Contributing	Valued	No Management
E9	Contributing, FC-4 (1st Visit), FC-1 (2nd Visit)	Agriculture	Cropland, Limited	Contributing	Valued	No Management
E10	Contributing, FC-5 (1st Visit), FC-1 (2nd Visit)	Agriculture	Cropland, Limited	Contributing	Valued	Mitigation
E11	Contributing, FC-4 (1st Visit), FC-1 (2nd Visit)	Agriculture	Cropland, Limited	Contributing	Valued	No Management
E12	Limited, FC-4 (1st Visit), FC-1 (2nd Visit)	Agriculture	Cropland, Limited	Contributing	Limited	No Management
E13	Limited, FC-4 (1st Visit), FC-1 (2nd Visit)	Agriculture	Cropland, Limited	Contributing	Limited	No Management
E14	Limited, FC-4 (1st Visit), FC-1 (2nd Visit)	Agriculture	Cropland, Limited	Contributing	Limited	No Management
E15	Limited, FC-4 (1st Visit), FC-1 (2nd Visit)	Agriculture	Cropland, Limited	Contributing	Limited	No Management

HDF Segment	Hydrologic Function	Modifiers	Riparian Function	Fish Habitat Function	Terrestrial Function	Management Recommendation
E16	Limited, FC-5 (1st Visit), FC-2 (2nd Visit)	Agriculture	Cropland, Limited	Contributing	Limited	Mitigation
E17	Contributing, FC-4 (1st Visit), FC-1 (2nd Visit)	Agriculture	Cropland, Limited	Contributing	Valued	No Management
E18	Limited, FC-4 (1st Visit), FC-1 (2nd Visit)	Agriculture	Cropland, Limited	Contributing	Limited	No Management
E19	Limited, FC-1 (1st Visit), FC-1 (2nd Visit)	Agriculture	Cropland, Limited	Contributing	Valued	No Management

FC – Flow Condition, FC-1 = No flow (dry), FC-2 = stagnant, FC-4 = Minimal Flow (<0.5 L/s), FC-5 = Flow (>0.5L/s). Riparian vegetation and fish habitat codes derived from TRCA/CVC HDF guidelines (2014). Vegetation codes: Limited=cropland, Contributing=lawn, Valued=meadow, Important=forest. Fish habitat codes: Contributing= water and sediment transfer, Valued= Seasonal fish usage (no spawning), Important= spring-mid summer usage, SAR present, spawning habitat.

During 2024 field surveys, 19 HDF segments were identified that conveyed surface flow during spring melt. Only two (2) of these features conveyed surface flow during the second visit. The majority of the length for most features was contained within lands of limited ecological function, and valued functions focus generally on the hydrologic inputs to the Etobicoke Creek valleylands. None of these features contain any direst fish habitat, contributing only runoff flows and allochthonous materials downstream. Riparian and terrestrial habitat function was limited as most traverse active agricultural lands. The majority of the length for most features was contained within lands of limited ecological function, and valued functions focus generally on the hydrologic inputs to the Etobicoke Creek valleylands.

Two (2) of the HDF features (E10 and E16) are assigned a management recommendation of Mitigation, recognizing that their hydrologic inputs are important to downstream environments, and the hydrologic functions should be maintained as part of future development through stormwater management (SMW) design and planning. Examples of potential SWM Management measures include directing rear year drainage to the HDF features through swales or LIDs to maintain flow conveyance to the valleylands along the HDF.

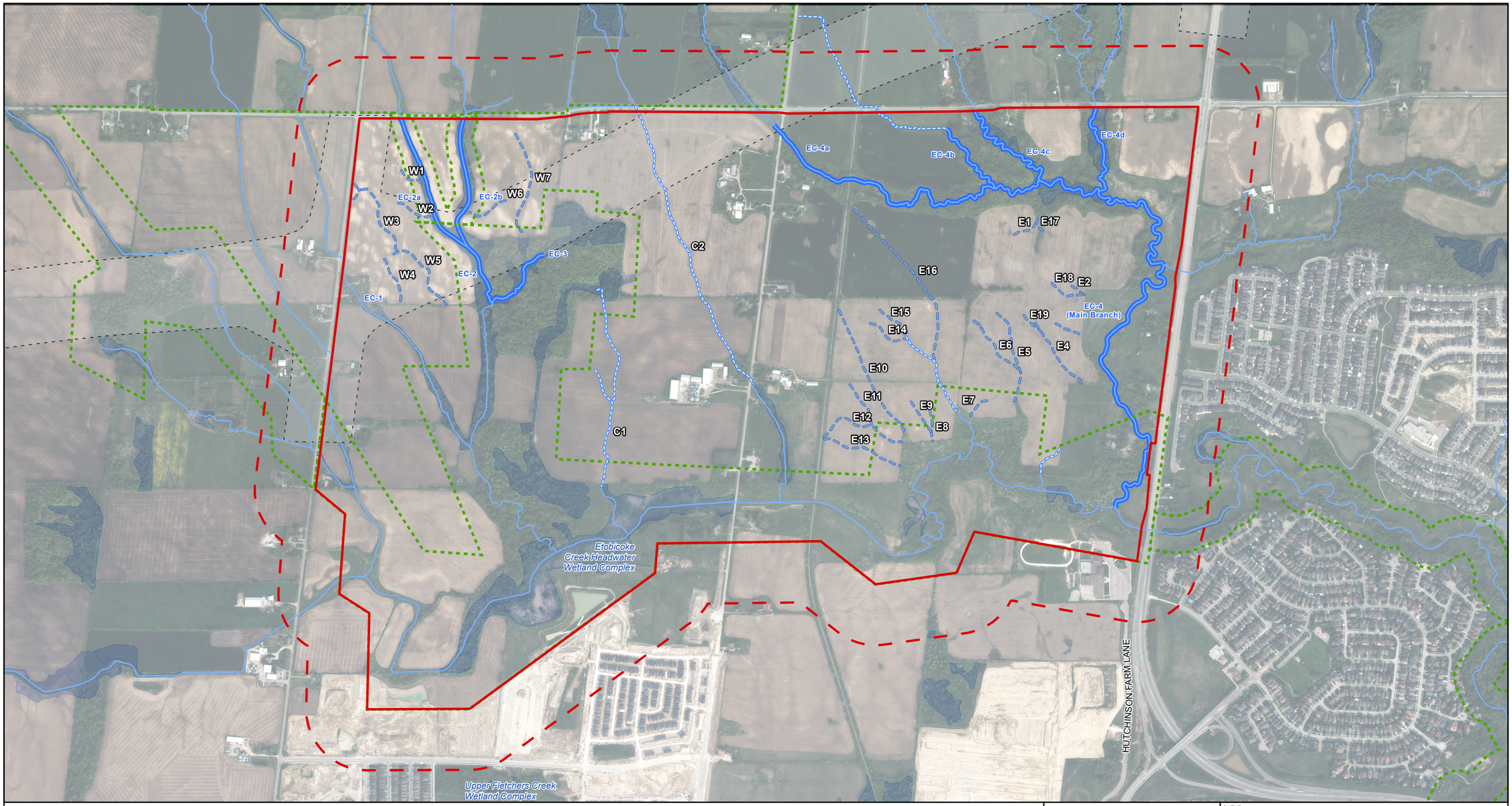
Two (2) HDF features, C1 and C2, are present on the central portion of the MW2-3 Lands within a property of a non-participating landowner. Based on a preliminary HDF assessment from data collected from the roadside during spring 2024 (see **photograph A**, below) and from Ortho imagery, these two HDF features are given a preliminary Management Recommendation of “Mitigation”. These function of these features should be maintained as part of future development through SWM design and planning. Appendix A presented the Concept Plan for the MW2-3 Lands with SWM pond out letting to downstream area of both C1 and C2, maintaining their downstream function.

***Photograph A** – HDF C2 looking south from Old School Road towards MW2-3 Lands (photo taken March 4, 2024). Channel appeared machine dug.*

2.11.3 Surface Water Flow

As part of the hydrological and hydrogeological monitoring, surface water flow to Etobicoke Creek was observed at the tributaries crossing the site boundary along Chinguacousy Road and Old School Road (locations shown on **Figure 4**). If flow was present at the time of observation, a visual quantitative estimation was made and recorded. The results of the flow observations and the location of the monitoring stations is provided in **Table 9**.

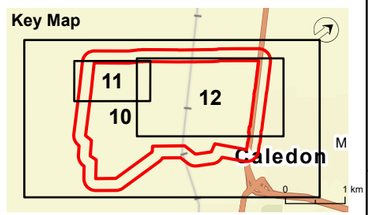
Surface water flow was generally absent in the winter months as the tributaries were either dry or frozen over (**Table 9**). During the warmer period in February 2018, and early spring (March and May 2018) flow was present at most stations and ranged from <1 L/sec at Flow Stations 5 and 6 due to ponding, to approximately 62.5 L/sec at Flow Station 11. Very low to no flow was common in the summer months (June to August 2018), where only Flow Stations 9, 10, and 11 had observable flow.



LEGEND

- Watercourse [1]
- Headwater Drainage Feature (Preliminary Assessment)
- Headwater Drainage Feature (HDF)
- Surveyed Reach
- Wetland - Evaluated Provincial
- Greenbelt NHS [2]
- Proposed Highway ROW
- Mayfield West Phase 2 Stage 3 Lands
- Study Area

1 - Land Information Ontario (LIO)
2 - Toronto and Region Conservation Authority (TRCA)



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Universal Transverse Mercator Projection Zone 17

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Date: Aug 2, 2024

NORTH

Source Notes: Imagery (2023) sourced from Caledon Maps.

CLIENT
Brookvalley Project Management Inc.

PROJECT
Mayfield West Phase 2 Stage 3

TITLE
Headwater Drainage Features
(Overview)

Palmer | PART OF SLR

REF. NO. 1701618-10-1

Figure 10

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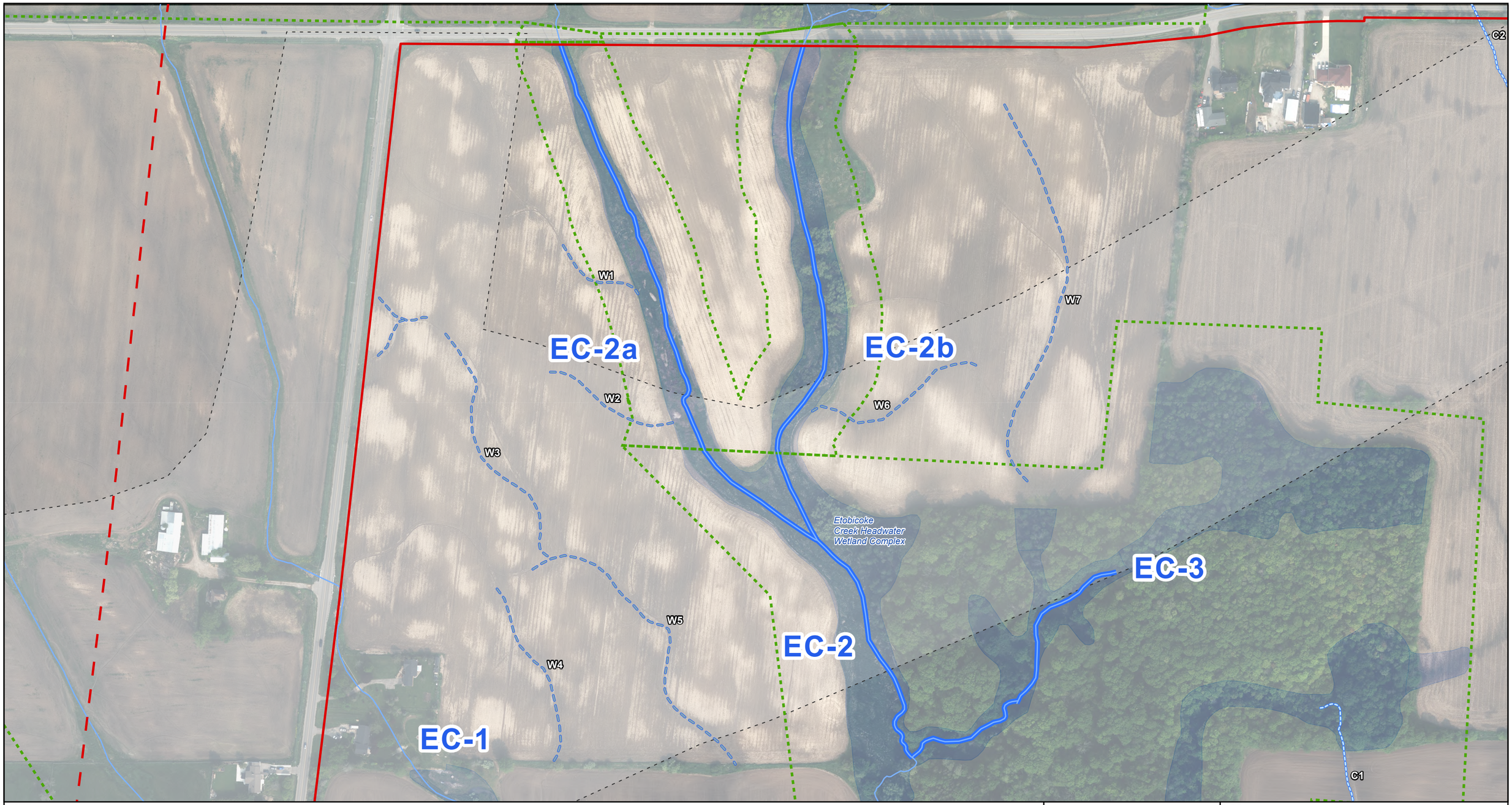
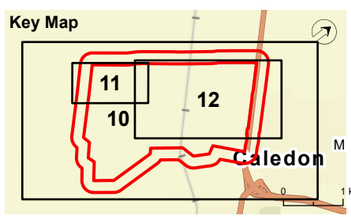


LEGEND

- Watercourse [1]
- Headwater Drainage Feature (Preliminary Assessment)
- Headwater Drainage Feature (HDF)
- Surveyed Reach
- Wetland - Evaluated Provincial
- Greenbelt NHS [2]
- Proposed Highway ROW
- Mayfield West Phase 2 Stage 3 Lands
- Study Area

1 - Land Information Ontario (LIO)
2 - Toronto and Region Conservation Authority (TRCA)

Key Map



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Date: Aug 2, 2024

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Source Notes: Imagery (2023) sourced from Caledon Maps.

CLIENT: Brookvalley Project Management Inc.

PROJECT: Mayfield West Phase 2 Stage 3

TITLE: **Headwater Drainage Features** (West)

Palmer PART OF SLR

REF. NO. 1701618-11-1

Figure 11

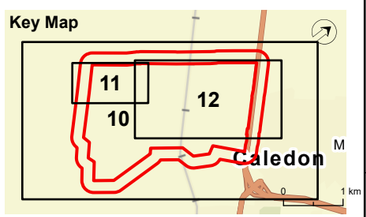
Document Path: G:\Shared drives\Projects 2017\17016 - Brook Valley Homes\1701628 - Mayfield West - Phase 2 - Stage 3\GIS\1_Workspace\Task 2 - Ecology Figures\(2024-05) EIS\1701628 -EIS Figures.aprx

LEGEND

- Watercourse [1]
- Headwater Drainage Feature (Preliminary Assessment)
- Headwater Drainage Feature (HDF)
- Surveyed Reach
- Wetland - Evaluated Provincial
- Greenbelt NHS [2]
- Proposed Highway ROW
- Mayfield West Phase 2 Stage 3 Lands
- Study Area

1 - Land Information Ontario (LIO)
2 - Toronto and Region Conservation Authority (TRCA)

Key Map



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METRE SCALE

North American Datum 1983
Universal Transverse Mercator Projection Zone 17

Scale: 1:6,000
Page Size: Tabloid (11 x 17 inches)

Drawn: RS
Checked: CH
Date: Aug 2, 2024

NORTH

Source Notes: Imagery (2023) sourced from Caledon Maps.

CLIENT
Brookvalley Project Management Inc.

PROJECT
Mayfield West Phase 2 Stage 3

TITLE
Headwater Drainage Features
(East)

Palmer PART OF SLR

REF. NO. 1701618-12-1

Figure 12

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Table 9. Surface Water Flow Observations at Tributaries to Etobicoke Creek

Flow Station ID	Location within Etobicoke Creek	UTM Coordinates		Approximate Flow Measurement (L/sec)							
		Easting (m)	Northing (m)	5-Dec-2017	10-Jan-2018	26-Feb-2018	26-Mar-2018	17-May-2018	13-Jun-2018	19-Jul-2018	27-Aug-2018
Flow Station 1	Tributary	591944	4841766	5	-	10	7.5	3	-	-	-
Flow Station 2	Tributary	591550	4842151	-	-	2	-	10	0.1	-	-
Flow Station 3	Tributary	591322	4842378	-	-	0.5	-	3	-	-	-
Flow Station 4	Tributary	591098	4842601	-	-	3	-	3	-	-	-
Flow Station 5	Tributary	590852	4843042	-	-	<1	-	-	-	-	-
Flow Station 6	Tributary	590983	4843206	-	-	<1	-	-	-	-	-
Flow Station 7	Tributary	591558	4843979	-	-	20	4	21	<1	-	-
Flow Station 8	Tributary	591813	4844290	-	-	4	-	-	-	-	-
Flow Station 9	Tributary	592003	4844544	4	-	20	20	19	<1	<1	<1
Flow Station 10	Tributary	592229	4844855	4	-	20	20	15	12	7.31	12.9
Flow Station 11	Tributary	592852	4844727	12	5	50	35	62.5	1	1	18.9

"-" indicates that the watercourse was dry or frozen and that no flow was observed

Note: "tributary" or "main branch" designation based on the Mayfield West Phase 2 Secondary Plan Comprehensive Environmental Impact Study and Management Plan completed by AMEC, 2010.

2.11.4 Surface Water Quality

In 2009, AMEC collected surface water samples at three locations during storm events, as well as during dry weather periods where stream flows were representative of baseflow conditions. The samples were analyzed for the following indicators: total metals, E. Coli, TSS, Biochemical Oxygen Demand, Chloride, Ammonia Nitrogen, Total Phosphorus, Total Kjeldahl Nitrogen, Nitrate and Nitrite, Alkalinity and Hardness and conductivity.

The results of water quality assessment indicate relatively little difference in concentrations of indicator analytes between wet weather and dry weather events. In general, surface water concentrations of indicator species at each monitoring location within the MW2-3 study area were found to be lower than surface water sampled collected elsewhere in the watershed. The results were found to have no significant seasonal variations in contaminant concentrations. This may be due to the near headwater position of the MW2-3 study area and the limited existing urban development.

2.11.5 Stormwater Erosion Control Analysis

Stormwater Erosion Control Analysis Stormwater erosion criteria for proposed SWM facilities were established based on the TRCA SWM Criteria (2012) and MOE (2003) requirement for extended detention volume based on detention of the 25mm storm event over a period of 48 hours. This level of design was sufficient to develop preliminary sizing of stormwater facilities in support of the land use plan. Through subsequent stages of this study, consultation will be undertaken with TRCA to confirm additional erosion analysis scope requirements for stormwater management, such as determination of an appropriate erosion threshold and exceedance analysis, in coordination with the future erosion threshold assessments at the specific SWM outfall locations.

2.11.6 Hydraulics

Modelling for the 100yr and the Regional storm events for the MW2-3 Lands has recently been completed as part of the Etobicoke Creek Watershed Study and updated 2022 floodplain modelling. The flood hazard limits are presented on **Figure 5**. Owing to the recency of the flood hazard updates and the fact that the MW2-3 Lands generally include confined valleyland systems where little or negligible change to flood elevations are expected from future development, no updates to the flood hazards has been completed as part of this CEISMP Report. The floodplain elevations and hazards will be future refined during detailed design to include crossing structures and mitigation measures for minor cut/fill balancing for mitigation. Similarly to what was approved as part of the MW2-2 Lands, stormwater ‘lenses’ within the Greenbelt Lands are expected to be proposed to mitigate flood volumes for minor flood hazard encroachments onto table lands areas. Details on updates to the floodplain assessment and mitigations will be provided by Candevcon during later design stages.

2.12 Fluvial Geomorphology

2.12.1 Background Conditions

To assess potential development constraints and hazards related to fluvial geomorphological processes, AMEC (2010) completed a detailed fluvial geomorphic study of the Mayfield West Phase 2 lands. The study inventories and characterizes the various reaches of Etobicoke Creek and the headwater drainage network.

Stream Morphology and Flow Characterization

The results of the study indicate that the MW2-3 study area is characterized by two distinct geomorphic features: the Etobicoke Creek valleylands of the two main branches, and headwater drainage swales. The main branches of Etobicoke Creek are dominated by permanently flowing channel situated within generally well defined valleyland systems. The first main branch flows along the southern portion of the study area bisecting McLaughlin Road, and the second originates south of Old School Road, east of McLaughlin Road (**Figure 3**). According to AMEC (2010), pebble count and bank materials are both indicative of the underlying peel plain sediment of fine clays and silts, some very fine sands. Average bankfull dimensions of Etobicoke Creek at geomorphic field sites MEC-R1, R2, R5, and R25 (shown on **Figure 13**), range from 4.9 to 7.1 m

The swales are typical of agricultural headwater drainage features that carry surface runoff downstream to the main branches of Etobicoke Creek (**Figure 3**). They have a moderate gradient and carry fine clay and silt sediment to Etobicoke Creek.

Meander Belt Assessment

Figure 13 presents the meander belt widths as delineated by AMEC (2010) using digital mapping from the study area. **Table 10** presents the results of this analysis and provides recommended setbacks based on a 20% factor of safety. As part of this updated assessment, the meander belt width and setback at MEC-R05, located upstream of McLaughlin Road, was reviewed by Palmer geomorphologists and confirmed to be appropriate. Little change in channel sinuosity or position was observed between 2014 and 2018.

Erosion Thresholds

A fluvial geomorphic assessment was completed as part of AMEC (2010) that calculated erosion thresholds for SWM discharges to Etobicoke Creek. Critical flow values (Q_{crit}) had a tight range of 0.68 to 2.15 m^3/s for four reaches of Etobicoke Creek. As part the detailed design of the MW2-3 Lands, further review and validation of the hydrologic model will be completed such that the duration and erosion effects assessment can be refined for relevant SWM pond outfall locations.

Table 10. Meander Belt Width (from AMEC, 2010)

REACH	BELT WIDTH (m)	20% FACTOR OF SAFETY (m)	15 m SETBACK	CORRIDOR WIDTH (m)
Etobicoke Creek				
MEC-R01	60.0	12.0	15.0	87.0
MEC-R02	50.0	10.0	15.0	75.0
MEC-R03	55.0	11.0	15.0	81.0
MEC-R04	50.0	10.0	15.0	75.0
MEC-R05	50.0	10.0	15.0	75.0
MEC-R06	50.0	10.0	15.0	75.0
MEC-R07	30.0	6.0	15.0	51.0
MEC-R08	50.0	10.0	15.0	75.0
MEC-R09	30.0	6.0	15.0	51.0
MEC-R10	40.0	8.0	15.0	63.0
MEC-R11	40.0	8.0	15.0	63.0
MEC-R12	55.0	11.0	15.0	81.0
MEC-R13	20.0	4.0	15.0	39.0
MEC-R14	30.0	6.0	15.0	51.0
MEC-R15	25.0	5.0	15.0	45.0
MEC-R16	25.0	5.0	15.0	45.0
MEC-R17	25.0	5.0	15.0	45.0
MEC-R17A	15.0	3.0	15.0	33.0
MEC-R22	15.0	3.0	15.0	33.0
MEC-R25	22.0	4.4	15.0	41.4
MEC-R30	15.0	3.0	15.0	33.0
MEC-R31	15.0	3.0	15.0	33.0
MEC-R32	15.0	3.0	15.0	33.0

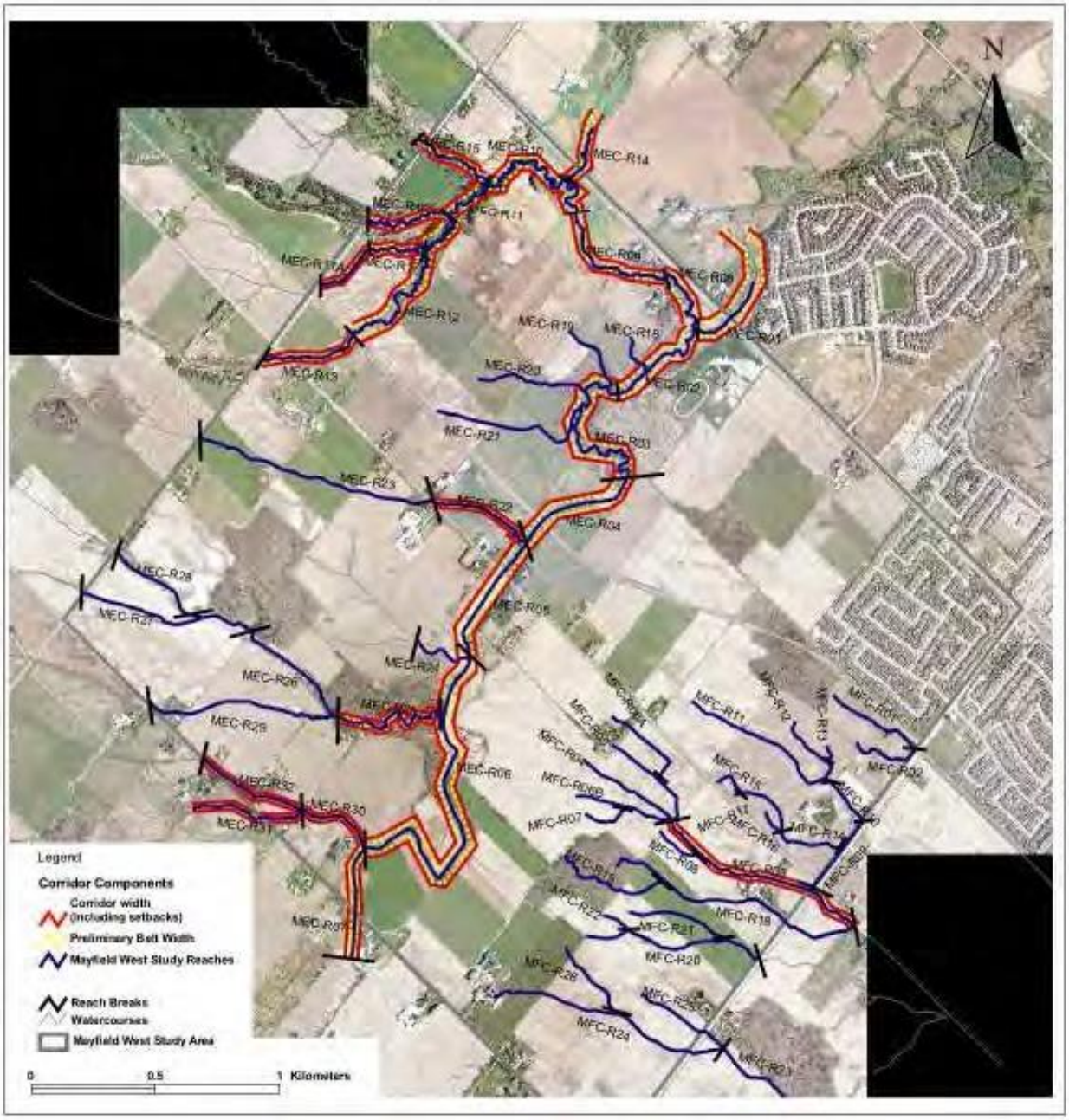


Figure 13. Meander Belt Width (from AMEC, 2014)

PART B: IMPACT ASSESSMENT

3. Assessment of Significant Features

The assessment of significance includes the identification of environmental and physical constraints including natural heritage features, hazard lands (top of slope, flood plain, meander belt) and associated buffers/setbacks. **Figure 14** provides the preliminary limits of the following features and constraints:

- Provincially Significant Wetland boundary plus 30 m buffer
- Woodland boundary plus 10 m buffer
- Watercourses and setbacks
- Screening of Headwater Drainage Features
- Floodplain plus 10 m setback
- Meander belt plus setback

3.1 Species at Risk Screening

The ESA provides protection for species listed as Endangered or Threatened in Ontario, including their habitat. The Species at Risk in Ontario (SARO) List also identifies species of Special Concern that may become Threatened or Endangered in the future. Species of Special Concern and their habitats are not protected under the ESA, rather through designation of Significant Wildlife Habitat.

Prior to the May 2022 field investigation, a background review was completed for potential SAR habitat opportunities. The NHIC database and other relevant sources were reviewed for SAR records. The study area was screened for potential SAR habitat opportunities by comparing habitat preferences of the species identified from the background and site records against current site conditions. This SAR habitat assessment can be found in **Appendix E**, providing a detailed description of each species' habitat, as well as a discussion of habitat suitability within and surrounding the study area.

Based on the rationale provided in **Appendix E**, habitat opportunities for the following 15 SAR were identified as potential in the study area:

Birds

• Bank Swallow (*Riparia riparia*) – Threatened
• Barn Swallow (*Hirundo rustica*) – Threatened
• Bobolink (*Dolichonyx oryzivorus*) – Threatened
• Common Nighthawk (*Chordeiles minor*) – Special Concern
• Chimney Swift (*Chaetura pelagica*) – Threatened
• Eastern Wood Pewee (Contopus virens) – Special Concern
• Wood Thrush (Hylocichla mustelina) – Special Concern
• Short-eared Owl (*Asio flammeus*) – Special Concern
• Meadowlark (*Sturnella magna*) – Threatened

Vascular Plants
• Butternut (Juglans cinerea) – Endangered

Mammals
• Little Brown Myotis (Myotis lucifugus) – Endangered
• Northern Myotis (Myotis septentrionalis) – Endangered
• Eastern Small-footed Myotis (Myotis leibii) – Endangered
• Tri-colored Bat (Perimyotis subflavus) – Endangered

Other
• Monarch Butterfly (Danaus plexippus) – Special Concern

3.2 Significant Wildlife Habitat Screening

Significant Wildlife Habitat (SWH) can be difficult to appropriately determine at the site-specific level, as the assessment must incorporate information from a wide geographic area and consider other factors such as regional resource patterns and landscape effects. To help with site level assessments, the MNRF has developed the Significant Wildlife Habitat Criteria Schedules for Ecoregion 6E (MNRF, 2015). The relevant planning authorities have the responsibility to identify Significant Wildlife Habitat. Detailed identification and designation of SWH has not been completed in the Town of Caledon.

The Natural Heritage Policies of the Provincial Policy Statement [Subsection 2.1.4 d)] identify four principal components of SWH as described in the Significant Wildlife Habitat Technical Guide (MNRF, 2000), and Natural Heritage Reference Manual (MNRF, 2010) including:

• Habitats of Seasonal Concentrations of Animals;
• Rare Vegetation Communities or Specialized Habitat for Wildlife;
• Habitat of Species of Conservation Concern; and,
• Animal Movement Corridors.

Criteria for the identification of these features are also provided in the Significant Wildlife Habitat Criteria Schedules for Ecoregion 6E (MNRF, 2015). These criteria were used to provide an initial screening for wildlife habitat within the study area and immediately adjacent to the subject lands. The following is a preliminary summary which discusses the SWH components and Candidate SWH that were identified as having the potential to occur within the study area limits. Based on the high-level May 2022 field investigations and a background review completed by Palmer staff, the study area has been identified to contain one confirmed SWH and having the potential to support an additional 13 SWH. The majority of these potential SWH areas would be expected to be associated with the larger area of PSW to the north of Old School Road and the immediately contiguous upland forests. These results are contained within the established NHS and/or Greenbelt Lands.

Potential Significant Wildlife Habitat:

- Deer Winter Congregation Areas
- Old Growth Forest
- Waterfowl Nesting Area
- Bat Maternity Colonies
- Turtle Wintering Areas
- Woodland Raptor Nesting Habitat
- Woodland Area-Sensitive Bird Breeding Habitat
- Marsh Bird Breeding Habitat
- Rare Vegetation Communities
- Seeps and Springs
- Amphibian Breeding Habitat (Woodland)

3.3 Woodland Assessment

The MW2-3 site supports several woodlands of varying sizes and community types. A preliminary assessment of the significance of on-site woodlands has been completed. As depicted on **Figure 14**, several larger woodland units (many comprised of several individual ELC communities) have been identified for reference use in this assessment. Note, several smaller woodland units/fragments also exist and will be discussed collectively. As aforementioned and reiterated below, the Town of Caledon considers significant woodlands as part of their Natural Heritage System however, detailed criteria for significant woodland assessment are not stated. To assess whether these features may be considered significant, the policies outlined in the Region of Peel Official Plan (Table 1) and the Natural Heritage Reference Manual (Ontario Ministry of Natural Resources, 2010) have been reviewed.

Region of Peel OP

As per the Region's OP, significant woodlands are considered components of the Core Areas of the Greenlands System. Woodlands that are included as part of the Core Area, and considered 'significant', are mapped in the OP's Schedule A and are considered "ecologically important in terms of features such as species composition, age of trees and stand history; functionally important due to its contribution to the broader landscape because of its location, size or due to the amount of forest cover in the planning area; or economically important due to site quality, species composition, or past management history". The Region OP defines relevant criteria and thresholds for the identification of Core, Natural Areas and Corridors (NAC) Woodlands in Table 1.

The recommended criteria / standards for the evaluation of significant woodlands are the following:

7. Woodland Size (based on the total forested area in the regional landscape)
8. Woodland Age (based on both woodland size and presence of native trees older than 100 years);
9. Significant Linkage function (based on woodland linkage to other significant features in the regional landscape);
10. Woodland Proximity (based on both woodland size and proximity to other significant features that support significant ecological relationships);
11. Surface Water Quality (based on woodland size and proximity to a watercourse, surface water feature, or wetland that can be identified with the Ontario Wetland Evaluation System);

12. Significant Species and Communities (based on woodland size, as well as GRANKS or SRANKS species, species at risk identified by COSEWIC or COSSARO, and/or specific forested communities)

MNRF's Natural Heritage Reference Manual

In the absence of specific woodland significance assessment criteria from the Town's OP, the Natural Heritage Reference Manual (Ontario Ministry of Natural Resources, 2010) has been reviewed to provide further guidance in determining significant woodlands within the Subject Property. This document provides the Province's recommended technical criteria / approaches in protecting the natural heritage features in Ontario while being consistent with the PPS. These are provided for municipalities to use when they are developing municipally specific criteria for the identification of significant woodlands.

The recommended criteria / standards for the evaluation of significant woodlands are the following:

5. Woodland Size (based on the percent forest cover in the regional landscape or planning area, should account for landscape-level physiographic differences);
6. Ecological Functions (woodland interior, shape and proximity, linkages, water protection, woodland diversity);
7. Uncommon Characteristics (rare communities, unique species composition, quality, older woodlands); and
8. Economic and Social Values (high economic productivity and social value)

Based on the manual guidelines, woodlands that meet the standards for any one of the criteria listed above may be considered significant. For woodlands that do not meet the simple size criterion #1, other criteria (based on ecological functions and characteristics) can be considered. For criteria #2-4, when the simple size criterion is not met, a range of size thresholds for significance is provided, where relevant.

3.4 Wetlands

As identified on **Figure 3** and **4**, several wetlands were identified within the Subject Property, including PSW and unevaluated wetlands. A high-level assessment of them was completed in Palmer's preliminary May 2022 and spring 2024 field reconnaissance.

3.4.1 Provincially Significant Wetlands

The Etobicoke Creek Headwater Provincially Significant Wetland (PSW) Complex occurs within the study area, where wetland units of this complex are mostly protected within the Greenbelt, with the exception of two areas south of Old School Road (**Figure 4**). This PSW complex was recently mapped and refined by MNRF (between 2008 and 2014) using aerial imagery.

3.4.2 Unevaluated Wetlands

Wetlands in Ontario that have not been evaluated using the Ontario Wetland Evaluation System are classified as unevaluated wetlands. No unevaluated wetlands were noted on the provincial LIO mapping source for the Subject Lands however, a few were identified by Palmer Ecologists during the preliminary

May 2022 field investigation (**Figure 4**). The north-central and north-eastern portions of the Subject Lands contain wetland communities. Palmer identified a deciduous swamp (SWD) community surrounding a shallow water pond in the north-central region of the Subject Lands. A mineral meadow marsh (MAM) community was identified adjacent to the shallow water community in the north-eastern portion. These wetlands were identified and preliminarily delineated in the field by assessing visible wetland herbaceous and shrub cover (based on best efforts in spring conditions).

3.5 Aquatic Habitat

For the purposes of this study, the aquatic ecosystem is considered to include fish, fish habitat and benthic invertebrates. Each are important natural heritage components and are valuable indicators of ecosystem health.

The AMEC (2010) report relied on existing fisheries information collected up to 2008 with some reconnaissance level fish sampling at four locations. The TRCA undertakes an aquatic sampling program in Etobicoke Creek at two stations that are part of the TRCA Regional Watershed Monitoring Program, ECOWM14 (at Mclaughlin Road) and ECOWM13 (just upstream of Hurontario Street), where fish are sampled every three years. Fish sampling has also been taking place at the Mayfield 3 station on 2013 and 2016 (**Figure 3**).

The TRCA have identified two fish species in the study area as Species of Conservation Concern; Bluntnose Minnow (Pimephales notatus) and Blackchin Shiner (Notropis heterodon). These species are considered more sensitivity to habitat alteration, chemical pollution, siltation and increased flow velocities.

No fish species listed as Endangered, Threatened or Special Concern under either the provincial Endangered Species Act (ESA) or federal Species at Risk Act (SARA) are present within the study area. There are historical records of Redside Dace (Clinostomus elongates) in the Etobicoke Creek Watershed prior to 1950 (TRCA, 2006) but this species has not been recorded within the study area for over 20 years and none of the watercourses within the study area have been identified as occupied, recovery or contributing Redside Dace habitat.

4. Environmental Constraints and Development Opportunities

The identification of environmental and physical constraints includes natural heritage features, flood limits, top of slope, and setbacks. These constraints are to be used to define the limits of development. **Figure 14** provides a detailed overlay of the components of the NHS and associated constraints that determine the proposed development limits.

4.1 Natural Heritage System

For the purposes of this study, the aquatic ecosystem is considered to include fish, fish habitat and benthic invertebrates. Each are important natural heritage components and are valuable indicators of ecosystem In the context of the preceding characterization of existing environmental conditions, assessment of significant natural heritage features, associated policy framework and on the basis of the results of Palmer's background research and field investigations, we offer the following preliminary assessment of constraints and opportunities for the MW2-3 Lands and the establishment of the NHS (**Figure 14**). A summary of environmental constraints and development opportunities associated with the MW2-3 Lands is provided below.

4.2 Environmental Constraints and Opportunities

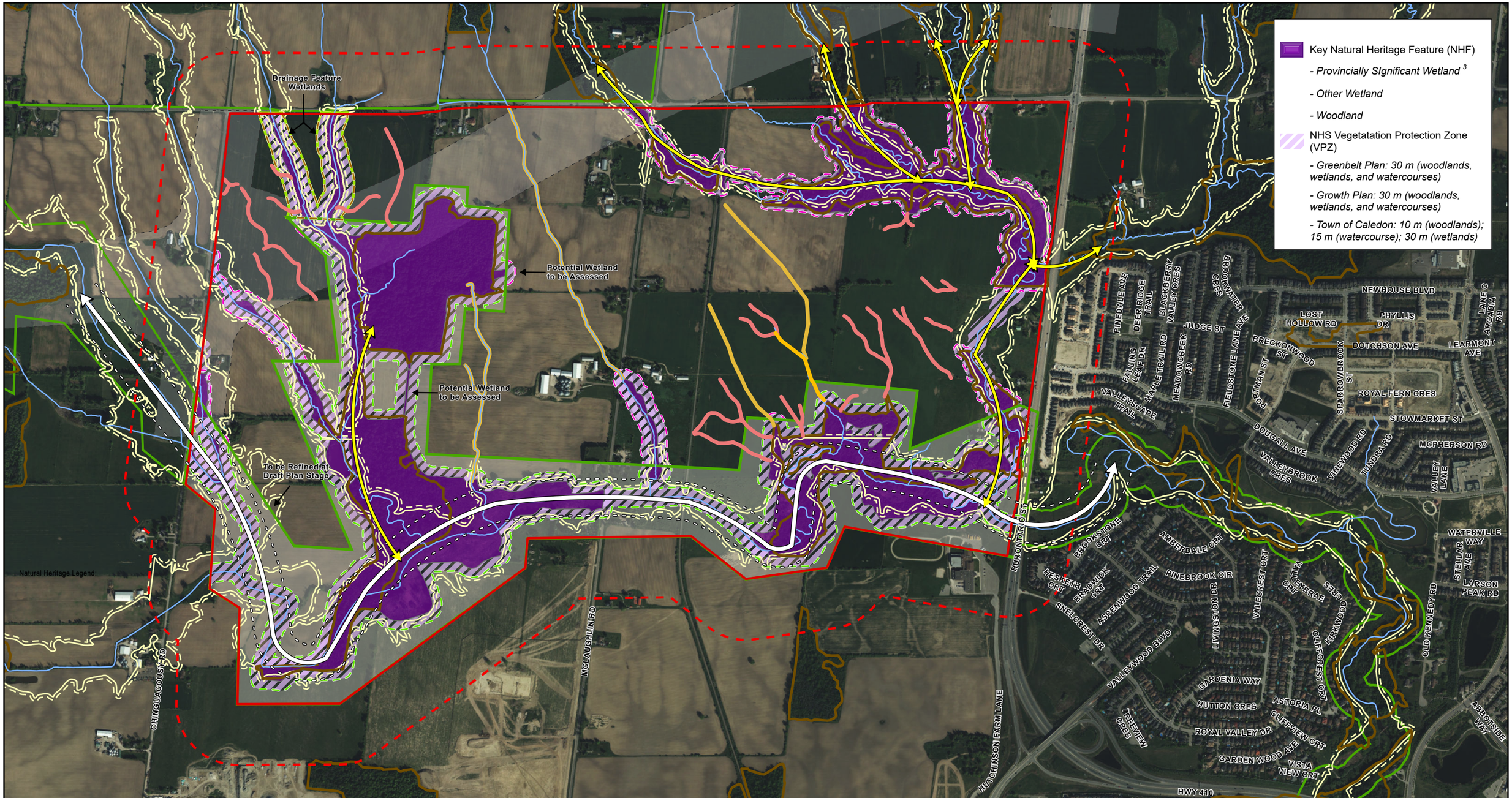
High Ecological Constraint

Through the initial background review, previous reports prepared by AMEC (2010) and Dougan (2008), as well as 2023/2024 field reconnaissance completed by Palmer staff, Palmer was able to identify areas of constraints as identified on **Figure 14** and incorporated into the NHS mapping.

Provincially Significant Wetlands
The Etobicoke Creek Headwater Provincially Significant Wetland (PSW) Complex occurs within the study area, where wetland units of this complex are mostly protected within the Greenbelt, with the exception of two areas south of Old School Road (**Figure 4**).

Significant Woodlands

Based on AMEC's report, all forested valleylands are considered significant woodlands and three tableland woodlands are also considered as significant woodlands (i.e., northeast segment of the subject area directly south of Old School Rd, southeast segment of subject area west of Hurontario Street, and west segment of the study area between Chinguacousy Road and McLaughlin Road), as mapped by MNRF (**Figure 2**).



LEGEND

- Watercourse (Field Confirmed) [1]

HDF Management Recomendation

- Mitigation
- No Management
- Greenbelt Plan [1]
- Growth Plan [1]
- Rural Lands
- Floodplain *(2022)* [2, 3]
- Floodplain Setback [3]
- Local Landscape Linkage
- Major Landscape Linkage
- 120 m Wide Setback
- Woodland (Peel Region)
- Greenbelt Plan NHS Boundary
- Growth Plan NHS Boundary
- Town of Caledon NHS Boundary
- Proposed Highway ROW
- Mayfield West Phase 2 Stage 3 Lands
- Study Area

1 - Land Information Ontario (LIO)
2 - Toronto and Region Conservation Authority (TRCA)
3 - To be refined at Detailed Design

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METRE SCALE

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Source Notes: Base imagery (2020) provided by Peel region GIS services.

CLIENT
Brookvalley Project Management Inc.

PROJECT
Mayfield West Phase 2 Stage 3

TITLE
Environmental Constraints and Natural Heritage System

Palmer | PART OF SLR

REF. NO. 1701628-14-1

Figure 14

Document Path: G:\Shared drives\Projects 2017\17016 - Brook Valley Homes\1701628 - Mayfield West - Phase 2 - Stage 3\GIS\1_Workspace\Task 2 - Ecology Figures\(2024-07) CEIMSP Figures\1701628 - CEIMSP Figures.aprx

Significant Valleylands

Based on AMEC's report, valleylands associated with Etobicoke Creek (i.e., northeast segment of the subject area directly south of Old School Rd, southeast segment of subject area west of Hurontario Street, and the southwest segment of the study area between Chinguacousy Road and McLaughlin Road) are all considered Significant Valleylands.

Significant Wildlife Habitat

AMEC's assessment for Significant Wildlife Habitat (SWH) was completed based on a draft criteria and thresholds developed by the Region of Peel and Town of Caledon (NSE et al., 2009). Palmer has completed a further detailed assessment of SWH as outlined in Section 3 and to be refined and confirmed during Detailed Design.

Species at Risk

The study area was screened for potential SAR habitat opportunities by comparing habitat preferences of a total of 23 species with records of local occurrences against current site conditions. This SAR habitat assessment can be found in **Appendix E**. Further assessment and confirmation of limits of SAR habitat and any requirements under the ESA will be confirmed during Detailed Design stage.

Permanent or Intermittent Watercourses & Waterbodies

Several permanent or intermittent watercourses act as the headwaters of Etobicoke Creek within the Subject Lands (**Figure 3**).

In the Town of Caledon OP, the following development constraints are as followed:

> *7.13.3.2.3.4 In the case of Key Hydrologic Features located anywhere within the Protected Countryside designation, the associated Vegetation Protection Zone shall be a minimum of 30 metres wide measured from the outside boundary of the Key Hydrologic Feature.*

Palmer identified a shallow water community (i.e., containing submergent and/or floating aquatic plants along with emergent vegetation) in a previous swamp habitat by recent beaver dam activities within the Etobicoke Creek valley south of Old School Road.

Moderate Ecological Constraint

Through previous reports prepared by AMEC (2010) and Dougan (2008), as well as 2023/2024 field reconnaissance, Palmer was able to identify areas of moderate constraint (**Figure 14**).

Headwater Drainage Features

Seventeen (17) headwater drainage features (HDF) were identified on the Subject Lands and are presented in **Figure 3**. HDF assessments were completed by Palmer Ecologists in 2023/2024 and it was determined that these drainage features were found to have no significant ecological function and were fully covered

by agricultural crops (corn or soybeans). No species indicative of permanent or intermittent flow conditions were observed at this time. All HDFs were classified as contributing with No Management Recommendations, and their function can be maintained through an appropriate SWM strategy.

Potential SWH

The AMEC report documents plant species and vegetation communities which are considered part of regional concern based on TRCA's local status (i.e., L-Rank) lists. The report states that at least 20 vegetation communities are considered uncommon, and a large number of plants were noted as species of regional concern.

No or Low Ecological Constraint

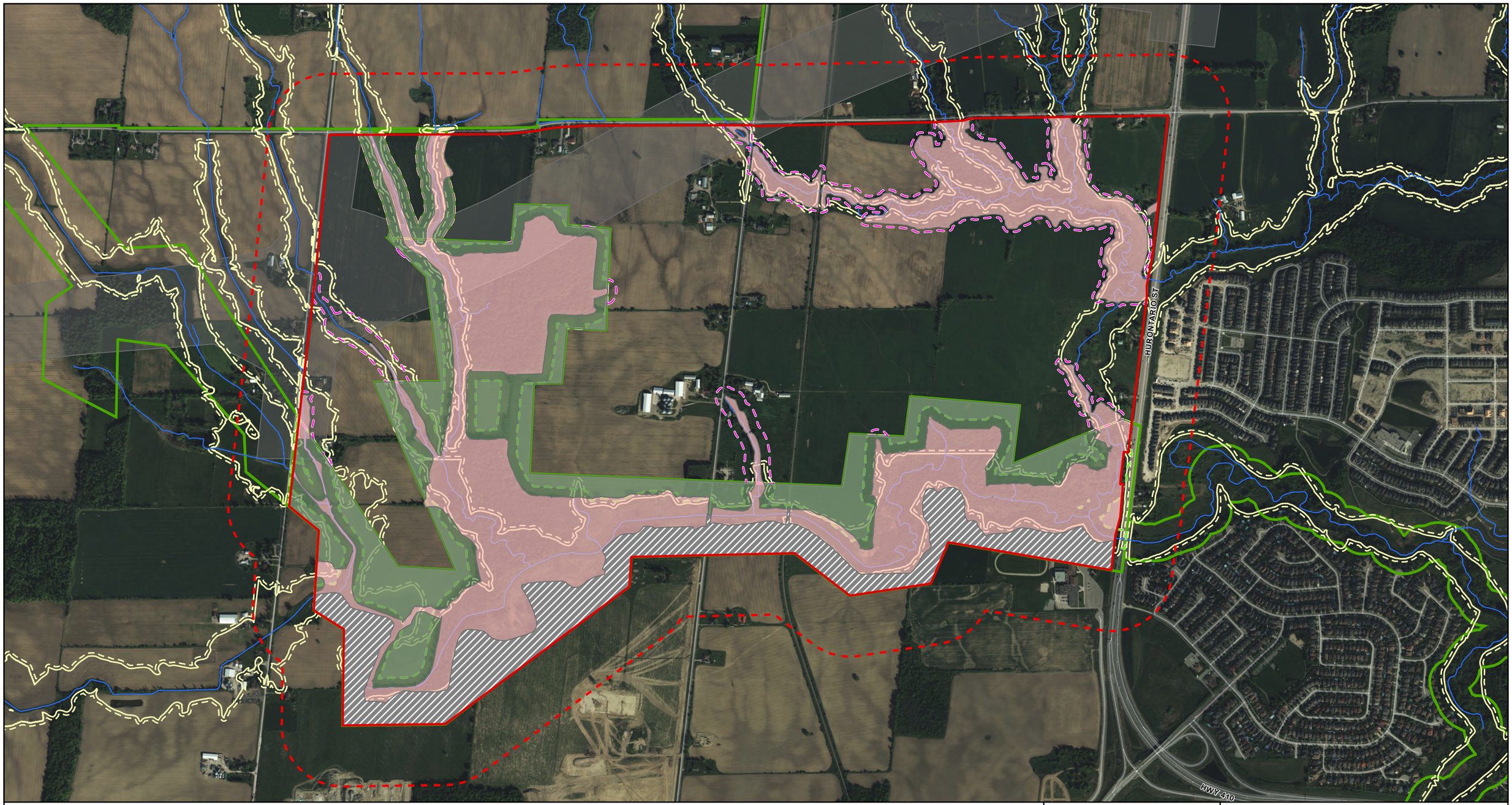
The areas within the Study Area that did not meet any significant criteria or designation were identified as no or low ecological constraint (**Figure 14**). These areas of no to low constraint were identified as heavily disturbed (i.e., road clearances, man-made clearings, cultural plantations) and/or already in-use for recreational and commercial purposes (i.e., agricultural fields that do not support grass cover, residential dwellings and associated buildings, and farming-related structures). It is Palmer's understanding from the initial background review, previous reports (AMEC (2010) and Dougan (2008)), and field reconnaissance on May 25, 2022, that development of these areas will produce no negative impacts on the surrounding natural features.

4.3 Wildlife Movement Corridors

Based on polices from the SABE Study (Wood, 2020), local landscape linkages and regional landscape linkages have been identified for the MW2-3 Lands (**Figure 14**). A major regional linkage corridor has been identified along the main branch of Etobicoke Creek, and a series of minor landscape linkages have been identified along the tributaries to Etobicoke creek facilitating northwards movements from the regional linkage. As described in the SABE natural environment report, major landscape linkages require a Minimum Vegetated Width (MVW) of 120 m and a Permeable Landscape Zone (PLZ) of 60 m; whereas a minor landscape linkage requires a MVM of 60m and a PLZ of 30m. The 120 m MVW is shown on **Figure 14** for the regional linkage corridor, and is fully contained within the Greenbelt NHS lands. The PLZ and MVM for the landscape linkage are not shown but are all fulled contained in the Greenbelt NHS or the valleylands system.

4.4 Natural Cover Enhancement

Based on Secondary Plan policies and objectives from the SABE polices, a 30% increase to natural cover is proposed as part of the CEISMP for the MW2-3 Lands. The total area of natural cover was calculated to be 104.8 ha and includes all ELC polygons except AGR, ANTH, HR, CUM, CUH1, and CUP communities shown on **Figure 15**. Details of the ELC communicates are presented on **Figure 2**. Therefore, the target for natural cover enhancement area is 31.4 ha.



LEGEND

- Watercourse (Field Confirmed) [1]
- Greenbelt Plan [1]
- Growth Plan [1]
- Floodplain *(2022)* [2, 3]
- Floodplain Setback [3]
- Greenbelt Plan NHS Boundary
- Growth Plan NHS Boundary
- Town of Caledon NHS Boundary
- Woodland (Peel Region)
- Study Area Setback (200 m)
- Mayfield West Phase 2 Stage 3 lands
- Proposed Highway ROW

Potential Cover Enhancement Area

- Covered Community (104.8 ha)
- Potential Enhancement Area (58.2 ha)
- Area not included in enhancement calculations

1 - Land Information Ontario (LIO)
2 - Toronto and Region Conservation Authority (TRCA)
3 - To be refined at Detailed Design

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CLIENT
Brookvalley Project Management Inc.

PROJECT
Mayfield West Phase 2 Stage 3

TITLE
Natural Cover and Enhancement Opportunities

Palmer PART OF SLR

REF. NO. 1701628-15-1

Figure 15

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It is proposed to provide natural cover enhancements in the Greenbelt NHS policy lands that are located outside of existing natural features (**Figure 15**). These are generally AG or ANTH lands directly adjacent to the existing natural feature providing an overall benefit of creating larger natural area blocks. The total area of these lands is 58.1 ha. Therefore, the full target for natural cover enhancement can be accommodated within the Greenbelt NHS policy lands outside of the natural features with 26.7 ha remaining.

It is proposed to also place lower impact and less intensive land uses that are permitting under Greenbelt policies, such as SWM ponds, LIDs, and park lands, within areas of the Greenbelt NHS that are outside of the 30 m MVPZ for the adjacent natural features. These less intensive land uses, combined with the enhancement targets will create a resilient corridor along the Greenbelt NHS.

4.5 Water Balance and Aquifers

4.5.1 Preliminary Feature Based Water Balance Risk Assessment

Urban development has the potential impact the water balance through the addition of impervious surface cover (i.e., roads, parking lots, driveways, and rooftops). Impervious surfaces reduce or prevent infiltration of water into the soils, and the removal of existing vegetation can reduce the evapotranspiration component of the natural water balance. The evaporation component from impervious surfaces is generally minor (estimated to be 10% to 20% of precipitation) compared to the evapotranspiration component (65% to 70% of precipitation). The net effect an increase to the impervious surface area is that more the precipitation becomes surplus water and runoff directed to stormwater management facilities (i.e., SWM Ponds) and the existing infiltration component is reduced. In addition, these changes to the water balance can affect the volume, timing and duration of water entering natural features.

The increases in surface water runoff that occur with urban development are typically addressed through the use of stormwater management techniques to control peak flows and provide sediment removal. Details of the stormwater management strategies for the property are provided in the Stormwater Management Reporting prepared by Candevcon.

Based on the criteria outlined in the ToR and in the TRCA Wetland Water Balance Risk Evaluation Criteria (2017), each contiguous wetland until in the MW2-3 Lands was screened using the Concept Plan (**Appendix A**) and the drainage area mapping (**Figure 16**) to provide a preliminary FBWB risk assessment to guide the appropriate level of monitoring and analysis to be completed during the draft plan stage of the project.

The 2017 TRCA Wetland Water Balance Risk Evaluation provides an assessment of the potential risk to each wetland. Palmer has prepared a Preliminary Wetland Water Balance Risk Evaluation to determine the appropriate monitoring requirements for the site. Based on the results of the ecology studies and suing the 2017 Framework Plan, we have completed the following risk assessment steps:

1. Determine the *magnitude* of potential hydrological change;
2. Determine the *sensitivity* of the wetland; and
3. Assign a *level of risk* for the wetland.

Based upon these criteria, an overall wetland Risk Assessment is completed to classify the wetland into Low, Medium or High Risk.

Error! Reference source not found.**1** below presents the summary of the wetland screening taking into account both the ToR as well as the TRCA Risk Evaluation. The results of the FBWB Risk Evaluation are consistent with the results of the Screening of Candidate Dependent Features from the ToR, further supporting the monitoring and analysis recommendations.

Table 11. Preliminary FWBW Risk Assessment

Wetland No.	Contributing Catchments (Figure 16)	Wetland Feature (ELC number - Figure 2)	Hydrological Change Risk Classification	Wetland Sensitivity	Risk Assignment
1	T,M,R,W,V,U	Riverine Wetland SWD4 **(81)**	Low	Low	Low
2	I	Riverine Wetland SAS1 **(59)**	Low	Low	Low
3	L	Riverine Wetland MAM2 **(122)**	High	Low	Medium
4	O,Q,K,F,A,B,C,E,D,G,J,H, plus additional US catchments	Contiguous Riverine SWT3 & MAM2 **(62,63, 64, 121, 76)**	Low	Low	Low
5	O,F,K,A,B,C, E,D,G,J,H, plus additional US catchments	Contiguous Riverine Wetland MAM2, SWD3 **(17, 103, 46)**	Low	Low	Low
6	K (northwestern part)	Contiguous Isolated Wetland MAM2, SWD3 **(35, 36)**	High	High	High
7	H,J	Contiguous Riverine MAM2, SWT2, SWD4, SWD -MA **(27, 53, 54, 57, 107, 108, 110, 111)**	Low	Low	Low
8	C	Contiguous Riverine SWD2 MAS2 **(50, 105)**	Low	Low	Low

Based on the above screening, the majority of wetlands on the MW2-3 Lands are considered to be Low Risk as they are located within valleylands and hydraulically connected to the adjacent creeks (i.e., riverine wetlands). These wetlands are supported by large upstream catchment areas and have further protection from watercourse buffers and other natural cover set backs. The stormwater management

strategy and the location of the SWM ponds are planned to maintain surface water flows to the pre-development conditions to riverine wetlands.

For each of the wetland identified as Low Risk, no future monitoring is required and the effects to these features can be assessed using a non-continuous modelling approach. The water balance to these features, including both groundwater and surface water must be maintained.

Wetland 3 and Wetland 6 were screened to be medium and high risk, respectively. The catchment area to these wetlands is catchments are L and K (**Figure 16**), which are located on non-participating lands. In addition, the forested lands immediately adjacent to Wetland 6, as well as a large portion of the catchment areas for both Wetland 3 and 6 will be impacted by the future Highway 413 right-of-way. Impacts from Highway 413 are beyond the scope of this assessment and are included under the Provincial Environmental Assessment (EA) completed for the Highway 413 project. As it is not possible to fully assessment the potential impact to these features at this time, no recommendations on the level of monitoring or the impact assessment methodology is recommended for these wetlands in the CEISMP Report. Future considerations for determining the potential effects to these features is recommended during later design stages.

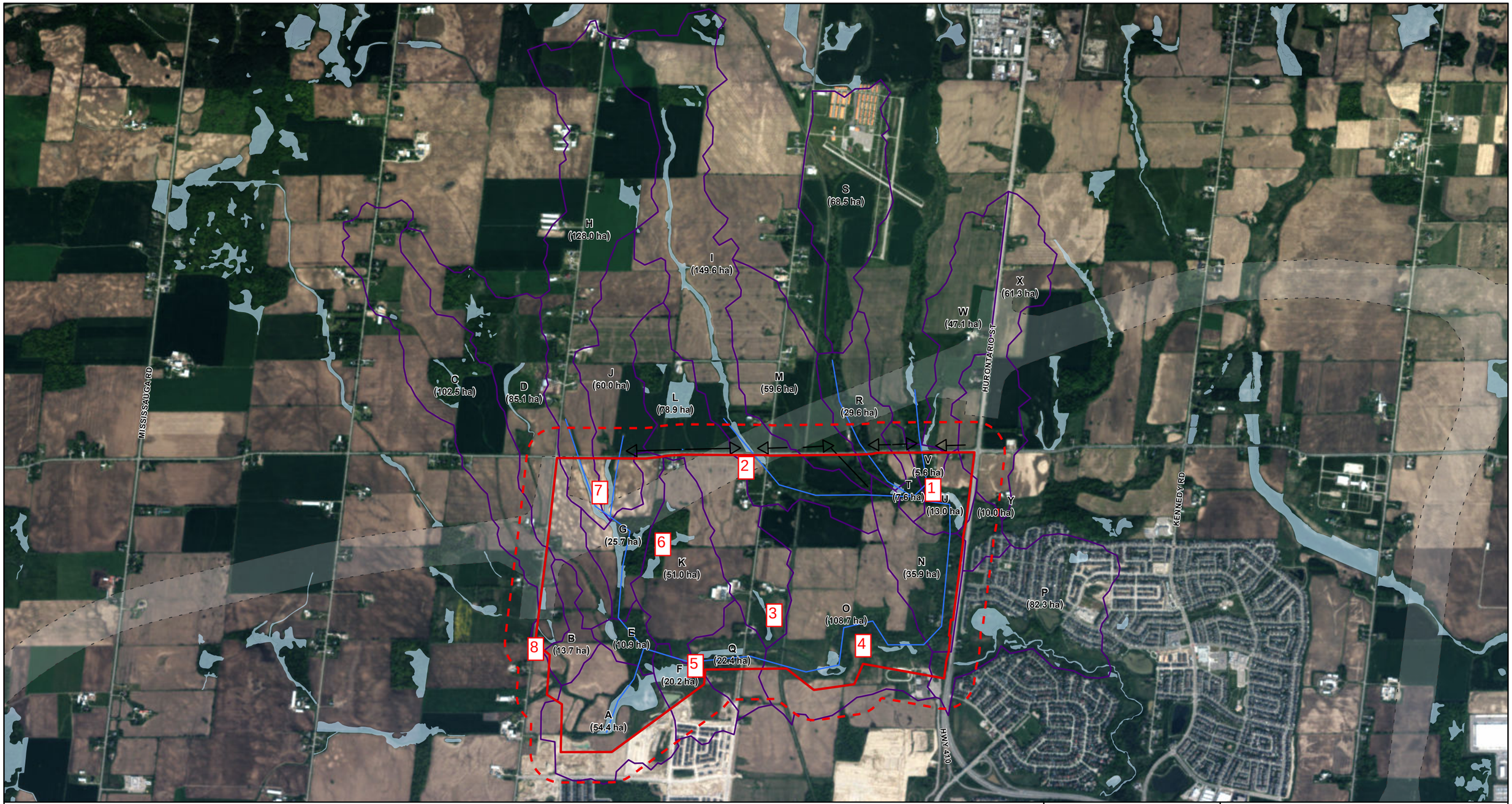
4.5.2 Low-Impact Development Considerations

The use of Low Impact Development (LID) measures is recommended as part of the overall stormwater management plan to help achieve at least 5 mm of stormwater retention and minimize changes to the existing water budget. As stated in *Low Impact Development Stormwater Management Planning and Design Guide Version 1.0* (2010) by CVC and TRCA,

> "Developing stormwater management plans requires an understanding of the depth to water table, depth to bedrock, native soil infiltration rates, estimated annual groundwater recharge rates, locations of significant groundwater recharge and discharge, groundwater flow patterns and the characteristics of the aquifers and aquitards that underlay the area" (TRCA and CVC, 2010).

For sites with deep water table conditions and high permeability soils, LID practices can significantly improve infiltration and groundwater recharge to maintain the groundwater characteristics of the underlying aquifer. Conversely, for sites with low permeability soils and high water table conditions, the amount of infiltration is limited by the saturated hydraulic conductivity of the soil (i.e., the rate at which water can infiltrate).

LID measures need to take the permeability of the soils, and depth to the seasonally high-water table into consideration. Based on OGS surficial geology mapping and borehole drilling results, the surficial material across the site consists primarily of low permeability clayey silt to silty clay till of the Halton Till formation (K value of 10^{-8} m/sec), higher permeability alluvial deposits, and silt and fine sand of the ORM formation (K value of 10^{-6} m/sec) near the Etobicoke Creek valley. Based on initial water level monitoring results, the shallow water table ranges between approximately 0.41 mbgs and 9.14 mbgs within the ORM sand and silt deposits, and between approximately 0.06 mbgs and 4.47 mbgs within the Newmarket Till. Infiltration trenches, vegetated swales and bioretention areas can all be effective in low permeability soils



LEGEND

- Watercourse
- External Drainage Direction[1]
- Ecological Landscape Classification (ELC) Wetland[2]
- Drainage Boundary[1]
- Proposed Highway ROW
- Mayfield West Phase 2 Stage 3 lands
- Study Area

1 - Candevcon
2 - ELC wetland boundaries within the subject site provided by Palmer/SLR Consulting, Wetlands outside of this boundary are sourced from Toronto and Region Conservation Authority (TRCA).

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Source Notes: Imagery (2023) sourced from Caledon Maps.

CLIENT
Brookvalley Project Management Inc.

PROJECT
Mayfield West Phase 2 Stage 3

TITLE
Subcatchment Area

Palmer | PART OF SLR

REF. NO. 1701628-16-1

Figure 16

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to increase infiltration. It is recommended that the implemented LIDs target areas associated with the deeper water table to ensure that the minimum separation requirement of 1 m from the seasonally high water table is met.

The following list of possible LID measures will be reviewed at the detailed design stage

- Increased topsoil depth on lots
- Increased topsoil depth in boulevards
- Increased topsoil depth in parks and SWM facilities
- Roof leaders that discharge to the surface
- Swales in NHS areas. parks. Downstream of SWM facilities, adjacent to rear yard swales located in buffers, and private side yard and rear yard swales
- Sub surface LIDS such as infiltration galleries in public property such as parks, parkettes or roadway

The above list is not considered a complete list as others may be added at the detailed design stage

The above items can be used singularly or in combination where applicable to both private and public property. The Town of Caledon has entered into a Consolidated Linear Infrastructure Environmental Compliance Approval (CLI-ECA) with the MECP.

The northeast corner of the site north of the Etobicoke Creek valley and south of Old School Road has a high infiltration capacity due to the presence of higher permeability ORM and alluvial soil deposits at surface, as well as a deep water table (approximately 4.29 – 9.14 m below ground). A wide variety of infiltration-based LIDs, such as infiltration chambers (i.e., clean water collection systems/ RDC/ 3rd Pipe), infiltration galleries, trenches or soakaway pits, are all expected to be highly effective in this area.

For the overall site, it is recommended that site and rear yard grading should be directed to the main branches and tributaries of Etobicoke Creek to contribute infiltration and overland flow to these features and maintain the water balance pre- to post-development, where applicable.

4.6 Groundwater Recharge and Discharge

4.6.1 Groundwater Recharge and Discharge

While the study area is predominantly underlain by low permeability aquitard materials, it still functions as a groundwater recharge area, albeit limited by the surficial soils. Over the majority of the site, the ORM aquifer is present below the Halton Till, which acts as a groundwater recharge feature and discharge feature depending upon the specific location in the MW2-3 area. In addition, long-term groundwater monitoring data that shows a wide range of groundwater level but generally, little seasonal and temporal change in groundwater levels at each well location.

The area with highest infiltration potential is found along the Etobicoke Creek valley, which is part of the protected Greenbelt Lands and Natural Heritage System. These lands will remain undeveloped, and naturalization of the greenbelt lands will over time be expected to increase the recharge function of this area.

Due to the low permeability Halton Till aquitard at surface, the dominant groundwater flow direction in the study area is downwards towards deeper aquifers. Near breaks in slope, shallow groundwater flow generally follows topography, and flows towards rivers and topographic lows. Lateral groundwater flow over the majority of the study area is towards the Etobicoke Creek valleylands. Many areas where the ORM aquifer intercepts Etobicoke Creek, its tributaries or valley wetlands, the features are supported by groundwater support discharge and baseflow. Maintaining groundwater recharge on tableland areas that directly contribute to groundwater discharge to these features should be the focus of LID measures and future SWM design.

4.7 Aquifers and Groundwater Users

The ORM aquifer is present at shallow depths over the majority of the study area, and is expected to be utilized by older, shallow dug water wells. A search of the MECP database identified potable water wells in the vicinity of the MW2-3 area, however it is expected that municipal water will be available in the near future. Newer well records generally target deeper overburden or bedrock aquifers below the Newmarket Till. These deeper wells would not be impacted by the proposed development.

The primary groundwater recharge area for the ORM aquifer is from lands north of the MW2-3 area and with LID measures implemented, no impacts to this aquifer are expected. A door-to-door water well survey should be completed at a future design phase to confirm the number of active wells and assess the risks to individual groundwater users.

4.8 Groundwater Supported Natural Features

Etobicoke Creek, its tributaries and valley wetlands are interpreted to be supported by groundwater discharge from the ORM aquifer where the valleylands have incised through the Halton Till. These areas are contained within the protected NHS and Greenbelt Lands and will not be directly impacted. Targeted infiltration-based LID measures are recommended to be employed in tableland areas where groundwater flow is towards these on-site features. Shallow drainage features and wetlands on the tableland areas are interpreted to be perched on the Halton Till and not connected to the groundwater table.

4.9 Stormwater Management Strategy

All lands within the MW2-3 Area drain to into the Etobicoke Creek watershed. The subject lands will be developed using a treatment-train approach for addressing stormwater runoff generated by the proposed development, consisting of source control and Low Impact Development (LID) measures as appropriate, conveyance techniques, and end of pipe wet pond facilities for additional quantity, quality, and erosion control.

The stormwater management design criteria pertinent to MW2-3 Lands are provided by the TRCA Stormwater Management Criteria Manual and Etobicoke Creek Stormwater Management Plan (2012). The stormwater management design within the MW2-3 Study Area includes:

- **Water Quality:** Water quality control with an Enhanced Level (Level 1) of Protection or a minimum of 80% TSS (Total Suspended Solids) removal is mandated for the proposed development area, as outlined in the Stormwater Management Practices Planning and Design Manual (MECP, March 2003).

- **Water Quantity for Erosion Control:** 25mm Erosion Control Criteria outlined in the TRCA SWM Criteria specified the detention and gradual release the runoff generated from the 25mm storm event over a period of at least 24 hours, with a preference for a 48-hour duration for stormwater management ponds.

- **Water Quantity Control:** The proposed SWM Ponds are located within Etobicoke Creek Sub-watershed and the quantity control targets are established based on Etobicoke Creek Stormwater Management Quantity Control Release Rates. The Precited Unit Peak Runoff Rates on Catchment-by-Catchment Basis provides unit target rates for 2 to 100yr storm events. The peak discharges for the SWM ponds are set to meet the calculated target flows which were derived from the Etobicoke Creek unit flow values.

- **Water Balance:** Identification of stormwater management measures to be integrated into the development concept with the aim of preserving existing infiltration targets, wherever feasible.

4.9.1 Major/ Minor System Flows

In general, the storm sewer system will be designed to comply with the Town of Caledon Design Criteria i.e. "Storm sewer systems must be designed to accommodate a 10-year storm in cases where foundation drains are to be connected. Alternatively, for systems that do not permit foundation drains, a 5-year design will be permissible." Overland flows will be directed to the SWM Ponds. Routing of the Regional Storm through the SWM Ponds will be determined as part of the final Engineering Design.

4.9.2 Stormwater Management Pond Design

To meet the SWM Criteria outlined above for the subject development, wet ponds are proposed. The proposed locations of the stormwater management ponds, and the determination of the associated drainage areas are based on the following considerations:

a) Selection of the conceptual stormwater pond locations also considered the existing drainage patterns to minimize drainage diversions and maintain the drainage areas contributing to each of the watercourse systems to the extent possible.
b) The ponds are generally located in or adjacent to topographical low areas to minimize the extent of cut and fill.
c) The ponds are designed to provide Enhanced Level quality control, erosion control as well as quantity control up to and including the 100-year storm event.
d) The proposed SWM ponds were reviewed from a natural heritage perspective to confirm implications to the NHS. All ponds are generally located adjacent to the NHS.

Ponds shall be designed to accommodate both onsite and off-site drainage areas. A review of a drainage map as prepared by the town of Caledon (**Figure 16**) shows the approximate drainage boundaries within and adjacent to the study area. It is noted that lands to the north of Old School Road drain across old school Road via the existing valley land crossing of the roadway. No lands drain directly across the subject lands. it is anticipated that when the lands to the north of Old school road develop, they will need to provide their own SWM facilities.

The lands to the east, west and south drain directly to Etobicoke Creek and its tributaries and therefore no external drainage will need to be accommodated within the onsite SWM facilities. In addition, ~~the additional of~~ the future Highway 413 corridor ~~will further complicate the~~ stormwater drainage from external lands ~~and~~ are expected to be managed as part of the highway design and EA.

At detailed design, in accordance with the TRCA (2012) Stormwater Management Criteria document, the outfall will be placed:

- Outside of the 25-year floodline, where possible;
- Outside of the 100-year erosion limit, where possible;
- Outside of the meander belt, where applicable; and
- Optimal 45-degree angle of release to receiving reaches to reduce erosion impacts where possible.

The proposed stormwater ponds will be designed to provide the required water quality, quantity and erosion control for development in the upstream catchments and future road improvements. These facility locations have been selected based on a cursory assessment of the general topography of the study area, existing drainage patterns, and the proposed development patterns.

The facilities will be designed with sediment forebays to receive inflows from the contributing drainage system, consisting of storm sewers, swales or other conveyance LID measures. Outlet structures will discharge to the adjacent stream/valley and will be sized to capture and release the necessary storage volumes. The basic components of a stormwater management pond and its typical location relative to a creek/headwater corridor for the Brookvalley Lands within the MW2-3 Area are illustrated in the Candevcon FSR (2024).

4.9.3 Stormwater Pond Control Targets and Sizing

Stormwater management targets to be applied over the subdivision development area were developed through consultation with TRCA and Town of Caledon. The water quality control, erosion control, and flood control targets which were established are outlined below together with conceptual storage volumes required to meet these targets.

4.9.4 SWM Pond Water Quality Control

A significant portion of the nutrients and metals found in stormwater runoff are in the form of small particles attached to the suspended sediment. Therefore, removal of the sediment with stormwater management ponds will reduce the steam loadings for many contaminants. The 2003 MOE Stormwater

Management Planning and Design Manual defines specific water quality control targets for stormwater facilities. The targets are based on:

- the type of facility (stormwater pond, infiltration practice, etc.).
- the land uses within the contributing area (in terms of an impervious component); and
- the level of control required.

For site areas of 5ha or less it is proposed that quantity control not be provided. Rear lots shall drain directly to the adjacent creek or wetland and quality control shall be provided with the use of an appropriately sized oil and grit separator (OGS) such as a jelly fish filter to obtain 80% suspended solids removal

4.9.5 SWM Pond Extended Detention for Erosion Control

For this Development, an interim erosion control target using the most stringent criteria in TRCA' s jurisdiction is to be applied; detain and release runoff from a 25 mm storm event over 48 hours.
In addition to the extended detention requirements noted above, the 2012 TRCA Stormwater Criteria document requires a minimum of 5mm of retention be applied to all development lands to reduce runoff volumes, and to minimize impacts to groundwater recharge and the overall water balance.

For SWM facilities **that outlet to a continuous flow creek pond shall be designed** to contain runoff from a **25mm storm for up to 48 hours**.

For SWM facilities **that outlet to an intermittent or ephemeral flow channels an** erosion assessment of the channel according to TRCA Erosion Assessment Protocol, which includes analyzing soil composition, reviewing the erosion potential of native soils with a fluvial geomorphologist, monitoring predevelopment flows in the channel, establishing a continues hydrology model and determining an allowable release rate into the channel. This assessment will establish the **extended detention requirement** and **runoff volume control requirements**.

4.9.6 SWM Pond Flood Control

For this Development, Consistent with current TRCA requirements in the West Humber River and Etobicoke Creeks Subwatershed, future development will also require flood (quantity) control facilities to attenuate post-development stormwater runoff rates to pre- development levels for the 2-year through 100-year storm events. TRCA defines the pre- development release rates for the Etobicoke watershed through a series of unit runoff rates (L/s/Ha) established for Etobicoke creek Watershed.

5. Impact Assessment

The proposed MW2-3 Land Use Plan, prepared by MGP (2024), is provided in **Appendix A**. This development plan utilizes the ecological constraints and Natural Heritage System established by Palmer (**Figure 14**), and provides setbacks from the NHS and the Greenbelt Lands. Areas of groundwater recharge and discharge have been established and mitigation LID measures can be implemented in key

areas to maintain groundwater supported ecosystems and baseflows. The overall change in pre-to-post development infiltration (i.e., water budget) has been buffered by the change from agricultural land use to Greenbelt Land for approximately 62.6 ha of the MW2-3 area. Over time, this large land area is expected to naturalize which will reduce runoff and increase recharge over the existing condition. This change has off set some of the infiltration losses from residential development and has been accounted for in the pre-to-post development water budget. In the absence of mitigation, a decrease in site wide infiltration of 41% is expected, which can be mitigated through the use of well placed LIDs.

Based on the assessment of environmental constraints and opportunities, the proposed development footprint is generally within areas of low constraint, predominately consisting of agricultural and rural residential land use. Through appropriate setbacks, methods of low impact design, mitigation and enhancement, potential adverse impacts to the natural heritage features and features can be avoided.

The stormwater from the site is proposed to be directed to SWM Ponds and outlet to the adjacent watercourse branch of Etobicoke Creek. All MW2-3 Lands drain to Etobicoke Creek and no discharge to wetlands is anticipated for this project. HDF surveys identified low constraint from these features and they their function is recommended to be maintained through the SWM design. The design of lot level control and LIDs to maintain the site-specific and feature specific water balance to the extent needed to sustain the water balance, where required, will be provided during later design stages.

Based on the environmental constraints identified on **Figure 14**, subject to potential refinement, all development is proposed to remain outside of the existing natural heritage features of the study area consisting of significant wetland, woodlands, valleylands and hazards. The natural heritage features or hazards and associated setback with the greatest outer limit and constraint will generally represent the limit of development. Some encroachment into setbacks and buffers (e.g., grading, trails) may be proposed subject and subject to detailed design.

Although no direct removal or encroachment is proposed into natural heritage features (i.e., development is prohibited from occurring within them), potential for indirect or secondary impacts from development on adjacent lands will continue to be carefully assessed by the consulting team through a collaboration of the project ecologists, hydrogeologists and civil engineers as the detailed design process advances. Through this process the appropriate SWM design and mitigation measures will be identified during detailed design to ensure that the features and functions of the natural features are maintained.

Although encompassed within the boundaries NHS, potential indirect impacts to the on-site watercourses and drainage features may also occur. Impacts such as increased sediment loading from adjacent construction earthworks will need to be considered and addressed through mitigation at the Detailed Design stage.

5.1 Wildlife

Construction timing windows are recommended for the proposed works to avoid direct or indirect impacts to wildlife species. Vegetation/tree removal from construction works could affect birds during the breeding bird season.

Per the MBCA, any destructive or disruptive activity such as vegetation removal cannot occur during the breeding bird period (April 1 – August 31). If vegetation removal is required during this period, a qualified ecologist should undertake a bird nesting survey before the works. If active nests are observed, then a site-specific mitigation plan may need to be prepared, including delaying tree removals until the young have fledged the nest. Other sensitive time during which all tree removal should be avoided is the maternity roosting period for Endangered bats (April 1 to September 30). If tree removals need to occur within this window, a qualified ecologist must screen for potential snag trees that may be used for roosting.

5.2 Valleyland Corridors

Consistent with the Part A, Part B and Part C Reports for Settlement Area Boundary Expansion (SABE) (Wood, 2022), a 120 m wide wildlife movement corridor is shown on **Figure 14** corresponding to the NHS Lands within the Etobicoke Creek Valley and adjacent Greenbelt. Restoration/ naturalization of these Greenbelt lands within the valleyland corridor will provide a long-term benefit for the watershed and the MW2-3 Lands through an increase to the overall natural cover and woodland size.

5.3 Creek Crossing

As part of the proposed development plan, watercourse crossings are proposed for the future 'Street A' and 'Street C' roadways (**Appendix A**). Watercourse crossings shall be designed to adhere to appropriate watercourse and associated natural heritage buffers and setbacks. Sizing of road crossings shall be such that long-term fluvial processes (ex. meander amplitude), and wildlife passage requirements, are comprehensively considered.

During the future construction phase of the project, erosion and sedimentation control, and protection of the watercourse, shall follow requirements specified in the Contract. The watercourse shall not be diverted, or blocked, and temporary watercourse crossings shall not be constructed or utilized, unless otherwise specified in the Contract. Construction material, excess material, construction debris, and empty containers shall be stored a minimum of 30 m away from watercourses and watercourse banks. All equipment maintenance and refuelling shall be controlled so as to prevent any discharge of petroleum products. Vehicular maintenance and refuelling shall be conducted a minimum of 30 m away from watercourses and watercourse banks.

From review of existing fisheries data, as outlined in Sections 4.1.3 and 4.2.3, it is recommended that all necessary in-water work, if required, be completed outside of April 1 to June 30 to protect the general spawning windows of noted fish species.

5.4 Buffers

The term "buffer" refers to an area of land neighbouring natural features that are alongside lands that are planned to undergo site alteration or development. The purpose of the buffer is to protect the ecological functions and features of the woodlands, wetlands and valleylands by reducing impacts from site alteration

or the proposed development. Generally, the buffer width depends on the sensitivity of the feature being protected and the potential risks of the proposed land use resulting in impacts to the natural heritage feature. Lesser buffers for woodlands that extend past the Greenbelt boundary will be considered based on maintain the buffer function and protection of the feature.

5.5 Species at Risk

Potentially suitable maternity roost habitat (e.g., snag trees) is present within the Study Area (any coniferous, deciduous, or mixed wooded ecosite and hedgerows). Significant woodlands represent areas with the greatest potential for snag trees and these areas will be protected.

5.6 Timing Windows

In general, an avoidance window of April 1 – August 31 is recommended to avoid potential conflicts with nesting birds and provide compliance with the Migratory Bird Convention Act. Within the context of this project where limited natural vegetation is proposed to be removed, these timing windows are recommended for any treed or vegetated areas and for the building structures. Should removals be necessary within the recommended timing windows, a screening for potential nesting activities should be completed by a qualified ecologists with specific mitigation measures provided pending the results of the site level screening.

Additionally, as SAR bats may be present within the Study Area, it is recommended that the removal of treed habitat be conducted outside of the active period for most bats (April 1 – September 30) to ensure these species are not present during such time.

5.7 Stormwater Management

Stormwater management facilities are permitted within the Greenbelt Plan, Protected Countryside Area. Facility and outfall designs (determined through the Candevcon Functional Servicing Report and detailed engineering design) will be established in a manner that minimizes ecological impacts to the valley system and associated watercourse and drainage features and natural heritage ecological features and functions. The general location of the proposed SWM ponds has been identified in the Servicing Report. Where applicable, the proposed naturalized SWM facility design details will be provided in the accompanying Servicing Report provides as part of the development application submission. Mitigation details and a construction plan can be provided to TRCA and the Town for comment during detailed design.

5.8 Low Impact Design

Low Impact Design LID (LID) Swales (rear-yard infiltration trenches) will be located at the rear of lots and areas of the development plan where appropriate to enhance infiltration. In general, the trenches will be designed to a width of 1.0 m, accommodate water to a depth of 1.0 m, and achieve a void ratio of 0.4 using filler material. Proposed LID features will have a target design to be at least 1 m above the true

water table (which is considered representative of the spring high groundwater elevation). Where applicable, LIDs will be designed to capture approximately 50% of rooftop runoff, as well as runoff from the contributing rear yards.

5.9 Erosion and Sediment Control

The following erosion and sediment control recommendations are provided for incorporation into the final Erosion and Sediment Plan:

- To minimize the potential for erosion and off-site transport of sediment into surface drainage areas and the natural environment, the project will implement Best Practices related to erosion and sediment control (ESC). ESC measures used by the contractor on all construction should meet guidelines as outlined in Erosion and Sediment Control Guideline for Urban Construction, December 2006 (ESC Guideline), prepared by the Greater Golden Horseshoe Area Conservation Authorities (GGHACA), or equivalent standards.
- Sediment and erosion control fencing should remain in place until the woodland buffer and enhancement plantings have been completed.
- All exposed and newly constructed surfaces should be stabilized using appropriate means in accordance with the characteristics of the exposed soils. These surfaces should be fully stabilized and re-vegetated as quickly as possible following the completion of the works, with native vegetation ground cover.
- Construction of the SWM pond headwall will be completed to minimize vegetation removals and works in proximity to natural features. A construction plan can be provided to TRCA and the Town for comment during detailed design

PART C: DETAILED ANALYSIS AND IMPLEMENTATION

6. Policy Conformity

6.1 Provincial Policy Statement

The Provincial Policy Statement lists natural heritage features for which development and site alternation are not permitted under the policies of the PPS, or are not permitted *"unless it has been demonstrated that there will be no negative impacts on the natural features or their ecological functions*". Within the project study area, the following natural heritage features have been identified:

- Significant Woodlands;
- Significant Valleylands
- Candidate Significant Wildlife Habitat;
- Fish habitat; and
- Potential Habitat of Endangered and Threatened species.

The development plan proposes to avoid encroachment into the natural heritage features, with the exception of the Street A and Street C crossing over the Etobicoke Creek. Through additional field surveys completed by Palmer in 2024, further site level assessment and confirmation of feature limits will be completed to inform detailed design and development limits. Through the implementation of setbacks and proposed mitigation measures, the objective is to maintain the identified natural features and their ecological functions.

6.2 Greenbelt Plan

Under the Greenbelt Plan, lands through in the southeastern portion of the West study area and along the south side of the East Study Area are designated as part of the Natural Heritage System of the Protected Countryside. Proposed development must demonstrate that there will be no negative impacts to key natural heritage features and key hydrologic features or their functions, as well as no negative impact on biodiversity or connectivity of the Natural Heritage System.

General infrastructure and Stormwater Management policies for lands within the Protected Countryside are set out in Section 4.2.1 and Section 4.2.3 of the Greenbelt Plan, respectively. **Table 12** below summarizes relevant policies of the Greenbelt Plan and the manner in which the proposed development plan meets the requirements of the Plan.

Table 12. Conformity with the Greenbelt Plan – Natural Environment

Policy Section	Plan Intent/Objective	Proposed Development Plan Implications and Conformity
3.2.2 Natural Heritage System Policies	(3) New development or site alteration in the Natural Heritage System (as permitted by the policies of this Plan) shall demonstrate that:	
	(a) There will be no *negative* impacts on *key natural heritage features* or *key hydrologic features* or their functions;	KNHF and KHF have been identified within and adjacent to the project Site, and a 30 m MVPZ applied to these features. No development or site alternation is proposed within the identified KNHF or their MVPZ, with the exception of temporary grading necessary to develop the stormwater management pond. Restoration will improve the grading area to conditions better than current conditions. No negative impacts are anticipated to KNHF or KHF or their functions as a result of the implementation of the proposed development plan.
	(b) *Connectivity* along the system and between *key natural heritage features* and *key hydrologic features* located within 240 m of each other will be maintained or, where possible enhanced for the movement of native plants and animals across the landscape;	Connectivity between features is maintained and enhanced through the incorporation of setbacks/buffers and the proposed restoration of buffer areas and additional restoration areas with the objective to enhance existing features and their functions, and connectivity between features of the Natural Heritage System.
	(c) The removal of other natural features not identified as *key natural heritage features* or *key hydrologic features* should be avoided. Such features should be incorporated into the planning and design of the proposed use whenever possible;	The proposed plan has aimed to avoid and minimize the removal and/or impact to natural heritage features where possible. The restoration plan for the Site aims to offset the removal of any natural heritage features in a manner that enhances the quality and function of existing features.
3.2.5 Key Natural Heritage Features and Key Hydrologic Features Policies	For lands within a key natural heritage feature or a key hydrologic feature in the Protected Countryside, the following policies shall apply:	
	(1) Development or site alteration is not permitted in *key hydrologic features* and *key natural heritage features* within the Natural Heritage System, including any associated *vegetation protection zone*, with the exception of:	As noted above, no development or site alternation is proposed within the identified KNHF, KHF or their VPZ, with the exception of temporary grading within the VPZ to develop the stormwater management pond, which will be restored to better than current conditions.

Policy Section	Plan Intent/Objective	Proposed Development Plan Implications and Conformity
	• c) *Infrastructure*, aggregate, recreational, shoreline and existing uses, as described by and subject to the policies of section 4.	
	• (4) In the case of *wetlands*, *seepage areas and springs, fish habitat, permanent and intermittent streams, lakes* and *significant woodlands*, the minimum vegetation protection zone shall be a minimum of 30 m measured from the outside boundary of the key natural heritage feature or key hydrologic feature.	A 30 m VPZ has been applied to KNHF and KHF, within which no development or site alternation is proposed (with the exception of potential temporary grading, which will be restored to better than current conditions).
4.1.2 Recreational Use Policies	(2) An application to establish or expand a major recreational use in the Natural Heritage System shall be accompanied by a vegetation enhancement plan that incorporates planning, design, landscaping and construction measures that:	
	a) Maintain or, where possible, enhance the amount of self-sustaining vegetation on the site and the connectivity between adjacent *key natural heritage features* or *key hydrologic features;*	Adjacent to KNHF, park and recreational uses are limited to a trail and potential bench area along the stormwater management berms (depending on final design) located outside the 30 m MVPZ. Any such areas would be planted with *natural, self-sustaining vegetation*, to enhance the ecological functions and connectivity of the adjacent KNHF and VPZ.
	b) Wherever possible, keep intermittent stream channels and drainage swales in a free-to-grow, low-maintenance conditions,	
	c) Minimize the application and use of pesticide and fertilizers; and	
	d) Locate new *natural self-sustaining vegetation* in areas that maximize the *ecological functions* and *ecological value* of the area.	
	3. An application to expand or establish a *major recreational use* shall be accompanied by a conservation plan demonstrating how water, nutrient and biocide use shall be kept to a minimum, including through the establishment and monitoring of targets.	
	4. Small-scale structure for recreational use (such as boardwalks, footbridges, fences, docks and picnic facilities) are permitted within *key natural heritage features* and *key hydrologic features*; however, the number of such structures and the negative impacts on these features should be minimized.	

Policy Section	Plan Intent/Objective	Proposed Development Plan Implications and Conformity
4.2.3 Stormwater Management Policies	Stormwater management systems are prohibited in the key natural heritage feature and their associated vegetation protection zones… e) Within those portions of the Protected Countryside that define major river valleys that connect the Niagara Escarpment and Oak Ridges Moraine to Lake Ontario, naturalized stormwater management systems may be permitted within the *vegetation protection zone* of a *significant valleyland*, provided they are located a minimum of 30 m from the river or stream, and they are located outside the *vegetation protection zone* of any other *key natural heritage feature* or *key hydrologic feature.*	The project Servicing Plan demonstrates in principle conformity with the requirements/intent of the policies of Section 4.2.3 related to the planning, design and construction practices. Proposed stormwater management facilities may be located within the Greenbelt but should be entirely outside of key natural heritage and key hydrologic features and their MVPZ. Any temporary grading that may be required within the MVPZ to develop stormwater management ponds will be restored to better than current conditions.

6.3 Region of Peel Official Plan

The natural heritage features in the Region of Peel are protected by its Greenlands System (Official Plan – Schedule A). Within the Study Area there are designated Core Areas of the Regional Greenlands System. These areas are designated as significant woodland, valleyland and wetland and are to be protected as part of the development plan. Site specific assessment and detailed design for Street A and Street C crossings will be needed to minimize impacts and provide for restoration and enhancement.

6.4 Town of Caledon Official Plan

Schedule B of the Town of Caledon Official Plan identifies designated Environmental Policy Area (EPA) through the valleyland corridors within the MW2-3 Lands. These EPAs are primarily within designated Protected Countryside under the Greenbelt Plan and the established NHS. EPA within the Site will be protected, and an appropriate buffer has been provided along the significant woodland features.

6.5 Endangered Species Act

Screening for significant habitat of endangered or threatened species and/or significant wildlife habitat show that there are potential SAR habitats within and adjacent to the Study Area. However, these habitats will either be avoided by development or hold ecological limitations as viable habitats. As part of the proposed mitigation/management plan, enhancement of buffer habitats will be implemented. Consultation with the MECP will be completed at the appropriate stages of the development process to ensure that the proposed development plan proceeds in a manner that conforms to the ESA.

6.6 TRCA Ont. Reg. 166/06

The project Study Area falls within the jurisdiction of the TRCA. Watercourses and their associated flood limit within the Site, are regulated under the TRCA O. Reg. 166/06 – Regulation of Development, Interference with Wetlands and Alterations to Shorelines and Watercourses. TRCA Regulated Area lands exist within the limits of the Site, at the northwestern and southeastern corners, in association with watercourse and valleyland features. Development within these areas will be subject to approvals and permitting from the TRCA.

The proposed concept plan (**Appendix A**) conforms to the buffer requirements as stated in the Living City Policies (TRCA, 2014), for valley or stream corridors. The proposed plan provides for a *10 m buffer from the greater of the long-term stable top of slope/bank, stable toe of slope, Regulatory flood plain, meander belt and any contiguous natural features or areas*. The HDF feature within the project area was determined to be of a class that does not require management. A 30 m setback has been applied from PSW wetland communities and a 15 m setback from small (less than 2 ha), unevaluated wetland communities.

7. Guidelines for Site Specific Studies and Monitoring

7.1 Terrestrial/Natural Heritage System

As part of the AMEC CEISMP Report and the Palmer CEISMP, a NHS has been recommended for the MW2-3 Lands. The following information was identified as being recommended for incorporation within the individual site-specific EIR/EIS Studies:

- Further refinement of the natural feature boundaries, setbacks, restoration/ enhancement areas, linkages and targets through the completion site-specific EIR/EIS Studies;
- Inclusion of a management plan specifying approaches by species and area;
- Consideration and summary of how NHS targets/ opportunities have been addressed through EIS recommendations;
- Consideration of SAR and inclusion of measures to ensure habitat and wildlife movement requirements are satisfied; and
- Identify general habitat management requirements for natural areas, buffers and corridors.

Palmer expects that minor refinements to the NHS may be completed and the NHS boundary and mitigation recommendations will be revised, where appropriate. Constant with existing policies in the Mayfield West Phase 2 (MW20 Secondary Plan, refinements to the NHS can be considered through a site specific EIR/EIS. The policy is described below.

“7.14.16.2.3

Minor adjustments to the location and configuration of the Natural Heritage System in the Secondary Plan may be considered to reflect the differences in scale and level of detail available through the preparation of the community-wide EIR as described in Section 7.14.4.6 and site-specific EIR as described in Section 7.14.4.7. Adjustments to the location and configuration of the Natural Heritage System in the Secondary Plan shall be permitted without requiring an amendment to this Plan provided that:

a) The Goal of the Secondary Plan, as described in Section 7.14.3.1, is maintained;
b) The intent of the overall Natural Heritage System strategy for the Secondary Plan, as recommended in the MW2 EIS & MP, is maintained; and
c) The adjustment shall not adversely impact the ecological or hydrologic functions or result in any significant increase or decrease in size of the Natural Heritage System in the Secondary Plan."

Refinements are permitted without an amendment to the OP so long as they meet the criteria listed in the policy.

"Refinements to the Natural Heritage System boundary in the MW2 Secondary Plan may be considered through the preparation of a community-wide EIR and site specific EIR, without an amendment to the Official Plan, provided that the intent of the Official Plan and the overall Natural Heritage System strategy is maintained and that the adjustment will not adversely impact the ecological or hydrologic functions of the Natural Heritage System (Section 7.14.16.2.3)."

7.2 Groundwater

A comprehensive hydrogeological investigation has been completed to provide an assessment of groundwater levels, soil permeability, groundwater flow direction, and LID design considerations.

Additional investigations are expected to be undertaken to further refine the hydrogeological conditions on a site-specific basis through a subsequent planning process (e.g., Draft Plan of Subdivision), these studies should focus on percolation testing and groundwater level measurements at the location of proposed LIDs. Should deep foundations be proposed, the hydrogeological assessment should focus on estimating construction dewatering rates and management of dewatering discharge.

7.3 Stormwater Management

Functional level engineering studies will be required to support future Draft Plan Applications and to assess site servicing and stormwater management strategies of each individual land holding. The report(s) will provide detailed consideration of stormwater management infrastructure including wet-ponds and LID infrastructure, as well as conveyance and distribution networks for stormwater, sewage and municipal water.

7.4 Restoration/ Enhancement of Greenbelt Plan Area

Implementation and specific design details/planting specifications for restoration of the greenbelt areas will be established through the preparation of Detailed Restoration Plans in support of Draft Plans of Subdivisions. These plans will be subject to approval of TRCA and Town of Caledon. Restoration of the subject lands will be progressive and determined by the phasing of development and related buildout timing. Monitoring of the success of the restoration efforts and related adaptive management will be a fundamental component of the establishment of the NHS for the MW2-3 Lands.

8. Comprehensive Adaptive Management Plan (CAMP)

Similarly to the MW2-1 and MW2-2 Lands, to adequately evaluate the efficacy of the proposed management strategy, a CAMP will be implemented during the construction and post-construction stage with adaptive/ mitigative measures to alter the management strategy as and if necessary. The CAMP will form the framework through which the performance of the CEISMP's recommended maintenance/ enhancement strategies will be measured. The CAMP will be developed to distinguish between natural variation in ecosystem function, and potential impacts resultant to land use changes.

Monitoring criteria and adaptive mitigation measures will be required for the following environmental systems:

- Surface Water Quality;
- Surface Water Quantity;
- Groundwater;
- Terrestrial Resources;
- Aquatic Resources; and
- Meteorological.

A generalized CAMP protocol/ summary was established as part of the AMEC CEIMSP Report and will be refined and detailed in full through the completion of EIR/EIS reports for the subject lands.

9. Signatures

This report was prepared by the undersigned.

Dirk Janas, B.Sc.
Principal Ecologist

Jason Cole, M.Sc., P.Geo.
Technical Discipline Manager

10. References

AMEC Earth & Environmental (AMEC). 2010. Mayfield West, Phase 2 Secondary Plan Comprehensive Environmental Impact Study and Management Plan, Part A: Existing Conditions and Characterization.

Chapman, L.J. & Putnam, D.F. (1984). The Physiography of Southern Ontario, 3rd Edition. Ontario Geological Survey, Special Volume 2.

Hensel Design Group Inc. (Hensel). 2017. Mayfield Phase 2, Stage 2 Secondary Plan Lands.

Hewitt, D.F. (1969). Industrial Mineral Resources of the Brampton Area, Ontario Department of Mines, Industrial mineral Report 12.

North-South Environmental Inc (NSE), Dougan & Associates, and Sorensen Gravely Lowes. 2009. Peel-Caledon Significant Woodland and Significant Wildlife Habitat Study. Report prepared for the Region of Peel and the Town of Caledon, Ontario.

Ontario Division of Mines. 1976. Palaeozoic Geology, Brampton (1:50,000), Map No. 2337.

Ontario Department of Mines. 1969. Brampton Area Drift Thickness Sheet (1:63,360), Map No. 2179

Ontario Department of Mines. 1969. Brampton Area Industrial Mineral Resources Sheet (1:63,360), Map No. 2176

Ontario Ministry of Natural Resources and Forestry (OMNRF). 2015. Significant Wildlife Habitat Criteria Schedules for Ecoregion 6E.

Soil Engineers, 2022. Geotechnical Investigation. Mayfield West Phase 2 Stage 3.

Terraprobe, 2007. Foundation Investigation & Design Report (Part 1: Factual Information), Etobicoke Creek bridge, Highway 410 Extension – Phase III, prepared for the Ministry of Transportation Ontario.

Terraprobe, 2007. Foundation Investigation & Design Report (Part 1: Factual Information), Valleywood Boulevard underpass Structure, Highway 410 Extension – Phase III, prepared for the Ministry of Transportation Ontario.

Thornthwaite, C.W. & Mather, J.R. (1957). Instructions and tables for computing potential evapotranpiration and the water balance.

Toronto and Region Conservation Authority (TRCA), 1998: State of the Watershed Report: Etobicoke and Mimico Creek Watersheds.

Toronto and Region Conservation Authority (TRCA), 2006: GTAA Living City Project: Etobicoke Creek - The Aquatic Ecosystem

Toronto and Region Conservation Authority (TRCA), 2008. Etobicoke Creek Headwaters Subwatershed Study Report.

Toronto and Region Conservation Authority (TRCA) and Credit Valley Conservation (CVC), 2009. Evaluation, Classification and Management of Headwater Drainage Features: Interim Guidelines.

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

Toronto and Region Conservation Authority (TRCA). 2017. Scoring and Ranking TRCA's Vegetation Communities, Flora, and Fauna Species.

Appendix A

MW2-3 Land Use Plan (MGP, 2024)

LAND USE PLAN

Mayfield West Phase 2 - Stage 3
Caledon

LAND USE

- Mayfield West Phase 2 - Stage 3 Secondary Plan Boundary
- Low Density Residential
- MD — Medium Density Residential
- MU — Mixed Use
- Institutional
- P — Open Space Policy Area
- SWM — Stormwater Pond Facility
- Collector Roads
- Future Trail System
- Environmental Policy Area
- Boundary of Greenbelt Plan Area
- Elementary School
- Highway 413 Technically Preferred Route

OLD SCHOOL ROAD
CHINGUACOUSY ROAD
McLAUGHLIN ROAD
FUTURE TRAIL SYSTEM
HURONTARIO STREET
MCLAUGHLIN RD
HWY 410
Highway 413 Technically Preferred Route

MU 1.7 ha
MU 7.8 ha
MU 1.4 ha
MU 2.6 ha
MD 4.1 ha
MD 3.4 ha
MU 1.9 ha
MD 1.0 ha
MU 2.1 ha
MU 5.0 ha
P 1.0 ha
P 2.5 ha
2.4 ha
2.8 ha
P 1.0 ha
P 3.2 ha
MU 2.6 ha
P 1.0 ha
SWM

0 20 40 100 200 300m

MGP File No.: 21-3130
Date: July 31, 2024

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Appendix B

Town of Caledon Subwatershed Study ToR

Terms of Reference

Local Subwatershed Studies

May 2023

Contents

1.0 INTRODUCTION

The Growth Plan for the Greater Golden Horseshoe (2019), along with other guiding documents, promote 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, as well as 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 on the basis of a subwatershed unit.

The Local Subwatershed Studies (Local SWS) will be required to assist in developing a sustainable development plan for the subject growth area in Caledon by protecting and enhancing 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., December 2021). The Local Subwatershed Studies are intended to confirm, refine and implement a natural heritage systems 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 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 more limited field work. The broader watershed/subwatersheds may have existing downstream constraints beyond the identified Secondary Plan study area and, to the appropriate extent, these will have to be considered in establishing the management strategies based on the overall study objectives and ultimate targets. Where there are watershed wide management strategies established through 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 and water resource systems) 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 (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 considered a minimum requirement;

- Provide direction on future study requirements (i.e., Environmental Impact Report (EIR) or equivalent), infrastructure needs (i.e., 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, 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 lands slated for development and less intensive desk-top forms of study in the lands beyond the secondary plan to provide an overall subwatershed context. This systems-based assessment involves an examination of 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, built on a period of field data collection and monitoring, 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 infrastructure studies such as Master Servicing (Water/wastewater) and Transportation Plans, which are 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. 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.

1.1 Study Area

*****TEXT TO BE ADDED, SPECIFIC TO THE SECONDARY PLAN AREA***

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.

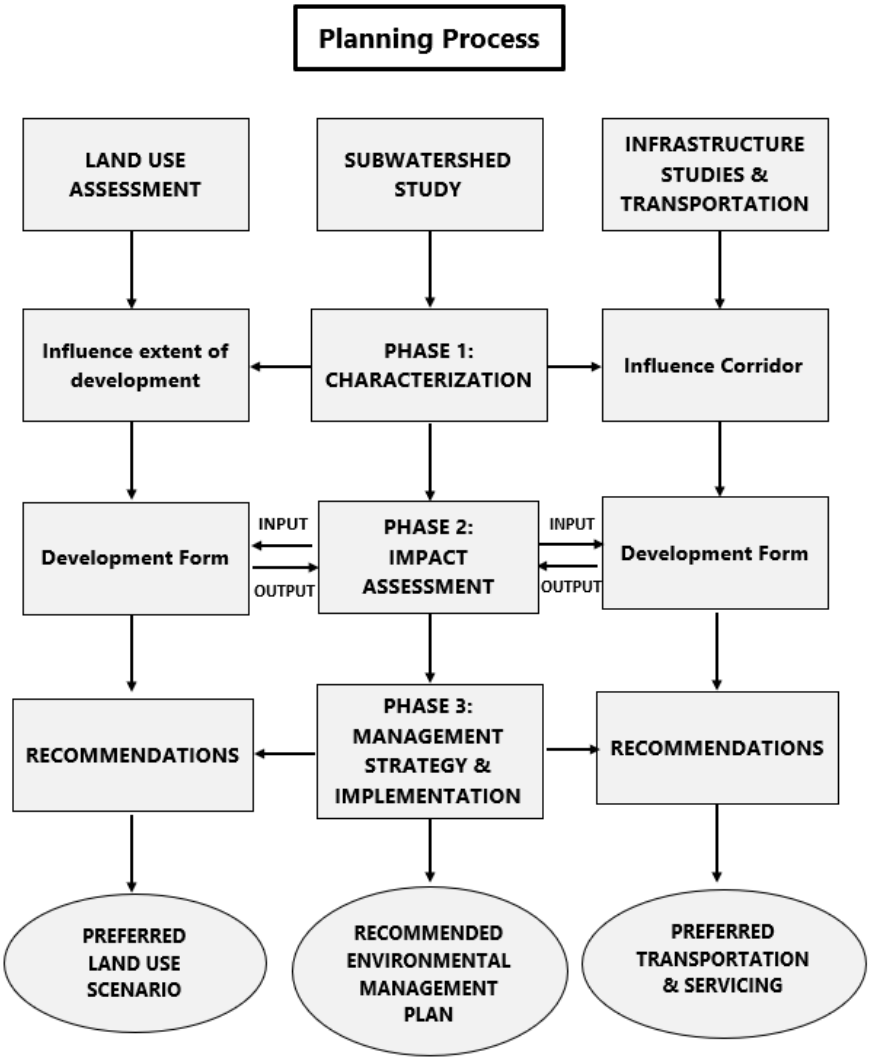

Figure 1: Integrated Land Use, Subwatershed, and Infrastructure Study Process

The Secondary Plan, with the accompanying studies, supports the development of a community development plan (with accompanying development policies). The Secondary Plan process 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) have been established to form 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.

The concurrent infrastructure related studies, as part of the Secondary Plan, are intended to follow the Municipal Class EA Master Planning Process (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 and B projects and 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 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.

Overall, the Secondary Plan will identify the community structure for the current 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 compact, complete, healthy, and resilient community.

2.0 GENERAL SUMMARY OF THE SUBWATERSHED STUDY PROCESS

2.1 Local Subwatershed Studies – Scope and Approach

The Secondary Plan Work Program and related Studies will guide the development of the Secondary Plan area through a consultative, collaborative, and coordinated process to establish a compact, complete, healthy, and resilient 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, Caledon's Official Plan, and the applicable Watershed Plans and Subwatershed Studies, including the Settlement Area Boundary Expansion Scoped Subwatershed Study (Wood et. al., December 2021). Using existing desktop information and available studies, as well as reconnaissance-level and detailed fieldwork, 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 (including the Landscape Scale Analysis sub-component) will reflect and refine the 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 Studies will be required to include monitoring pre-development to characterize existing features and systems and 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 Planning Stage. The post-development monitoring program, implemented following completion of the 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 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 strategy.

The Local Subwatershed Studies will be conducted in three (3) phases, discussed in further detail below. 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 would be developed and specifically tailored for each local study area under a separate process, prior to initiating the Local Subwatershed Study and site monitoring. The Technical Work Plan would include details on the scope of field work and monitoring along with 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, etc. in 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.

Phase 1: Characterization and Integration

Phase 1 of the Local SWS builds upon the Scoped Subwatershed Study to characterize the resources associated with each subwatershed 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:

a) establish the form, function and linkages of the environmental resources,

b) confirm, refine and identify environmental constraints and opportunities related to terrestrial and aquatic habitat, features, and systems,

c) 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,

d) Refine and implement criteria and constraints for management opportunities associated with the environmental features and systems.

Goals, objectives and targets were developed through the Scoped Subwatershed Study, the Local Subwatershed Study will refine direction from the scoped work to establish area-specific direction that is refined over the study period for the respective subwatershed(s) in consultation with the Technical Advisory Committee (TAC), comprised of representatives from Caledon, Peel, CAs, and various Provincial agencies.

The Phase 1 characterization includes pre-development monitoring to characterize existing systems and features as well as to inform establishing baseline conditions for comparison with post-development conditions.

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 Town's Land Use Team. For various disciplines (i.e., groundwater, hydrology, hydraulics and water quality) analytical tools are 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 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: 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 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. Further details on area specifics would need to be considered as part of future neighbourhood scale studies.

2.2 Phase 1 – Subwatershed Characterization and Integration

2.2.1 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 fieldwork.

Existing desk-top information relevant to the Local Subwatershed Study Area will need to be reviewed. The Regional Scoped SWS 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 methods preferred 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 will need to be prepared. For each source, a brief (single paragraph) 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 beyond that outlined in the core scope shall be determined, and a proposed program for collecting potential 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. Any budget implications (plus or minus) will need to be appropriately reviewed and approved by the Town of Caledon in advance of execution.

2.2.2 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 Municipality, 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, as well as new local detailed continuous hydrologic modelling 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 subwatersheds' 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 the hydrologic and hydraulic features are quantified for each subwatershed within the study area. The development of the models in accordance with applicable standards to support future Municipal or Conservation Authority use of the model, and model results, will be considered as an asset.

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/validation should be collected between April and November inclusive. Once calibrated/validated the model is to be executed in both event (synthetic design storms) and continuous mode 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 expected that the model(s) will be calibrated/validated based upon both historical rainfall and flow monitoring data, as well as new study data collected as part of this study. The exercise should meet the standards to provide a comprehensive understanding of the existing hydrologic conditions of the study area. The model shall be calibrated/validated to provide comparable flows at the subwatershed outlets to those determined in any previous watershed or drainage studies for the given watercourses. 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) to confirm development of the Secondary Plan Area will not have adverse impacts on the peak flow rates.

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 Centers 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.

2.2.3 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 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 throughthe 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 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: 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 is expected to include but not be limited to the following; specific details of each will need to be tailored to the characteristics and resources in the subject Subwatershed area:

- 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 include contributions to and from areas outside the subwatersheds.

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 will be coordinated at the outset of the field program. In order to efficiently use the field resources, observations from all disciplines should be utilized, 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 could 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, if carried out, should be compared to the hydrological water balance described above.

2.2.4 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 management guidance. Assessments will identify 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 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 fieldwork 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.

2.2.5 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 them. 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, if possible, to maximize the utility of the data.

2.2.6 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 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 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, confirmand, where appropriate recommend additionallinkages between the ecological systems 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

An 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 development is consistent with Section 2.1 of the Provincial Policy Statement and Region of Peel's 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 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 SABE 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.)

Biophysical Inventory	Inventory Requirements
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
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).

2.2.7. 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 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 and the respective catchment areas, as the baseline reference for stormwater management in terms of water quantity/ quality control.

Should additional water quality information be needed, local water quality monitoring data can be collected in order 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. Surface water quality monitoring would need to be conducted between the months of April and December. Water quality grab sampling would be completed at each station for three (3) dry weather events and 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 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 should be identified, building upon that identified in the Regional 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:
    a. Climate, landform, geology, and soils
    b. Hydrogeology/groundwater quantity and quality
    c. Surface water quantity and quality
    d. Stream geomorphology
    e. Aquatic and Terrestrial ecosystems
    f. Natural Environment Systems

  based on the findings of the:

  (i) review of secondary sources (compiling information from existing documents); (ii) reconnaissance-level fieldwork; and/or (iii) detailed fieldwork.

- 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 – Impact Assessment

Based on the outcomes of Phase 1, including the review of background information sources and supplementary fieldwork, Phase 2 will require an iterative assessment of the potential impacts of future land use changes on the natural environment and water-based system within the study area. The findings from the Phase 1 Characterization and Integration work, 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 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 be assessing 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;
- identify opportunities and constraints to development;
- provide a strategy to manage legacy impacts from existing land uses;
- detail preliminary locations and areas for stormwater management (LID BMPs and end-of-pipe facilities); and
- identify restoration and enhancement opportunities.

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 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/individually.

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.

The next iteration of impact assessment will be expected to be more scoped and focused on the specific changes to the land use and 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 continuously and in event mode 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 on surface water, groundwater and water budgets. The Phase 2 Impact assessment hydrologic analysis will need to:

- Delineate a discrete drainage area plan based on potential future development;
- Calculate post-development flows for all event storms at predetermined locations, as per discretized drainage area plan and model schematic diagram within 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 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) and four (4) locally historic storms , and the formative timeseries for four (4) formative storm events which occurred in other jurisdictions.
- 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.

Hydraulics:

The existing hydraulic condition 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 parameter (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 flow 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.

2.3.2 Hydrogeology

The hydrogeology impact analysis shall examine the impact of future development land use changes on the groundwater systems. 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 urbanizing 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
- Take into account 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 to consider potential impacts particularly to changes in groundwater recharge. As presented in Phase 1, the hydrological model is also utilized to carry out a water balance and a comparison should be conducted 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 the 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 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 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 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 the existing and potential erosion concerns. The extent to which downstream areas need to be assessed with 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 negative impacts, while accommodating opportunities to restore and improve the existing watercourse or HDF condition. This 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 recommendations for features 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). The natural channel design strategy must clearly define that all channel blocks have the ability to 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 which are to be 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 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 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 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 buffers/setbacks, will be identified in order to protect the natural heritage features and functions from disturbance. In addition, linkages identified through the Scoped SWS will be confirmed or refined, and consideration for additional linkages (e.g., site scale linkages) are to be assessed. Linkages shall be confirmed and protected through this phase. Linkages are important in reducing the potential adverse impacts of habitat fragmentation on natural areas. The management strategies shall be documented toto :

- 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.

The assessment shall generally focus on the sensitive areas identified in Phase 1 of the Local SWS and areas in the immediate vicinity of proposed developments. 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 successful consultant 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 resulting in degraded water quality shall be developed. Best Management Practices (BMPs) for urban stormwater management shall be recommended for all new development 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 Iterative Land Use Assessments , Reports will need to be prepared (i.e., one for each iteration) outlining the results of the Impact Assessment. These Reports 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. 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 the future development(s) are in compliance 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., December 2021) shall be used as the foundation for developing the monitoring plan to further refine, develop and identify management recommendations and requirements for 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 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 Block 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 drainage sheds for consideration as part of future neighbourhood 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 reflect 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 that are identified as avoidance (i.e., protect in-situ), minimize and mitigate, linkages, 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., features protected by policy) and/or supporting features that are 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 late 2023/early 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.

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Appendix C

Plants of the MW2-3 Study Area

APPENDIX H-3: List of vascular plant species documented in the study area.

No.	Scientific Name	Common Name	Conservation Status							CC	CW	Native Status
			Global	National	Provincial		Regional	Local				
			GRank	COSEWIC	MNR	SRank	GTA	Peel	TRCA	CVC			
1	*Acer negundo*	Manitoba Maple	G5			S5			L+?		0	-2	N
2	*Acer pensylvanicum*	Striped Maple	G5			S5					7	3	N
3	*Acer rubrum*	Red Maple	G5			S5			L4		4	0	N
4	*Acer saccharinum*	Silver Maple	G5			S5			L4		5	-3	N
5	*Acer saccharum var. saccharum*	Sugar Maple	G5T?			S5			L5		4	3	N
6	*Acer X freemanii*	Freeman's Maple	G?			S5			LH			0	N
7	*Alisma plantago-aquatica*	Broad-leaved Water-plantain	G5			S5			L4		3	-5	N
8	*Sagittaria latifolia*	Broadleaf Arrowhead	G5			S5			L4		4	-5	N
9	*Amaranthus hybridus*	Smooth Amaranth	G?			SE5?			L+		0	5	I
10	*Amaranthus retroflexus*	Red-root Amaranth	G?			SE5			L+		0	2	I
11	*Rhus aromatica*	Fragrant Sumac	G5			S5	R				8	5	N
12	*Toxicodendron rydbergii*	Western Poison Ivy	G5T			S5			L5		0	0	N
13	*Carum carvi*	Common Caraway	G?			SE1?			L+		0	5	I
14	*Cicuta maculata*	Spotted Water-hemlock	G5			S5			L5		6	-5	N
15	*Conium maculatum*	Poison-hemlock	G5			SE2?					0	-3	I
16	*Daucus carota*	Queen Anne's Lace	G?			SE5			L+		0	5	I
17	*Eryngium planum*	Plain Coyote-thistle	G?			SE1					0	5	I
18	*Apocynum androsaemifolium ssp. androsaemifolium*	Spreading Dogbane	G5T?			S5			L4		3	5	N
19	*Vinca minor*	Periwinkle	G?			SE5			L+		0	5	I
20	*Arisaema triphyllum ssp. triphyllum*	Jack-in-the-pulpit	G5T5			S5			L4		5	-2	N
21	*Asclepias incarnata ssp. incarnata*	Swamp Milkweed	G5T5			S5			L4		6	-5	N
22	*Asclepias syriaca*	Common Milkweed	G5			S5			L5		0	5	N
23	*Ambrosia trifida*	Great Ragweed	G5			S5			L5		0	-1	N
24	*Antennaria rosea*	Rose Pussytoes	G4G5			S1							N
25	*Arctium lappa*	Greater Burdock	G?			SE5			L+			0	I
26	*Arctium minus*	Lesser Burdock	G?T?			SE5			L+		0	5	I
27	*Artemisia annua*	Annual Wormwood	G?			SE1			L+		0	3	I
28	*Aster lanceolatus ssp. lanceolatus*	Panicled Aster	G5T?			S5			L5		3	-3	N
29	*Aster lateriflorus var. lateriflorus*	Calico Aster	G5T5			S5			L5		3	-2	N
30	*Aster puniceus var. puniceus*	Purple-stemmed Aster	G5T?			S5			L5		6	-5	N
31	*Aster sp*	Aster Species									0	0	
32	*Bidens vulgata*	Tall Beggar's Ticks	G5			S5	U	R1	L4	L	5	-3	N
33	*Bidens frondosa*	Devil's Beggar's Ticks	G5			S5			L5		3	-3	N
34	*Carduus acanthoides*	Spiny Plumeless-thistle	G?			SE5			L+		0	5	I
35	*Carduus nutans ssp. nutans*	Musk Thistle	G?T?			SE?			L+				I
36	*Centaurea jacea*	Brown Knapweed	G?			SE5			L+		0	5	I
37	*Cichorium intybus*	Chicory	G?			SE5			L+		0	5	I
38	*Cirsium arvense*	Creeping Thistle	G?			SE5			L+		0	3	I
39	*Conyza canadensis*	Fleabane	G5			S5			L5		0	1	N
40	*Crepis tectorum*	Narrow-leaf Hawksbeard	G?			SE5			L+		0	5	I
41	*Erigeron annuus*	White-top Fleabane	G5			S5			L5		0	1	N

No.	Scientific Name	Common Name	Conservation Status								CC	CW	Native Status
			Global	National	Provincial		Regional	Local					
			GRank	COSEWIC	MNR	SRank	GTA	Peel	TRCA	CVC			
42	*Eurybia macrophylla*	Large-leaved Aster	G5			S5			L5		5	5	N
43	*Euthamia graminifolia*	Grass-leaved Goldenrod	G5			S5			L5		2	-2	N
44	*Galinsoga parviflora*	Small-flower Quickweed	G?			SE			L+		0	5	I
45	*Inula helenium*	Elecampane	G?			SE5			L+		0	5	I
46	*Iva xanthifolia*	Coarse Sumpweed	G5			SE1			L+		0	5	I
47	*Matricaria recutita*	German Mayweed	G?			SE			L+		0	5	I
48	*Prenanthes altissima*	Tall Rattlesnake-root	G5?			S5			L5		5	3	N
49	*Rudbeckia hirta*	Black-eyed Susan	G5			S5			L4		0	3	N
50	*Solidago arguta var. arguta*	Sharp-leaved Goldenrod	G5T4			S3	R		L2		8	3	N
51	*Solidago caesia*	Bluestem Goldenrod	G5			S5			L5		5	3	N
52	*Solidago canadensis*	Canada Goldenrod	G5			S5			L5		1	3	N
53	*Solidago canadensis var. scabra*	Tall Goldenrod	G?			S5			L5		1	3	N
54	*Solidago flexicaulis*	Broad-leaved Goldenrod	G5			S5			L5		6	3	N
55	*Solidago patula*	Rough-leaved Goldenrod	G5			S5	R	R4	L3	R/L	8	-5	N
56	*Solidago sp*	Goldenrod Species									0	0	
57	*Sonchus arvensis ssp. arvensis*	Field Sowthistle	G?T?			SE5			L+		0	1	I
58	*Symphyotrichum lateriflorum var. angustifolium*	Calico Aster	G5T?			S4?			L5				N
59	*Symphyotrichum novae-angliae*	New England Aster	G5			S5			L5		2	-3	N
60	*Tanacetum vulgare*	Common Tansy	G?			SE5			L+		0	5	I
61	*Taraxacum officinale*	Common Dandelion	G5			SE5			L+		0	3	I
62	*Tragopogon dubius*	Meadow Goat's-beard	G?			SE5			L+		0	5	I
63	*Tussilago farfara*	Colt's Foot	G?			SE5			L+		0	3	I
64	*Xanthium strumarium*	Rough Cockle-bur	G?			S5			L5		2	0	N
65	*Impatiens capensis*	Spotted Jewel-weed	G5			S5			L5		4	-3	N
66	*Berberis vulgaris*	European Barberry	G?			SE5			L+		0	3	I
67	*Caulophyllum giganteum*	Blue Cohosh	G			S5			L4	R/L			N
68	*Podophyllum peltatum*	May Apple	G5			S5			L4		5	3	N
69	*Alnus incana spp. rugosa*	Speckled Alder	G5T5			S5			L3		6	-5	N
70	*Betula alleghaniensis*	Yellow Birch	G5			S5			L4		6	0	N
71	*Betula papyrifera*	Paper Birch	G5			S5			L4		2	2	N
72	*Carpinus caroliniana ssp. virginiana*	American Hornbeam	G5T			S5			L4		6	0	N
73	*Ostrya virginiana*	Eastern Hop-hornbeam	G5			S5			L5		4	4	N
74	*Anchusa officinalis*	Common Bugloss	G?			SE1					0	5	I
75	*Echium vulgare*	Common Viper's-bugloss	G?			SE5			L+		0	5	I
76	*Myosotis scorpioides*	True Forget-me-not	G?			SE4			L+		0	-5	I
77	*Alliaria petiolata*	Garlic Mustard	G?			SE5			L+		0	0	I
78	*Barbarea vulgaris*	Yellow Rocket	G?			SE5			L+		0	0	I
79	*Brassica oleracea*	Northern Winter-cress	G?			SE1			L+				I
80	*Capsella bursa-pastoris*	Common Shepherd's Purse	G?			SE5			L+		0	1	I
81	*Cardamine concatenata*	Cutleaf Toothwort	G5			S5			L3		6	3	N
82	*Cardamine diphylla*	Broad-leaved Toothwort	G5			S5			L4		7	5	N
83	*Cardamine pensylvanica*	Pennsylvania Bitter-cress	G5			S5	U	U	L4		6	-4	N
84	*Cardamine pratensis var. pratensis*	Meadow Bitter-cress	G5T?			SE1	R	R1		R/L			N
85	*Cardamine bulbosa*	Spring-Cress	G5			S4	R6	E	L2	R/L	8	-5	N

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			GRank	COSEWIC	MNR	SRank	GTA	Peel	TRCA	CVC			
86	*Hesperis matronalis*	Dame's Rocket	G4G5			SE5			L+		0	5	I
87	*Lepidium campestre*	Field Pepper-grass	G?			SE5			L+		0	5	I
88	*Raphanus raphanistrum*	Wild Radish	G?			SE3			L+		0	5	I
89	*Rorippa nasturtium-aquaticum*	True Watercress	G?			SE					0	-5	I
90	*Sinapis arvensis*	Charlock	G?			SE5			L+		0	5	I
91	*Thlaspi arvense*	Field Penny-cress	G?			SE5			L+		0	5	I
92	*Campanula rapunculoides*	Creeping Bellflower	G?			SE5			L+		0	5	I
93	*Diervilla lonicera*	Northern Bush-honeysuckle	G5			S5			L4		5	5	N
94	*Lonicera morrowii*	Morrow's Honeysuckle	G?			SE3			L+		0	5	I
95	*Lonicera tatarica*	Tartarian Honeysuckle	G?			SE5			L+		0	3	I
96	*Sambucus racemosa var. racemosa*	Red-berried Elder	G5T4T5			S5			L5		5	2	N
97	*Dianthus armeria*	Deptford-pink	G?			SE5			L+		0	5	I
98	*Euonymus europaea*	European Spindle-tree	G?			SE2			L+		0	5	I
99	*Euonymus obovata*	Running Strawberry-bush	G5			S5			L3		6	5	N
100	*Ceratophyllum demersum*	Common Hornwort	G5			S5	U	R3	L3	R/L	4	-5	N
101	*Atriplex patula*	Halberd-leaf Saltbush	G5			S5			L+?		0	-2	N
102	*Chenopodium album var. album*	White Goosefoot	G5T5			SE5			L+		0	1	I
103	*Hypericum perforatum*	St. John's-wort	G?			SE5			L+		0	5	I
104	*Convolvulus arvensis*	Field Bindweed	G?			SE5			L+		0	5	I
105	*Cornus alternifolia*	Alternate-leaf Dogwood	G5			S5			L5		6	5	N
106	*Cornus sericea ssp. sericea*	Red-osier Dogwood	G5			S5			L5		2	-3	N
107	*Echinocystis lobata*	Wild Mock-cucumber	G5			S5			L5		3	-2	N
108	*Thuja occidentalis*	Northern White Cedar	G5			S5			L4		4	-3	N
109	*Carex blanda*	Woodland Sedge	G5?			S5			L5		3	0	N
110	*Carex bromoides*	Brome-like Sedge	G5			S5	R	R3	L3	R/L	7	-4	N
111	*Carex brunnescens ssp. brunnescens*	Brownish Sedge	G5T?			S5	R	R3	L3	R/L	7	-3	N
112	*Carex communis*	Fibrous-root Sedge	G5			S5			L4		6	5	N
113	*Carex crawfordii*	Crawford Sedge	G5			S5	R	R1	L3	R/L	7	-1	N
114	*Carex crinita*	Fringed Sedge	G5			S5	U	U	L3		6	-4	N
115	*Carex eburnea*	Ebony Sedge	G5			S5	U	R2	L3	L	6	4	N
116	*Carex gracillima*	Graceful Sedge	G5			S5			L4		4	3	N
117	*Carex grayi*	Asa Gray Sedge	G4			S4	R	R3	L2	R/L	8	-4	N
118	*Carex hirtifolia*	Pubescent Sedge	G5			S5	U	R3	L4	L	5	5	N
119	*Carex intumescens*	Bladder Sedge	G5			S5			L4		6	-4	N
120	*Carex lacustris*	Lake-bank Sedge	G5			S5			L4		5	-5	N
121	*Carex laxiflora*	Loose-flowered Sedge	G5			S5	U	R7	L4	L	5	0	N
122	*Carex lupulina*	Hop Sedge	G5			S5			L3		6	-5	N
123	*Carex molesta*	Troublesome Sedge	G4			S4?	U	R5	L3	L	5	2	N
124	*Carex pensylvanica*	Pennsylvania Sedge	G5			S5			L4		5	5	N
125	*Carex radiata*	Stellate Sedge	G4			S5			L5		4	5	N
126	*Carex rosea*	Rosy Sedge	G5			S5			L5		5	5	N
127	*Carex scoparia*	Pointed Broom Sedge	G5			S5	R	R5	L3	R/L	5	-3	N
128	*Carex sp*	Sedge Species									0	0	
129	*Carex sparganioides*	Burreed Sedge	G5			S5			L4		5	0	N

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130	*Carex spicata*	Spiked Sedge	G?			SE5			L+		0	5	I
131	*Carex sprengelii*	Longbeak Sedge	G5?			S5	R	R1	L4	R/L	6	0	N
132	*Carex stipata*	Stalk-grain Sedge	G5			S5			L5		3	-5	N
133	*Carex tenera*	Slender Sedge	G5T			S5			L4		4	-1	N
134	*Carex tribuloides*	Blunt Broom Sedge	G5			S4S5	R	R5	L4	R/L	5	-4	N
135	*Carex tuckermanii*	Tuckerman Sedge	G4			S4	U	R6	L3	L	7	-5	N
136	*Carex vulpinoidea*	Fox Sedge	G5			S5			L5		3	-5	N
137	*Eleocharis erythropoda*	Bald Spikerush	G5			S5			L5		4	-5	N
138	*Schoenoplectus tabernaemontani*	Soft-stemmed Bulrush	G?			S5			L4		5	-5	N
139	*Scirpus atrovirens*	Woolgrass Bulrush	G5?			S5			L5		3	-5	N
140	*Scirpus cyperinus*	Cottongrass Bulrush	G5			S5			L3		4	-5	N
141	*Scirpus microcarpus*	Small-fruit Bulrush	G5			S5	U		L4		4	-5	N
142	*Dipsacus fullonum ssp. sylvestris*	Common Teasel	G?T?			SE5			L+		0	5	I
143	*Athyrium filix-femina var. angustum*	Lady-fern	G5T5			S5			L5		4	0	N
144	*Cystopteris tenuis*	Machay's Fragile Fern	G4G5			S5	U	U	L2		6	5	N
145	*Dryopteris carthusiana*	Spinulose Wood Fern	G5			S5			L5		5	-2	N
146	*Dryopteris clintoniana*	Clinton Wood Fern	G5			S4	U	R6	L2	L	7	-4	N
147	*Dryopteris intermedia*	Evergreen Wood Fern	G5			S5			L4		5	0	N
148	*Dryopteris marginalis*	Marginal Wood Fern	G5			S5			L4		5	3	N
149	*Matteuccia struthiopteris var. pensylvanica*	Ostrich Fern	G5			S5			L5		5	-3	N
150	*Onoclea sensibilis*	Sensitive Fern	G5			S5			L5		4	-3	N
151	*Elaeagnus angustifolia*	Russian Olive	G?			SE3			L+		0	4	I
152	*Equisetum arvense*	Field Horsetail	G5			S5			L5		0	0	N
153	*Equisetum pratense*	Meadow Horsetail	G5			S5	R	R7	L3	R/L	8	-3	N
154	*Equisetum sylvaticum*	Woodland Horsetail	G5			S5	R	U	L3	R	7	-3	N
155	*Euphorbia cyparissias*	Cypress Spurge	G5			SE5			L+		0	5	I
156	*Caragana arborescens*	Siberian Peashrub	G?			SE1			L+		0	5	I
157	*Coronilla varia*	Crown-vetch	G?			SE5			L+		0	5	I
158	*Gleditsia triacanthos*	Honey Locust	G5			S2			L+		3	0	N
159	*Lotus corniculatus*	Bird's-foot Trefoil	G?			SE5			L+		0	1	I
160	*Medicago lupulina*	Black Medic	G?			SE5			L+		0	1	I
161	*Medicago sativa ssp. falcata*	Alfalfa	G?T?			SE5			L+				I
162	*Melilotus alba*	White Sweet Clover	G5			SE5			L+		0	3	I
163	*Melilotus officinalis*	Yellow Sweet Clover	G?			SE5			L+		0	3	I
164	*Robinia pseudo-acacia*	Black Locust	G5			SE5			L+		0	4	I
165	*Trifolium pratense*	Red Clover	G?			SE5			L+		0	2	I
166	*Trifolium repens*	White Clover	G?			SE5			L+		0	2	I
167	*Vicia cracca*	Tufted Vetch	G?			SE5			L+		0	5	I
168	*Fagus grandifolia*	American Beech	G5			S5			L4		6	3	N
169	*Quercus alba*	White Oak	G5			S5			L2		6	3	N
170	*Quercus macrocarpa*	Bur Oak	G5			S5			L4		5	1	N
171	*Quercus rubra*	Northern Red Oak	G5			S5			L4		6	3	N
172	*Dicentra canadensis*	Squirrel-corn	G5			S5	U	U	L3		7	5	N
173	*Geranium robertianum*	Herb-robert	G5			SE5			L+?		0	5	I

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174	*Ribes americanum*	Wild Black Currant	G5			S5			L5		4	-3	N
175	*Ribes cynosbati*	Prickly Gooseberry	G5			S5			L5		4	5	N
176	*Ribes sp*	Currant Species									0	0	
177	*Elodea canadensis*	Broad Waterweed	G5			S5	U	R3	L3	L	4	-5	N
178	*Hydrophyllum virginianum*	Virginia Waterleaf	G5			S5			L5		6	-2	N
179	*Iris pseudacorus*	Yellow Iris	G?			SE3			L+		0	-5	I
180	*Iris versicolor*	Blueflag	G5			S5			L3		5	-5	N
181	*Sisyrinchium montanum*	Strict Blue-eyed-grass	G5			S5		R5	L3	L	4	-1	N
182	*Carya cordiformis*	Bitternut Hickory	G5			S5			L4		6	0	N
183	*Carya ovata var. ovata*	Shagbark Hickory	G5			S5	U		L3		6	3	N
184	*Juglans cinerea*	Butternut	G4	END	END	S4			L3		6	2	N
185	*Juncus bufonius*	Toad Rush	G5			S5			L5		1	-4	N
186	*Juncus dudleyi*	Dudley's Rush	G5			S5			L5		1	0	N
187	*Juncus effusus ssp. solutus*	Soft Rush	G5T?			S5			L4		4	-5	N
188	*Luzula acuminata*	Hairy Woodrush	G5			S5	U	U	L3		6	1	N
189	*Elscholtzia ciliata*	Ciliate Elsholtzia	G?			SE1							I
190	*Glechoma hederacea*	Ground Ivy	G?			SE5			L+		0	3	I
191	*Lycopus americanus*	American Bugleweed	G5			S5			L4		4	-5	N
192	*Lycopus europaeus*	European Bugleweed	G?			SE5			L+		0	-5	I
193	*Mentha spicata*	Spearmint	G?			SE4			L+		0	-4	I
194	*Nepeta cataria*	Catnip	G?			SE5			L+		0	1	I
195	*Scutellaria galericulata*	Hooded Skullcap	G5			S5			L5		6	-5	N
196	*Lemna minor*	Lesser Duckweed	G5			S5			L5		2	-5	N
197	*Allium tricoccum*	Wild Leek	G5			S5			L3		7	2	N
198	*Asparagus officinalis*	Asparagus	G5?			SE5			L+		0	3	I
199	*Convallaria majalis*	European Lily-of-the-valley	G5			SE5			L+		0	5	I
200	*Erythronium americanum ssp. americanum*	Yellow Trout-lily	G5T5			S5			L5		5	5	N
201	*Hemerocallis fulva*	Orange Daylily	G?			SE5			L+		0	5	I
202	*Lilium michiganense*	Michigan Lily	G5			S5	U	U	L3		7	-1	N
203	*Maianthemum canadense*	Wild-lily-of-the-valley	G5			S5			L4		5	0	N
204	*Maianthemum racemosum ssp. racemosum*	False Solomon's Seal	G5T			S5			L5		4	3	N
205	*Maianthemum stellatum*	Starflower False Solomon's Seal	G5			S5			L5		6	1	N
206	*Polygonatum pubescens*	Downy Solomon's Seal	G5			S5			L3		5	5	N
207	*Scilla siberica*	Squill	G?			SE2			L+		0	5	I
208	*Streptopus lanceolatus var. roseus*	Rosy Twisted-stalk	G5			S5			L3		7	0	N
209	*Trillium erectum*	Red Trillium	G5			S5			L3		6	1	N
210	*Trillium grandiflorum*	White Trillium	G5			S5			L3		5	5	N
211	*Uvularia grandiflora*	Large-flowered Bellwort	G5			S5			L3		6	5	N
212	*Linum usitatissimum*	Common Flax	G?			SE3			L+		0	5	I
213	*Lythrum salicaria*	Slender-spike Loosestrife	G5			SE5			L+		0	-5	I
214	*Althaea officinalis*	Common Marsh-mallow	G?			SE1			L+		0	0	I
215	*Malva moschata*	Musk Mallow	G?			SE5			L+		0	5	I
216	*Monotropa uniflora*	Indian-pipe	G5			S5			L3		6	3	N
217	*Fraxinus americana*	White Ash	G5			S5			L5		4	3	N

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218	*Fraxinus nigra*	Black Ash	G5			S5			L4		7	-4	N
219	*Fraxinus pennsylvanica*	Green Ash	G5			S5			L5		3	-3	N
220	*Epilobium ciliatum ssp. ciliatum*	Hairy Willow-herb	G5			S5			L5		3	3	N
221	*Epilobium coloratum*	Purple-leaf Willow-herb	G5			S5	R	R6	L4	R/L	3	-5	N
222	*Epilobium sp*	Willow-herb Species									0	0	
223	*Epifagus virginiana*	Beechdrops	G5			S5			L4		6	5	N
224	*Oxalis stricta*	Upright Yellow Wood Sorrel	G5			S5			L+?		0	3	N
225	*Picea abies*	Norway Spruce	G?			SE3			L+		0	5	I
226	*Picea glauca*	White Spruce	G5			S5		R3	L3	L	6	3	N
227	*Pinus strobus*	Eastern White Pine	G5			S5			L4		4	3	N
228	*Pinus sylvestris*	Scotch Pine	G?			SE5			L+		0	5	I
229	*Tsuga canadensis*	Eastern Hemlock	G5			S5			L4		7	3	N
230	*Plantago lanceolata*	English Plantain	G5			SE5			L+		0	0	I
231	*Plantago major*	Nipple-seed Plantain	G5			SE5			L+		0	-1	I
232	*Plantago rugelii*	Black-seed Plantain	G5			S5			L5		1	0	N
233	*Agrostis stolonifera*	Spreading Bentgrass	G5			S5			L+?		0	-3	N
234	*Avena sativa*	Cultivated Oat	G?			SE3			L+		0	5	I
235	*Briza media*	Perennial Quaking Grass	G?			SE1			L+		0	0	I
236	*Bromus erectus*	Meadow Brome	G?			SE1					0	5	I
237	*Bromus inermis ssp. inermis*	Smooth Brome	G4G5T?			SE5			L+		0	5	I
238	*Bromus japonicus*	Japanese Brome	G?			SE4			L+		0	3	I
239	*Cinna arundinacea*	Stout Wood Reedgrass	G5			S4	R	R3	L3	R/L	7	-3	N
240	*Cinna latifolia*	Slender Wood Reedgrass	G5			S5	U	R4	L3	L	7	-4	N
241	*Dactylis glomerata*	Orchard Grass	G?			SE5			L+		0	3	I
242	*Deschampsia caespitosa*	Tufted Hairgrass	G5T?			SE2					0	-4	I
243	*Elymus hystrix*	Bottle-brush Grass	G5			S5			L4		5	5	N
244	*Elymus repens*	Quack Grass	G?			SE5			L+		0	3	I
245	*Elymus riparius*	River-bank Wild-rye	G5			S4?	R	R3	L4	R/L	7	-3	N
246	*Elymus virginicus var. virginicus*	Virginia Wild-rye	G5T?			S5			L5		5	-2	N
247	*Eragrostis sp*	Love Grass Species									0	0	
248	*Festuca rubra ssp. rubra*	Red Fescue	G5T4			S5			L+		0	1	N
249	*Glyceria striata*	Fowl Manna Grass	G5			S5			L5		3	-5	N
250	*Hordeum jubatum ssp. jubatum*	Fox-tail Barley	G5T?			SE5			L+		0	-1	I
251	*Leersia virginica*	White Cutgrass	G5			S4	R	R4	L4	R/L	6	-3	N
252	*Lolium perenne*	Perennial Ryegrass	G?			SE4			L+		0	3	I
253	*Oryzopsis asperifolia*	White-grained Mountain Ricegrass	G5			S5			L3		6	5	N
254	*Phalaris arundinacea*	Reed Canary Grass	G5			S5			L+?		0	-4	N
255	*Phragmites australis*	Common Reed	G5			S5			L+?		0	-4	N
256	*Poa nemoralis*	Woods Bluegrass	G5			SE3			L+		0	0	I
257	*Setaria viridis*	Green Bristle Grass	G?			SE5			L+		0	5	I
258	*Polygonum amphibium*	Water Smartweed	G5			S5		U	L3		5	-5	N
259	*Polygonum lapathifolium*	Dock-leaf Smartweed	G5			S5			L5		2	-4	N
260	*Rumex crispus*	Curly Dock	G?			SE5			L+		0	-1	I
261	*Claytonia caroliniana*	Carolina Spring Beauty	G5			S5	U	R5	L3	L	7	3	N

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262	*Claytonia virginica*	Narrow-leaved Spring Beauty	G5			S5			L3		5	3	N
263	*Potamogeton natans*	Floating Pondweed	G5			S5	U	U	L3		5	-5	N
264	*Stuckenia vaginatus*	Sheathed Pondweed	G5			S5					8	-5	N
265	*Lysimachia ciliata*	Fringed Loosestrife	G5			S5			L5		4	-3	N
266	*Lysimachia nummularia*	Moneywort	G?			SE5			L+		0	-4	I
267	*Prenanthes sp*	Rattlesnake-root Species									0	0	
268	*Actaea pachypoda*	White Baneberry	G5			S5			L4		6	5	N
269	*Actaea rubra*	Red Baneberry	G5			S5			L5		5	5	N
270	*Anemone canadensis*	Canada Anemone	G5			S5			L5		3	-3	N
271	*Anemone quinquefolia var. quinquefolia*	Wood Anemone	G5			S5	U		L3		7	0	N
272	*Anemone virginiana var. cylindroidea*	Thimbleweed	G5T			SU			L5			0	N
273	*Caltha palustris*	Marsh Marigold	G5			S5			L4		5	-5	N
274	*Ranunculus abortivus*	Kidney-leaved Buttercup	G5			S5			L5		2	-2	N
275	*Ranunculus acris*	Tall Buttercup	G5			SE5			L+		0	-2	I
276	*Ranunculus repens*	Creeping Buttercup	G?			SE5			L+		0	-1	I
277	*Ranunculus sceleratus var. sceleratus*	Cursed Crowfoot	G5T5			S5			L5		2	-5	N
278	*Thalictrum dioicum*	Early Meadowrue	G5			S5			L5		5	2	N
279	*Rhamnus cathartica*	Buckthorn	G?			SE5			L+		0	3	I
280	*Amelanchier laevis*	Smooth Serviceberry	G4G5Q			S5	U	U	L4		5	5	N
281	*Crataegus monogyna*	English Hawthorn	G5			SE5			L+		0	5	I
282	*Crataegus punctata*	Dotted Hawthorn	G5			S5			L5		4	5	N
283	*Crataegus sp*	Hawthorn Species									0	0	
284	*Fragaria vesca ssp. americana*	Woodland Strawberry	G5T?			S5			L5		4	4	N
285	*Fragaria virginiana ssp. virginiana*	Virginia Strawberry	G5T?			SU			L5		2	1	N
286	*Geum laciniatum*	Rough Avens	G5			S4	U		L4		4	-3	N
287	*Geum aleppicum*	Yellow Avens	G5			S5			L5		2	-1	N
288	*Geum canadense*	White Avens	G5			S5			L5		3	0	N
289	*Geum sp*	Avens Species									0	0	
290	*Geum urbanum*	Clover-root	G5			SE2			L+		0	5	I
291	*Malus pumila*	Common Apple	G5			SE5			L+		0	5	I
292	*Potentilla argentea*	Silvery Cinquefoil	G?			SE5			L+		0	3	I
293	*Potentilla norvegica ssp. norvegica*	Norway Cinquefoil	G5T?			SU			L+?				I
294	*Potentilla recta*	Sulphur Cinquefoil	G?			SE5			L+		0	5	I
295	*Prunus serotina*	Wild Black Cherry	G5			S5			L5		3	3	N
296	*Prunus virginiana var. virginiana*	Choke Cherry	G5T?			S5			L5		2	1	N
297	*Rosa canina*	Dog Rose	G?			SE2			L+		0	5	I
298	*Rubus allegheniensis*	Allegheny Blackberry	G5			S5			L5		2	2	N
299	*Rubus caesius*	European Dewberry	G5			SEH							I
300	*Rubus idaeus ssp. strigosus*	Wild Red Raspberry	G5T			S5			L5		0	-2	N
301	*Rubus occidentalis*	Black Raspberry	G5			S5			L5		2	5	N
302	*Rubus pubescens*	Dwarf Raspberry	G5			S5			L4		4	-4	N
303	*Spiraea alba*	Narrow-leaved Meadow-sweet	G5			S5			L3		3	-4	N
304	*Waldsteinia fragarioides*	Barren Strawberry	G5			S5			L4		5	5	N
305	*Asperula arvensis*	Field Woodruff	G5			SEH							I

No.	Scientific Name	Common Name	Conservation Status								CC	CW	Native Status
			Global	National	Provincial		Regional	Local					
			GRank	COSEWIC	MNR	SRank	GTA	Peel	TRCA	CVC			
306	*Galium palustre*	Marsh Bedstraw	G5			S5			L4		5	-5	N
307	*Galium sp*	Bedstraw Species									0	0	
308	*Populus deltoides ssp. deltoides*	Eastern Cottonwood	G5T?			SU			L5				N
309	*Populus grandidentata*	Large-tooth Aspen	G5			S5			L4		5	3	N
310	*Populus tremuloides*	Quaking Aspen	G5			S5			L5		2	0	N
311	*Populus X canadensis*	Carolina Poplar	HYB			SE1			L+				
312	*Salix lucida*	Shining Willow	G5			S5	U	R5	L3	L	5	-4	N
313	*Salix alba*	White Willow	G5			SE4			L+		0	-3	I
314	*Salix amygdaloides*	Peach-leaved Willow	G5			S5		R6	L4	L	6	-3	N
315	*Salix bebbiana*	Bebb's Willow	G5			S5			L4		4	-4	N
316	*Salix discolor*	Pussy Willow	G5			S5			L4		3	-3	N
317	*Salix eriocephala*	Heart-leaved Willow	G5			S5			L5		4	-3	N
318	*Salix exigua*	Sandbar Willow	G5			S5		R5	L5	L	3	-5	N
319	*Salix fragilis*	Crack Willow	G?			SE5			L+		0	-1	I
320	*Salix X rubens*	Reddish Willow	HYB			SE4			L+		0	-4	I
321	*Salix X sepulcralis*	Hybrid Willow	HYB			SE2			L+				
322	*Tiarella cordifolia*	Heart-leaved Foam-flower	G5			S5			L4		6	1	N
323	*Chelone glabra*	Turtlehead	G5			S5	U	U	L3		7	-5	N
324	*Linaria vulgaris*	Butter-and-eggs	G?			SE5			L+		0	5	I
325	*Verbascum thapsus*	Common Mullein	G?			SE5			L+		0	5	I
326	*Veronica officinalis*	Common Speedwell	G5			SE5			L+		0	5	I
327	*Solanum dulcamara*	Climbing Nightshade	G?			SE5			L+		0	0	I
328	*Sparganium eurycarpum*	Large Bur-reed	G5			S5	U	R6	L3	L	3	-5	N
329	*Tilia americana*	American Basswood	G5			S5			L5		4	3	N
330	*Typha angustifolia*	Narrow-leaved Cattail	G5			S5			L+		3	-5	N
331	*Typha latifolia*	Broad-leaf Cattail	G5			S5			L4		3	-5	N
332	*Typha X glauca*	Blue Cattail	HYB			S4?			L+		3	-5	N
333	*Ulmus americana*	American Elm	G5?			S5			L5		3	-2	N
334	*Ulmus glabra*	Wych Elm	G?			SE1			L+				I
335	*Boehmeria cylindrica*	False Nettle	G5			S5			L4		4	-5	N
336	*Laportea canadensis*	Wood Nettle	G5			S5			L5		6	-3	N
337	*Urtica dioica ssp. dioica*	Stinging Nettle	G5T?			SE2			L+		0	-1	I
338	*Verbena urticifolia*	White Vervain	G5			S5			L5		4	-1	N
339	*Viola affinis*	Lecontes Violet	G5			S4?	U	R3	L3		6	-3	N
340	*Viola conspersa*	American Bog Violet	G5			S5			L5		4	-2	N
341	*Viola pubescens*	Downy Yellow Violet	G5			S5			L5		5	4	N
342	*Viola sororia*	Woolly Blue Violet	G5			S5			L5		4	1	N
343	*Parthenocissus vitacea*	Thicket Creeper	G5			S5			L5		3	3	N
344	*Vitis riparia*	Riverbank Grape	G5			S5			L5		0	-2	N

APPENDIX H-4: Explanation of Plant Conservation Status Ranks, and Native Status

Global Conservation Status (Natureserve 2014)

G1 = **Critically Imperiled**—At very high risk of extinction due to extreme rarity (often 5 or fewer populations), very steep declines, or other factors.
G2 = **Imperiled**—At high risk of extinction due to very restricted range, very few populations (often 20 or fewer), steep declines, or other factors.
G3 = **Vulnerable**—At moderate risk of extinction due to a restricted range, relatively few populations (often 80 or fewer), recent and widespread declines, or other factors.
G4 = **Apparently Secure**—Uncommon but not rare; some cause for long-term concern due to declines or other factors.
G5 = **Secure**—Common; widespread and abundant.
HYB = **Hybrid**
G#G# = Range Rank—A numeric range rank (e.g., G2G3) is used to indicate the range of uncertainty in the status of a species or community. Ranges cannot skip more than one rank (e.g., GU should be used rather than G1G4).
GU = **Unrankable**—-Currently unrankable due to lack of information or due to substantially conflicting information about status or trends. Whenever possible, the most likely rank is assigned and the question mark qualifier is added (e.g., G2?) to express uncertainty, or a range rank (e.g., G2G3) is used to delineate the limits (range) of uncertainty.
GNR = **Unranked**—Global rank not yet assessed.
GNA = **Not Applicable**—A conservation status rank is not applicable because the species is not a suitable target for conservation activities.
? = **Inexact Numeric Rank**—Denotes inexact numeric rank (e.g., G2?)
Q = **Questionable taxonomy**—Taxonomic distinctiveness of this entity at the current level is questionable; resolution of this uncertainty may result in change from a species to a subspecies or hybrid, or the inclusion of this taxon in another taxon, with the resulting taxon having a lower-priority conservation priority.
C = **Captive or Cultivated Only**—At present extant only in captivity or cultivation, or as a reintroduced population not yet established.
T# = **Infraspecific Taxon** (trinomial)—The status of infraspecific taxa (subspecies or varieties) are indicated by a "T-rank" following the species' global rank. Rules for assigning T-ranks follow the same principles outlined above for global conservation status ranks. For example, the global rank of a critically imperiled subspecies of an otherwise widespread and common species would be G5T1. A T-rank cannot imply the subspecies or variety is more abundant than the species as a whole-for example, a G1T2 cannot occur. A vertebrate animal population, such as those listed as distinct population segments under under the U.S. Endangered Species Act, may be considered an infraspecific taxon and assigned a T-rank; in such cases a Q is used after the T-rank to denote the taxon's informal taxonomic status.

Federal Conservation Status (COSEWIC 2014)

Wildlife Species – A species, subspecies, variety, or geographically or genetically distinct population of animal, plant or other organism, other than a bacterium or virus, that is wild by nature and it is either native to Canada or has extended its range into Canada without human intervention and has been present in Canada for at least 50 years.
X = **Extinct** – A wildlife species that no longer exists.
XT = **Extirpated** – A wildlife species that no longer exists in the wild in Canada, but occuring elsewhere.
END = **Endangered** – A wildlife species facing imminent extirpation or extinction.
THR = **Threatened** – A wildlife species that is likely to become endangered if nothing is done to reverse the factors leading to its extirpation or extinction.
SC = **Special Concern** – A wildlife species that may become threatened or endangered because of a combination of biological characteristics and identified threats.
NAR = **Not at Risk** – A wildlife species that has been evaluated and found to be not at risk of extinction given the current circumstances
DD = **Data Deficient** – A category that applies when the available information is insufficient (a) to resolve a wildlife species' eligibility for assessment or (b) to permit an assessment of the wildlife species' risk of extinction.

Provincial Conservation Status (OMNRF 2014)

EXT = Extinct. Any species formerly native to Ontario that no longer exists.
EXP = Extirpated. Lives somewhere in the world, and at one time lived in the wild in Ontario, but no longer lives in the wild in Ontario.
END = Endangered. Lives in the wild in Ontario but is facing imminent extinction or extirpation
THR = Threatened. Lives in the wild in Ontario, is not endangered, but is likely to become endangered if steps are not taken to address factors threatening it.
SC = Special Concern. Lives in the wild in Ontario, is not endangered or threatened, but may become threatened or endangered due to a combination of biological characteristics and identified threats.
NAR = Not at Risk. A species that has been evaluated and found to be not at risk.
DD = Data Deficient. A species for which there is insufficient information for a provincial status recommendation.

Subnational Rank – SRANK (NHIC 2014)

Provincial (or Subnational) ranks are used by the Natural Heritage Information Centre to set protection priorities for rare species and natural communities. These ranks are not legal designations. Provincial ranks are assigned in a manner similar to that described for global ranks, but consider only those factors within the political boundaries of Ontario. By comparing the global and provincial ranks, the status, rarity, and the urgency of conservation needs can be ascertained. The NHIC evaluates provincial ranks on a continual basis and produces updated lists at least annually. The NHIC welcomes information which will assist in assigning accurate provincial ranks.

SX **Presumed Extirpated**—Species or community is believed to be extirpated from the nation or state/province. Not located despite intensive searches of historical sites and other appropriate habitat, and virtually no likelihood that it will be rediscovered.
SH **Possibly Extirpated (Historical)**—Species or community occurred historically in the nation or state/province, and there is some possibility that it may be rediscovered. Its presence may not have been verified in the past 20-40 years. A species or community could become NH or SH without such a 20-40 year delay if the only known occurrences in a nation or state/province were destroyed or if it had been extensively and unsuccessfully looked for. The NH or SH rank is reserved for species or communities for which some effort has been made to relocate occurrences, rather than simply using this status for all elements not known from verified extant occurrences.
S1 **Critically Imperiled**—Critically imperiled in the nation or state/province because of extreme rarity (often 5 or fewer occurrences) or because of some factor(s) such as very steep declines making it especially vulnerable to extirpation from the state/province.
S2 **Imperiled**—Imperiled in the nation or state/province because of rarity due to very restricted range, very few populations (often 20 or fewer), steep declines, or other factors making it very vulnerable to extirpation from the nation or state/province.
S3 **Vulnerable**—Vulnerable in the nation or state/province due to a restricted range, relatively few populations (often 80 or fewer), recent and widespread declines, or other factors making it vulnerable to extirpation.
S4 **Apparently Secure**—Uncommon but not rare; some cause for long-term concern due to declines or other factors.
S5 **Secure**—Common, widespread, and abundant in the nation or state/province.
SNR **Unranked**—Nation or state/province conservation status not yet assessed.
SU **Unrankable**—Currently unrankable due to lack of information or due to substantially conflicting information about status or trends.
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 or community. Ranges cannot skip more than one rank (e.g., SU is used rather than S1S4).

Distribution and Status of the Vascular Plants of the Greater Toronto Area (Varga *et al*., 2005)

Plant Station
A plant station or location is defined as a 1 km radius around the occurrence. Plant rarity is based on the number of stations for a native plant species. A variable cut-off is used for the number of stations based on the size of the municipality or site district and by the intensity of fieldwork that has been carries out in the area. Native species that

are restricted to specialized rare habitats covering less than 1% of the GTA are given rarity status even when their number of stations exceeds the cut-off.

Species Status
R –rare native species
R^x – x is the number of stations for a rare native species
U – uncommon native species
E – extirpated native species
H – historical species not seen since 1950, however its habitat is still present
SR – species record based on a sight record (all other species based on herbarium collections)
LR – species record based on a literature record.

GTA (Greater Toronto Area) Status
The GTA includes the Regions of Halton, Peel, the City of Toronto, and the Regions of York and Durham. Rare (R) species in the GTA occur at 40 or fewer stations; Uncommon (U) species occur at 41 to 80 stations.

Regional Municipality of Peel
A rare (R) species occurs at 10 or fewer stations and an uncommon (U) species at 11 to 20 stations.

Toronto and Region Conservation Authority Rank (TRCA 2008)

L5 = Able to withstand high levels of disturbance; generally secure throughout the jurisdiction, including the urban matrix. May be of very localized concern in highly degraded areas.
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; 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; generally occur in high-quality natural areas in natural matrix; almost certainly rare in the TRCA jurisdiction; of concern regionally.

Credit Valley Conservation Rank (Kaiser 2001)

R = regionally (GTA) rare
P = provincially rare
L = locally rare
E = endangered
S = special concern

Coefficient of Conservatism (Oldham *et al.* 1995)

CC = Coefficient of Conservatism. CC is a value (0 to 10) assigned to native species in Ontario based on its degree of fidelity to a specific vegetation community type. The lower this value, the more likely the plant is to be found in a wide variety of plant community types including disturbed sites. The presence of plants with a coefficient of conservatism of 9 or 10 indicates later-successional native plants that have undergone only minor disturbance. Exotic species are not assigned a CC value. This calculation was based on the total number of species for which a cc value was available. Although some more conservative species are present on this site, there are many species representing disturbed conditions, leading to the lower average score

Coefficient of Wetness (Oldham *et al*. 1995)

CW = Coefficient of Wetness. Coefficient of Wetness is a value (-5 to +5) assigned to native species in Ontario based on their affinity for wet or dry habitats. The gradient runs from obligate wetland species at -5, facultative wetland species from -4 to -2, facultative species from -1 to +1, facultative upland species from +2 to +4, and upland species at +5.

Native Status (Newmaster *et al*. 1998; Oldham *et al.* 1995)

"N" = Plant is considered native to this region.
"I" = Plant has been introduced from another region.

REFERENCES

Bakowsky, W. D. 1996. Natural Heritage Resources of Ontario: Vegetation communities of southern Ontario. Natural Heritage Information Centre, Ontario Ministry of Natural Resources, Peterborough, Ontario. 21 pp.

COSEWIC (Committee on the Status of Endangered Wildlife in Canada). 2014. Canadian Wildlife Species at Risk. October 2014. Committee on the Status of Endangered Wildlife in Canada. Web site: http://www.cosewic.gc.ca/eng/sct0/rpt/rpt_csar_e.cfm [accessed 17 November 2014]

Kaiser, J. 2001. The Vascular Plant Flora of the Region of Peel and the Credit Watershed. Credit Valley Conservation. Meadowvale, Ont.

Natureserve. 2014. Natureserve Explorer Global Conservation Status Definitions. http://explorer.natureserve.org/granks.htm

Newmaster, S.G., A. Lehela, P.W.C. Uhlig, S. McMurray and M.J.Oldham. 1998. Ontario Plant List. Ontario Ministry of Natural Resources, Ontario Forest Research Institute, Sault Ste. Marie, Ontario, Forest Research Information Paper No. 123, 550 pp. + appendices.

NHIC (Natural Heritage Information Centre). 2014. NHIC Species Lists. Available at: http://www.mnr.gov.on.ca/en/Business/NHIC/2ColumnSubPage/STDU_138223.html

Oldham, M.J., W.D. Bakowsky, and **D.A. Sutherland. 1995.** Floristic Quality Assessment System for Southern Ontario. Natural Heritage Information Center, OMNR (Ontario Ministry of Natural Resources). Peterborough, Ontario. 69 pp.

OMNRF (Ontario Ministry of Natural Resources). 2014. Species at Risk in Ontario List (updated June 27, 2014). Available at: http://www.mnr.gov.on.ca/en/Business/Species/2ColumnSubPage/MNR_SAR_CSSR_SARO_LST_EN.html [accessed July 25, 2014] and categories of at risk status http://www.ontario.ca/environment-and-energy/classifying-species-risk#section-3.

TRCA (Toronto and Region Conservation Authority). **2008.** List of Vascular Plant Species Ranks.

Varga, S., D. Leadbeater, J. Webber, J. Kaiser, B. Crins, J. Kamstra, D. Banville, E. Ashley, G. Miller, C. Kingsley, C. Jacobsen, K. Mewa, L. Tebby, E. Mosley and **E. Zajc. 2005.** Distribution and Status of the Vascular Plants of the Greater Toronto Area. OMNR, Aurora District.

Appendix D

Birds of the MW2-3 Study Area

Appendix C_Breeding Birds Mayfield West Study Area

Common Name	Scientific Name	Status				
		National Species at Risk COSEWIC [a]	Species at Risk in Ontario Listing [a]	Provincial breeding season SRANK [b]	TRCA Status	Area-sensitive (OMNR) [c]
Great Blue Heron	*Ardea herodias*			S4	L3	
Green Heron	*Butorides virescens*			S4	L4	
Wood Duck	*Aix sponsa*			S5	L4	
Mallard	*Anas platyrhynchos*			S5	L5	
Turkey Vulture	*Cathartes aura*			S5	L5	
Red-tailed Hawk	*Buteo jamaicensis*			S5	L5	
American Kestrel	*Falco sparverius*			S4	L4	
Killdeer	*Charadrius vociferus*			S5	L4	
Upland Sandpiper	*Bartramia longicauda*			S4	LX	A
American Woodcock	*Scolopax minor*			S4	L3	
Ring-billed Gull	*Larus delawarensis*			S5	L4	
Rock Pigeon	*Columba livia*			SE	L+	
Mourning Dove	*Zenaida macroura*			S5	L5	
Black-billed Cuckoo	*Coccyzus erythropthalmus*			S	L3	
Yellow-billed Cuckoo	*Coccyzus americanus*			S4	L3	
Great Horned Owl	*Bubo virginianus*			S4	L4	
Eastern Screech-Owl	*Megascops asio*			S4	L3	
Short-eared Owl	*Asio flammeus*	THR	THR	S4	LX	A
Belted Kingfisher	*Ceryle alcyon*			S4	L4	
Red-bellied Woodpecker	*Melanerpes carolinus*			S4	L4	
Downy Woodpecker	*Dryobates pubescens*			S5	L5	
Hairy Woodpecker	*Dryobates villosus*			S5	L4	A
Northern Flicker	*Colaptes auratus*			S4	L4	
Pileated Woodpecker	*Dryocopus pileatus*			S5	L3	A
Eastern Wood-Pewee	*Contopus virens*	SC	SC	S4	L4	
Willow Flycatcher	*Empidonax traillii*			S5	L4	
Eastern Phoebe	*Sayornis phoebe*			S5	L5	
Great Crested Flycatcher	*Myiarchus crinitus*			S4	L4	
Eastern Kingbird	*Tyrannus tyrannus*			S4	L4	
Horned Lark	*Eremophila alpestris*			S5	L3	
Tree Swallow	*Tachycineta bicolor*			S4	L4	
Cliff Swallow	*Petrochelidon pyrrhonota*			S4	L5	
Barn Swallow	*Hirundo rustica*	SC	SC	S4	L4	
Blue Jay	*Cyanocitta cristata*			S5	L5	
American Crow	*Corvus brachyrhynchos*			S5	L5	
Black-capped Chickadee	*Poecile atricapillus*			S5	L5	
Red-breasted Nuthatch	*Sitta canadensis*			S5	L4	A
White-breasted Nuthatch	*Sitta carolinensis*			S5	L4	A
House Wren	*Troglodytes aedon*			S5	L5	
Winter Wren	*Troglodytes hiemalis*			S5	L3	A
Sedge Wren	*Cistothorus stellaris*			S4	L3	
Wood Thrush	*Hylocichla mustelina*	THR	SC	S4	L3	
American Robin	*Turdus migratorius*			S5	L5	
Gray Catbird	*Dumetella carolinensis*			S4	L4	
Brown Thrasher	*Toxostoma rufum*			S4	L3	
American Pipit	*Anthus rubescens*			S4		
Cedar Waxwing	*Bombycilla cedrorum*			S5	L5	
European Starling	*Sturnus vulgaris*			SE	L+	
Warbling Vireo	*Vireo gilvus*			S5	L5	

Common Name	Scientific Name	Status				
		National Species at Risk COSEWIC [a]	Species at Risk in Ontario Listing [a]	Provincial breeding season SRANK [b]	TRCA Status	Area-sensitive (OMNR) [c]
Red-eyed Vireo	*Vireo olivaceus*			S5	L4	
Yellow Warbler	*Setophaga petechia*			S5	L5	
American Redstart	*Setophaga ruticilla*			S5	L4	A
Ovenbird	*Seiurus aurocapilla*			S4	L2	A
Mourning Warbler	*Geothlypis philadelphia*			S4	L3	
Common Yellowthroat	*Geothlypis trichas*			S5	L4	
Northern Cardinal	*Cardinalis cardinalis*			S5	L5	
Rose-breasted Grosbeak	*Pheucticus ludovicianus*			S4	L4	
Indigo Bunting	*Passerina cyanea*			S4	L4	
Chipping Sparrow	*Spizella passerina*			S5	L5	
Vesper Sparrow	*Pooecetes gramineus*			S4	L3	
Savannah Sparrow	*Passerculus sandwichensis*			S4	L4	A
Grasshopper Sparrow	*Ammodramus savannarum*	SC	SC	S4	L2	A
Song Sparrow	*Melospiza melodia*			S5	L5	
Swamp Sparrow	*Melospiza georgiana*			S5	L4	
White-throated Sparrow	*Zonotrichia albicollis*			S5	L3	
Bobolink	*Dolichonyx oryzivorus*	THR	THR	S4	L2	A
Red-winged Blackbird	*Agelaius phoeniceus*			S4	L5	
Eastern Meadowlark	*Sturnella magna*	THR	THR	S4	L3	A
Common Grackle	*Quiscalus quiscula*			S5	L5	
Brown-headed Cowbird	*Molothrus ater*			S5	L5	
Baltimore Oriole	*Icterus galbula*			S4	L5	
American Goldfinch	*Spinus tristis*			S5	L5	

Appendix E

Species At Risk Screening

Appendix D_Species at Risk Screening

NAME	SARA STATUS	SARO	COSEWIC	SCHEDULE	S-RANK	HABITAT REQUIREMENTS	SOURCE OF RECORD	HABITAT PRESENT (Y/P/N)	RATIONALE	POTENTIAL IMPACTS AND MITIGATION
AVIFAUNA										
Bank Swallow (*Riparia riparia*)	THR	THR	THR	1	S4B	The Bank Swallow is threatened by loss of breeding and foraging habitat, destruction of nesting habitat and widespread pesticide use. Bank swallows are small songbirds with brown upperparts, white underparts and a distinctive dark breast band. It averages 12 cm long and weighs between 10 and 18 grams. The swallow can be distinguished in flight from other swallows by its quick, erratic wing beats and its almost constant buzzy, chattering vocalizations. They nest in burrows in natural and human-made settings where there are vertical faces in silt and sand deposit, including banks of rivers and lakes, active sand and gravel pits or former ones where the banks remain suitable. The birds breed in colonies ranging from several to a few thousand pairs (Ministry of Natural Resources and Forestry, 2014).	NHIC, OBBA	P	Recorded by Dougan and Associates in the general area.	Potential river banks are protected within NHS
Barn Swallow (*Hirundo rustica*)	THR	SC	SC	1	S4B	The Barn Swallow is a threatened species, is found throughout southern Ontario, and can range into the north as long as suitable nesting locations can be found. These birds prefer to nest within human made structures such as barns, bridges, and culverts. Barn Swallow nests are cup-shaped and made of mud; they are typically attached to horizontal beams or vertical walls underneath an overhang. A significant decline in populations of this species has been documented since the mid-1980s, which is thought to be related to a decline in prey. Since the Barn Swallow is an aerial insectivore, this species relies on the presence of flying insects at specific times during the year. Changes in building practices and materials may also be having an impact on this species (Ministry of Natural Resources and Forestry, 2015).	OBBA	Y	Recorded by AMEC during breeding bird surveys within the Study Area	Any proposed removal of structure with nests to be completed outsdie of the active season with potential compensation
Bobolink (*Dolichonyx oryzivorus*)	THR	THR	THR	1	S4B	The Bobolink is found in grasslands and hayfields, and feeds and nests on the ground. This species is widely distributed across most of Ontario; however, are designated at risk because of rapid population decline over the last 50 years (Ministry of Natural Resources and Forestry, 2014). The historical habitat of the bobolink was tallgrass prairie and other natural open meadow communities; however, as a result of the clearing of native prairies and the post-colonial increase in agriculture, bobolinks are now widely found in hayfields. Due to their reproductive cycle, nesting habits, and use of agricultural areas, bobolink nests and young are particularly vulnerable to loss as a result of common agricultural practices (i.e. first cut hay).	NHIC, OBBA	Y	Recorded by AMEC during breeding bird surveys within the Study Area	Vegetation clearing and tree removals is recommended to occur outside the breeding bird nesting window from April 1st to August 31st. Potential compensation under the ESA.

Chimney Swift (*Chaetura pelagica*)	THR	THR	THR	1	S4B,S4N	The Chimney Swift is a threatened species which breeds in Ontario and winters in northwestern South America. It is found mostly near urban areas where the presence of chimneys or other manmade structures provide nesting and roosting habitat. Prior to settlement, the Chimney Swift would mainly nest in cave walls and hollow tress. The Chimney Swift initially benefitted from human settlement; however, recent declines in flying insects and the modernization of chimneys are factors attributed to their current population declines. As a threatened species, the Chimney Swift receives protection for both species and habitat under the ESA (Ministry of Natural Resources and Forestry, 2014).	OBBA	P	Recorded by Dougan and Associates in the general area.	Further study is required.
Common Nighthawk (*Chordeiles minor*)	SC	SC	SC	1	S4B	The Common Nighthawk is an extremely well camouflaged bird that inhabits gravel beaches, rock outcrops and burned woodlands, that have little to no ground vegetation. This species can also be found in highly disturbed locations such as clear cuts, mine tailings areas, cultivated fields, urban parks, gravel roads, and orchards. As an insectivore, the primary threat to this species is the widespread application of pesticides (Ministry of Natural Resources and Forestry, 2015). Special concern species do not receive habitat protection under the ESA.	OBBA	P	Recorded by Dougan and Associates in the general area.	Vegetation clearing and tree removals is recommended to occur outside the breeding bird nesting window from April 1st to August 31st.
Eastern Meadowlark (*Sturnella magna*)	THR	THR	THR	1	S4B	The Eastern Meadowlark is a bird that prefers pastures and hayfields, but is also found to breed in orchards, shrubby fields and human use areas such as airports and roadsides. Eastern meadowlarks can nest from early May to mid-August, in nests that are built on the ground and well-camouflaged with a roof woven from grasses. The decline in population of these species is thought to be at least partially related to habitat destruction and agricultural practices (Ministry of Natural Resources and Forestry, 2014).	NHIC, OBBA	Y	Recorded by AMEC during breeding bird surveys within the Study Area	Vegetation clearing and tree removals is recommended to occur outside the breeding bird nesting window from April 1st to August 31st. Potential compensation under the ESA.
Eastern Wood-Pewee (*Contopus virens*)	SC	SC	SC	1	S4B	The Eastern Wood-pewee is classified as a species of special concern by COSSARO. Their population has been gradually declining since the mid-1960's (The Cornell Lab of Ornithology, 2015). The Eastern Wood-pewee is a "flycatcher", a bird that eats flying insects, that lives in the mid-canopy layer of forest clearings and edges of deciduous and mixed forests. It prefers intermediate-age forest stands with little understory vegetation. Threats to the population are largely unknown; however, causes may include loss of habitat due to urban development and decreases in the availability of flying insect prey (Ministry of Natural Resources and Forestry, 2014).	NHIC, OBBA	Y	Recorded by AMEC during breeding bird surveys within the Study Area	Vegetation clearing and tree removals is recommended to occur outside the breeding bird nesting window from April 1st to August 31st.
Grasshopper Sparrow (*Ammodramus savannarum*)	SC	SC	SC	o Schedu	S4B	Grasshopper Sparrow are specialized to open relatively short grassland habitat, preferably grasslands with relatively sparse cover such as those in areas of poor soils, including alvars, moraines, and sand plains and generally does not favour tall grass moist meadows. It will also breed in manmade hayfields and occasionally in cereals such as Rye (*Secale cereale*).	NHIC, OBBA	Y	Recorded by AMEC during breeding bird surveys within the Study Area	Vegetation clearing and tree removals is recommended to occur outside the breeding bird nesting window from April 1st to August 31st.

Red-headed Woodpecker (*Melanerpes erythrocephalus*)	END	END	END	1	S4B	The Red-headed Woodpecker is a medium-sized bird, with black and white colouring and a bright red head, neck, and breast. Adults often return to the same nesting site year after year. Between May and June, adults often return to the same nesting site and females lay from three to seven eggs. Habitat for the birds includes open woodland and woodland edges, often near man-made landscapes such as parks, golf courses and cemeteries. The red-headed woodpecker is widespread across southern Ontario but rare (Ministry of Natural Resource and Forestry, 2014).	OBBA	P	Recorded by Dougan and Associates in the general area.	Habitat protection under the ESA
Short-eared Owl (*Asio flammeus*)	SC	THR	THR	1	S2N,S4B	The Short-eared Owl is a medium-sized owl with a brown back, light coloured chest, and visible feather tufts on the round head that can be mistaken for small ears. This well-camouflaged bird is mostly seen during flight when the long wings and short tail are readily apparent. The short-eared owl is found in scattered pockets across the province where suitable open habitat, including grassland, tundra and marsh, can be found in sufficient quantities. Adults build nests on the ground in grassy areas and feed primarily at dawn and dusk on rodents and other small mammals in the surrounding area. Habitat loss is currently the greatest threat to the recovery of this species as prairie, savannah, and marsh ecosystems are modified or developed. Intensive grazing and early harvesting on farmlands can also affect this species by exposing or destroying nests during breeding season (Ontario Ministry of Natural Resources and Forestry, 2015).	Previous professional record	Y	Recorded as an incidental by Dougan & Associates within the Study Area	Further study is required.
Wood Thrush (*Hylocichla mustelina*)	THR	SC	THR	1	S4B	The Wood Thrush is a species of Special Concern because of habitat degradation or destruction by anthropogenic development. The Wood Thrush is a medium-sized songbird, generally rusty-brown on the upper parts with white under parts and large blackish spots on the breast and sides, and about 20 cm long. The Wood Thrush forages for food in leaf litter or on semi-bare ground, including larval and adult insects as well as plant material. They seek moist stands of trees with well-developed undergrowth in large mature deciduous and mixed (conifer-deciduous) forests. The Wood Thrush flies south to Mexico and Central America for the winter (Ministry of Natural Resources and Forestry, 2014).	NHIC, OBBA	Y	Recorded by AMEC during breeding bird surveys within the Study Area	Vegetation clearing and tree removals is recommended to occur outside the breeding bird nesting window from April 1st to August 31st.
HERPTILES										
Eastern Musk Turtle (*Sternotherus odoratus*)	SC	SC	SC	1	S3	The eastern musk turtle is a small freshwater turtle with a highly arched shell and a dull black-brown body. These turtles are found primarily in slow moving water bodies with abundant emergent vegetation and mucky bottoms along the southern edge of the Canadian Shield. Wetland drainage and shoreline development are among the most significant contributors to the decline in the population of this species (Ministry of Natural Resources and Forestry, 2014).	ORAA 2019	N	Species not previously recorded.	None
Jefferson Salamander (*Ambystoma jeffersonianum*)	END	END	END	1	S2	Adult Jefferson Salamanders, throughout their range, are found within deciduous or mixed upland forests containing, or adjacent to, suitable breeding ponds. Breeding ponds are normally ephemeral, or vernal, woodland pools that dry in late summer. Terrestrial habitat is in mature woodlands that have small mammal burrows or rock fissures that enable adults to over-winter underground below the frost line.	ORAA 2007	N	Species not previously recorded.	None

Northern Map Turtle (*Graptemys geographica*)	SC	SC	SC	1	S3	The northern map turtle is a medium sized turtle with a carapace marked by concentric rings that resemble contour lines on a map. The range of this turtle includes larger lakes and rivers that contain an abundance of their primary prey species; molluscs. Shoreline development, water pollution and the spread of the zebra mussel are notable reasons for the decline in populations of this species (Ministry of Natural Resources and Forestry, 2014).	ORAA 2018	N	Species not previously recorded.	None
Snapping Turtle (*Chelydra serpentina*)	SC	SC	SC	1	S3	The snapping turtle is a species of special concern in Ontario due to the potential for the species to become threatened or endangered as a result of biological factors or other identified threats. While not presently protected by law, the snapping turtle has been recognized as a species of special concern by COSSARO. Snapping turtles spend the majority of their lives in water and travel slightly upland to gravel or sandy embankments or beaches to lay their eggs (Ontario Ministry of Natural Resources and Forestry, 2014).	NHIC, ORAA 2019	P	Species not previously recorded, however Etobicoke Creek may provide suitable movement habitat.	Further study is required.
VASCULAR PLANTS										
Black Ash (*Fraxinus nigra*)	No Status	END	THR	o Schedul	S3	Found throughout Ontario in moist ecosystems; commonly found in northern swampy woodlands (MNRF 2018). This species typically grows on mucky or peaty soils and is considered a facultative wetland species (Reznicek et al. 2011).	Professional Experience	P	Swamp habitat is present within the Study Area.	Further study is required.
Butternut (*Juglans cinerea*)	END	END	END	1	S2?	The butternut is designated as endangered by COSSARO and is tracked by the NHIC as a species at risk. The tree is federally regulated by the Species at Risk Act (2002). Butternut belongs to the walnut family and produces edible nuts which are a preferred food source for wildlife. The range of butternut trees is south of the Canadian Shield on soils derived from calcium rich limestone bedrock. Butternut trees, which at one time were much more common to the south extending to the northern aspect of zone 6E, have been declining due to factors including forest loss and disease. Butternut trees suffer from a highly transmissible fungal disease called butternut canker. Butternut canker is causing very rapid decline in this tree species across its native range. The fungal disease is easily transmitted by wind and is very difficult to prevent. Trees often die within a few years of infection by butternut canker (Ministry of Natural Resource and Forestry, 2014).	NHIC	Y	Palmer observed four Butternut in the east side.	Further study is required.
MAMMALS										
Tri-colored Bat (*Perimyotis subflavus*)	END	END	END	1	S3?	Tri-colored Bat is a small bat that is widely distributed in eastern North America and whose range extends north to southern Ontario. Tri-colored Bat is rare in this region of Ontario which is at the northernmost limit of the natural range for the species. These bats prefer to nest in foliage, tree cavities and woodpecker holes, and are occasionally found in buildings; though this is not their preferred habitat. Winter hibernation takes place in caves, mines and deep crevices. Tri-colored Bat feed primarily on small insects and prefer an open forest habitat type in proximity to water (University of Michigan Museum of Zoology, 2004).	Professional Experience	P	Buildings and/or suitable treed habitat is present within the Subject Property.	Future snag tree surveys to be completed in areas with proposed tree removals

Eastern Small-footed Myotis (*Myotis leibii*)	No Status	END	No Status	No Schedul	S2S3	The eastern small-footed myotis, a bat, are an endangered species threatened by a disease known as white nose syndrome, caused by a fungus from Europe. Eastern small-footed myotis' fur has black roots and shiny light brown tips, giving it a yellowish-brown appearance. Its face mask, ears and wings are black, and its underside is grayish-brown, about 8 cm long in size and weighs 4-5 grams. In the spring and summer, eastern small-footed myotis will roost in a variety of habitats, including in or under rocks, in rock outcrops, in buildings, under bridges, or in caves, mines, or hollow trees. They change their roosting locations daily and hunt at night for insects to eat, including beetles, mosquitos, moths, and flies. They hibernate in winter, often in caves and abandoned mines. They can be found from south of Georgian Bay to Lake Erie and east to the Pembroke area, and choose colder and drier sites (Ministry of Natural Resources and Forestry, 2014).	Professional Experience	P	Preferred habitat, rocky features is not present. However, suitable treed habitat is present within the Subject Property.	Future snag tree surveys to be completed in areas with proposed tree removals
Little Brown Myotis (*Myotis lucifugus*)	END	END	END	1	S4	Little brown myotis, a bat, are an endangered species threatened by a disease known as white nose syndrome, caused by a fungus from Europe. Little brown myotis have glossy brown fur and usually weigh between four and 11 grams. Bats are nocturnal. During the day they roost in trees and buildings. They often select attics, abandoned buildings and barns for summer colonies where they can raise their young. Little brown myotis hibernate from October or November to March or April, most often in caves or abandoned mines that are humid and remain above freezing – an ideal environment for the fungus to grow and flourish. The syndrome affects bats by disrupting their hibernation cycle, so that they use up body fat supplies before the spring when they can once again find food sources (Ministry of Natural Resources and Forestry, 2014).	Professional Experience	P	Buildings and/or suitable treed habitat is present within the Subject Property.	Future snag tree surveys to be completed in areas with proposed tree removals
Northern Myotis (*Myotis septentrionalis*)	END	END	END	1	S3	Northern myotis, a bat, are an endangered species threatened by a disease known as white nose syndrome, caused by a fungus from Europe. Northern myotis have dull yellow-brown fur with pale grey bellies. They are approximately eight cm long, with a wingspan of about 25 cm, and usually weigh six to nine grams. Northern myotis can be found in boreal forests but occurs throughout southern Ontario to the north shore of Lake Superior and occasionally as far north as Moosonee. roosting under loose bark and in the cavities of trees. Northern Myotis roosts within tree crevices, hollows and under the bark of live and dead trees, particularly when trees are located within a forest gap. These bats hibernate from October or November to March or April, most often in caves or abandoned mines (Ministry of Natural Resources and Forestry, 2014).	Professional Experience	P	Buildings and/or suitable treed habitat is present within the Subject Property.	Future snag tree surveys to be completed in areas with proposed tree removals
OTHER										

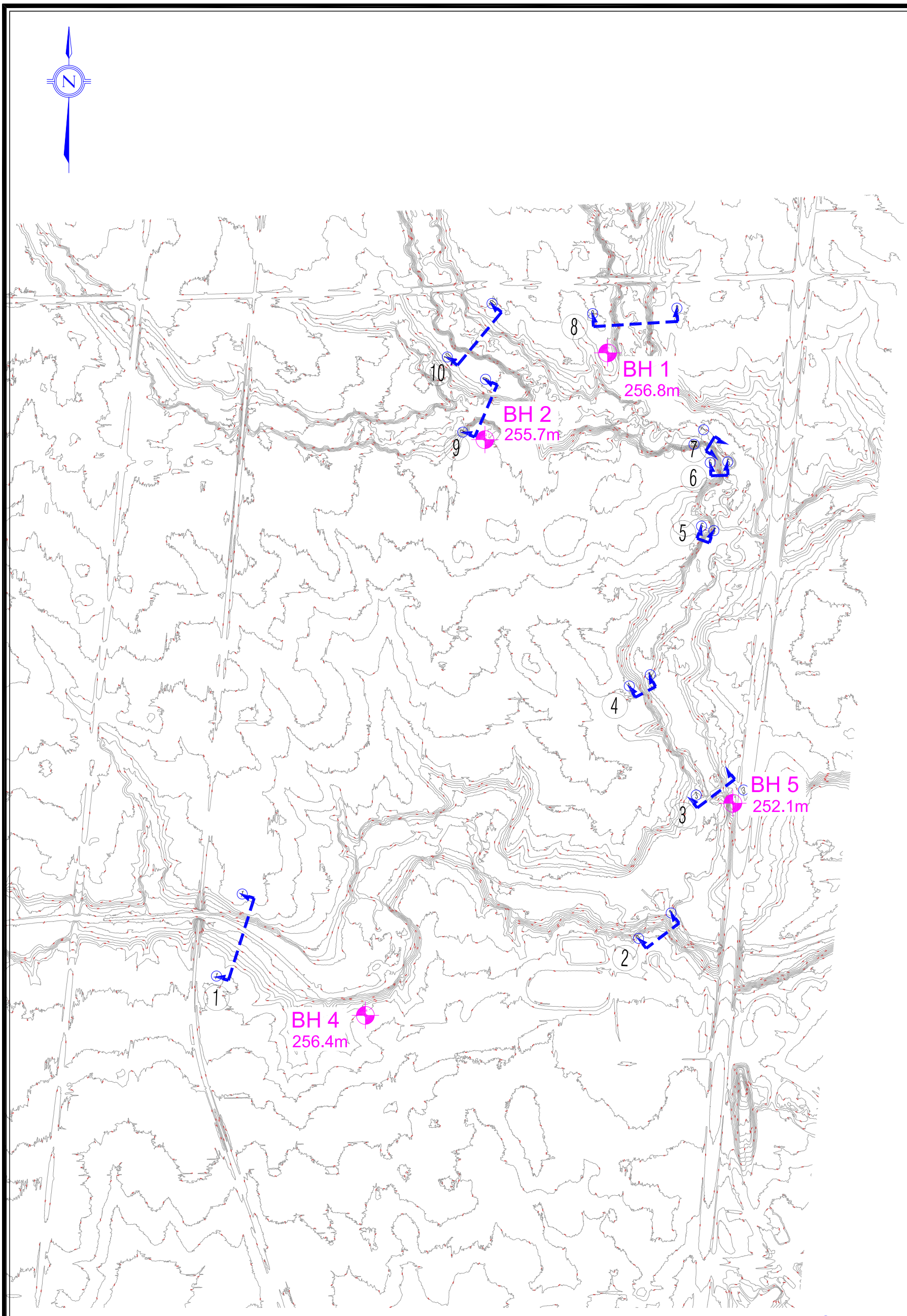
Monarch Butterfly (*Danaus plexippus*)	END	SC	END	1	S2N,S4B	The monarch is an orange and black butterfly with small white spots and is classified as a species of special concern by COSSARO. The monarch relies on milkweed plants as a food source for growing caterpillars, but the adult butterflies forage in diverse habitats for nectar from wildflowers. The greatest threat to the monarch is loss of overwintering habitat in Mexico. Other threats include use of pesticides and herbicides throughout its range (Ministry of Natural Resources and Forestry, 2014).	OBA 2022	Y	Recorded by Hansel. Common Milkweed (*Asclepias syriaca*) was observed in appropriate habitats suggesting Monarchs could breed in the Study Area.	None

Notes:
SC - Special Concern
THR - Threatened
END - Endangered
S1 - Extremely rare in Ontario
S2 - Very rare in Ontario
S3 - Rare to uncommon in Ontario
S4 - Considered to be common in Ontario
S5 - Species is widespread in Ontario
SH - Possibly extirpated
S#S# - Indicates insufficient information exists to assign a single rank.
S#? - Indicates some uncertainty with the classification due to insufficient data.
S#N - Nonbreeding
S#B - Breeding
Y= Yes, P = Potential, N = No

Palmer™

Appendix F

Long-Term Stable Top of Slope (LTSTOP) Assessment by Terraprobe, in AMEC (2010)



LEGEND

Cross Section

Borehole location

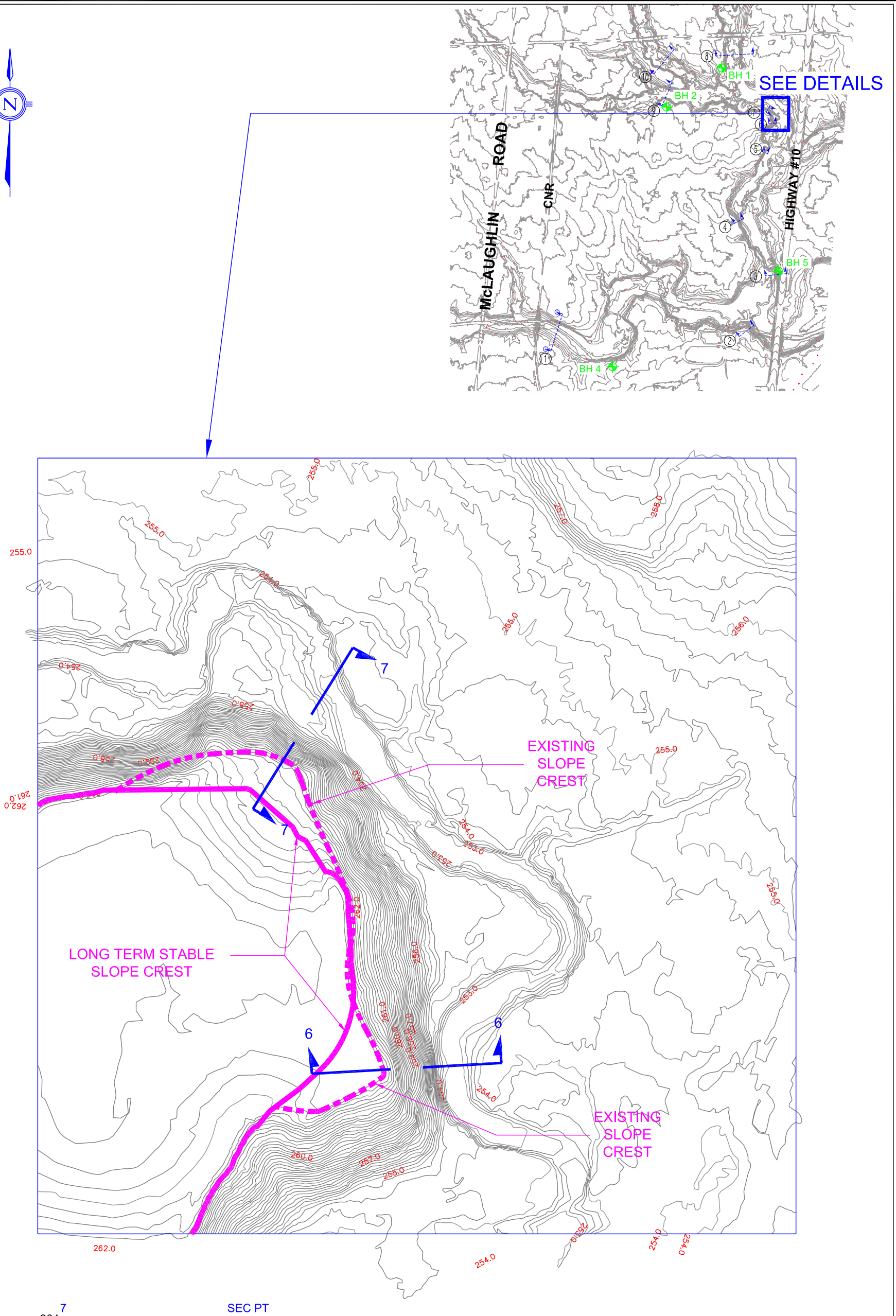
CROSS SECTION LOCATION PLAN

TERRAPROBE

File No. 1-08-3053

FIGURE 4

\\Terradocs\FileServer\Terraprobe Limited\Active Projects\2008 File Numbers\1-08-3053 MAYFIELD\A. Dwgs, Logs\AutoCAD\1-08-3053 MAYFIELD WEST.dwg, Kelvin



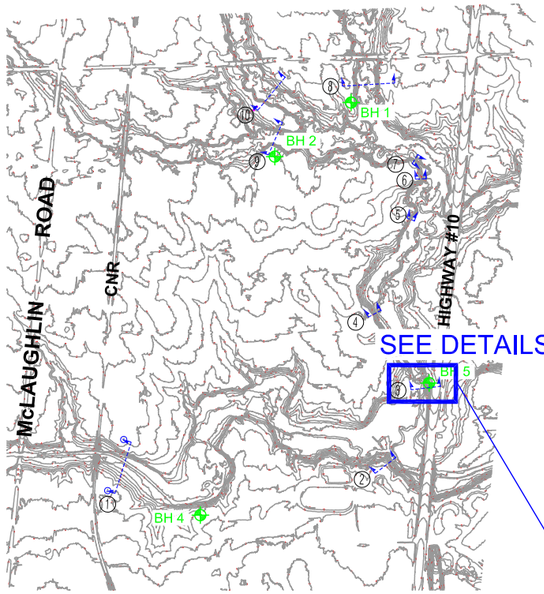
LTSSC PLAN

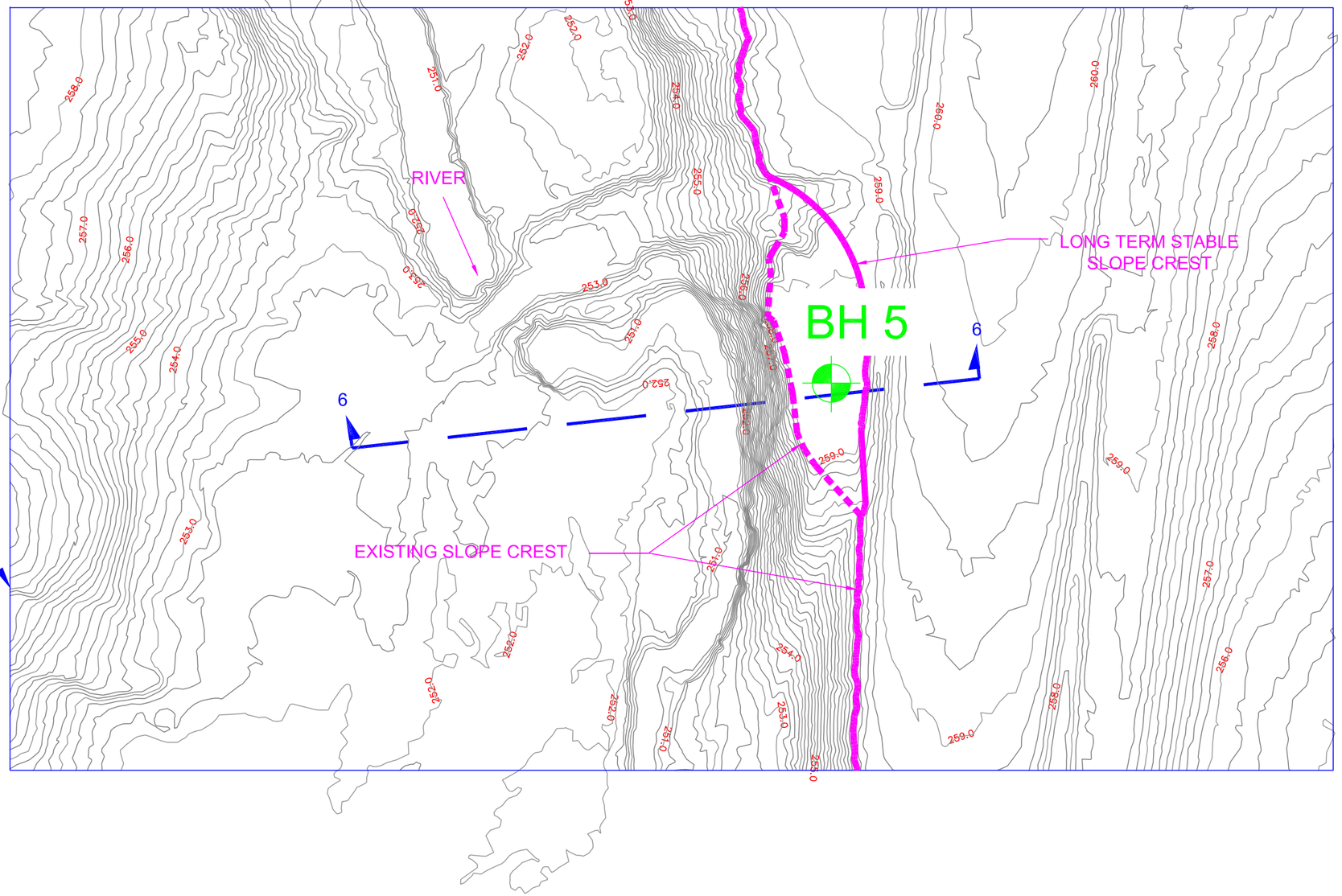
TERRAPROBE

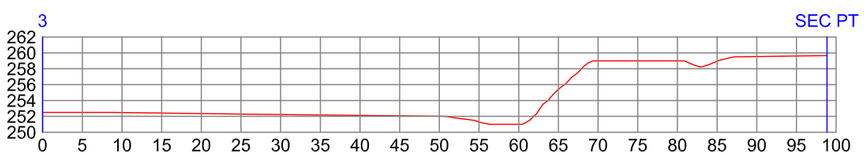
File No. 1-08-3053

FIGURE 5A

KEY PLAN







LTSSC PLAN

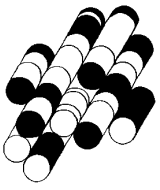
TERRAPROBE

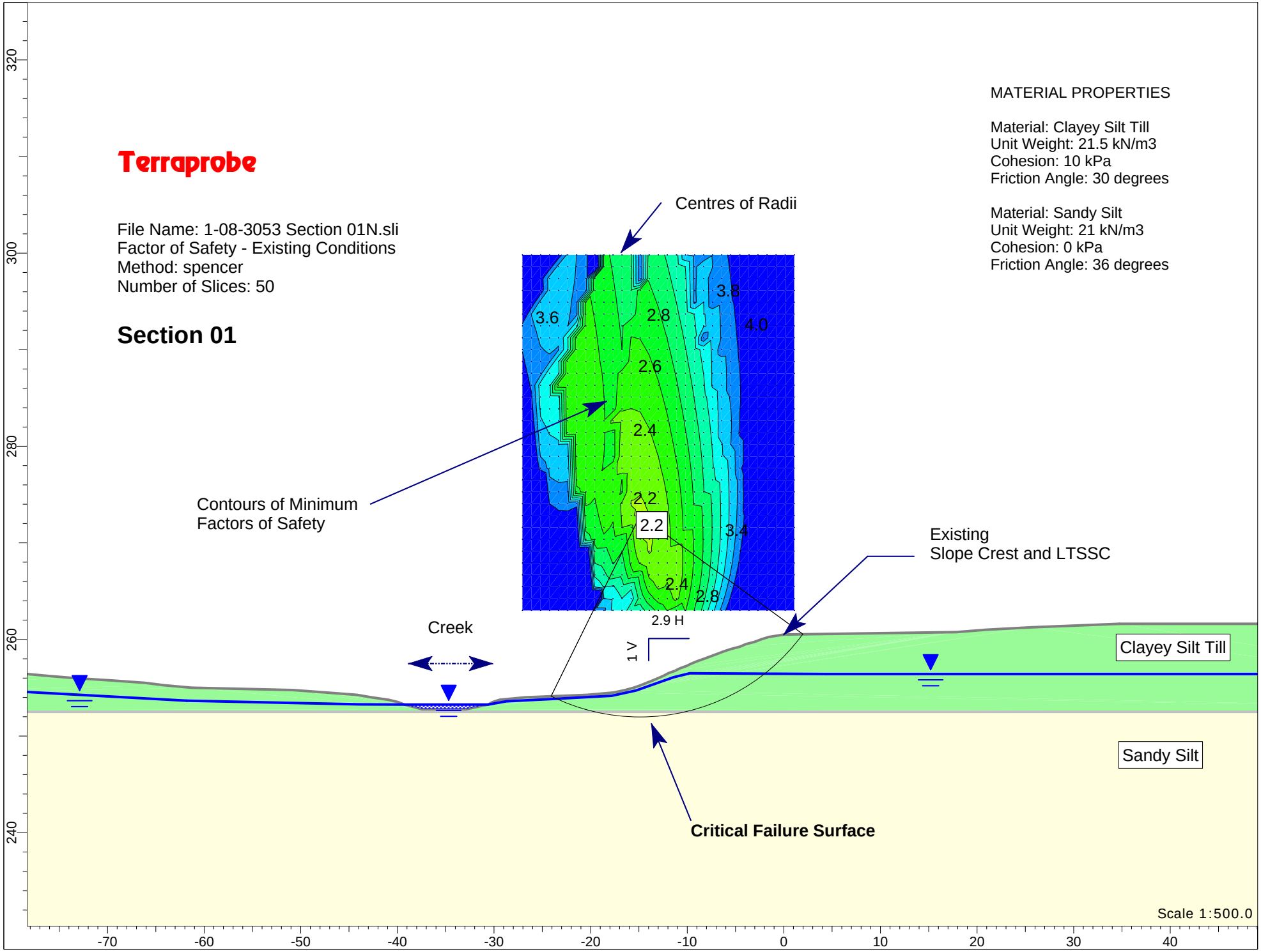
File No. 1-08-3053

FIGURE 5B

SLOPE STABILITY ANALYSES

Terraprobe Limited

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Section 01
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Unit Weight: 21.5 kN/m3
Cohesion: 10 kPa
Friction Angle: 30 degrees
Material: Sandy Silt
Unit Weight: 21 kN/m3
Cohesion: 0 kPa
Friction Angle: 36 degrees
Centres of Radii
Contours of Minimum
Factors of Safety
3.6
2.8
3.8
4.0
2.6
2.4
2.2
2.2
3.4
2.4
2.8
2.9 H
1 V
Creek
Existing
Slope Crest and LTSSC
Clayey Silt Till
Sandy Silt
Critical Failure Surface
Scale 1:500.0
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280
260
240
-70
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-50
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-30
-20
-10
0
10
20
30
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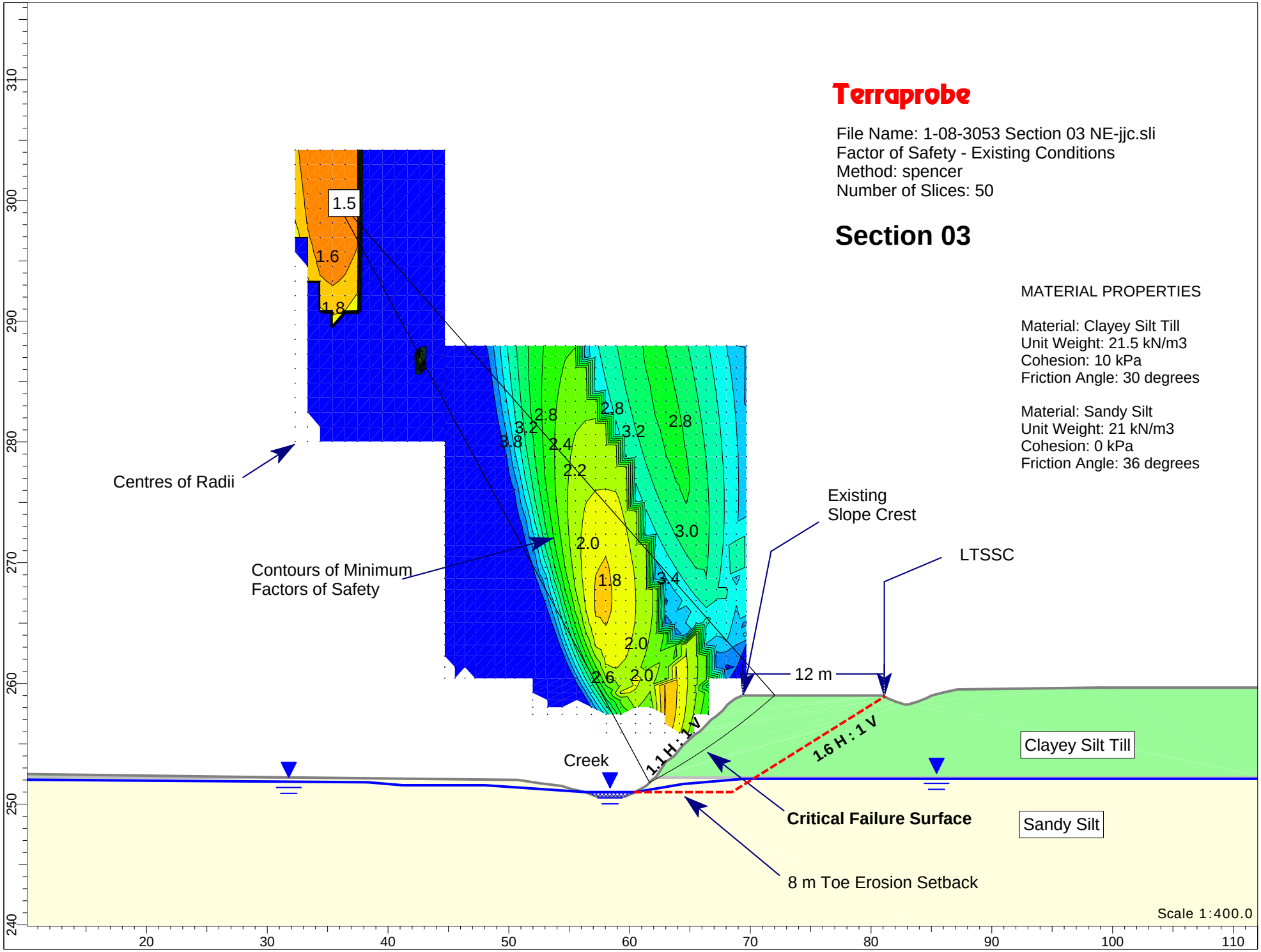
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Friction Angle: 30 degrees
Material: Sandy Silt
Unit Weight: 21 kN/m3
Cohesion: 0 kPa
Friction Angle: 36 degrees
Centres of Radii
Contours of Minimum Factors of Safety
Existing Slope Crest
LTSSC
12 m
1.1 H : 1 V
1.6 H : 1 V
Creek
Clayey Silt Till
Sandy Silt
Critical Failure Surface
8 m Toe Erosion Setback
Scale 1:400.0
1.5
1.6
1.8
2.8
3.2
3.8
2.4
2.2
2.0
1.8
3.0
3.4
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90
100
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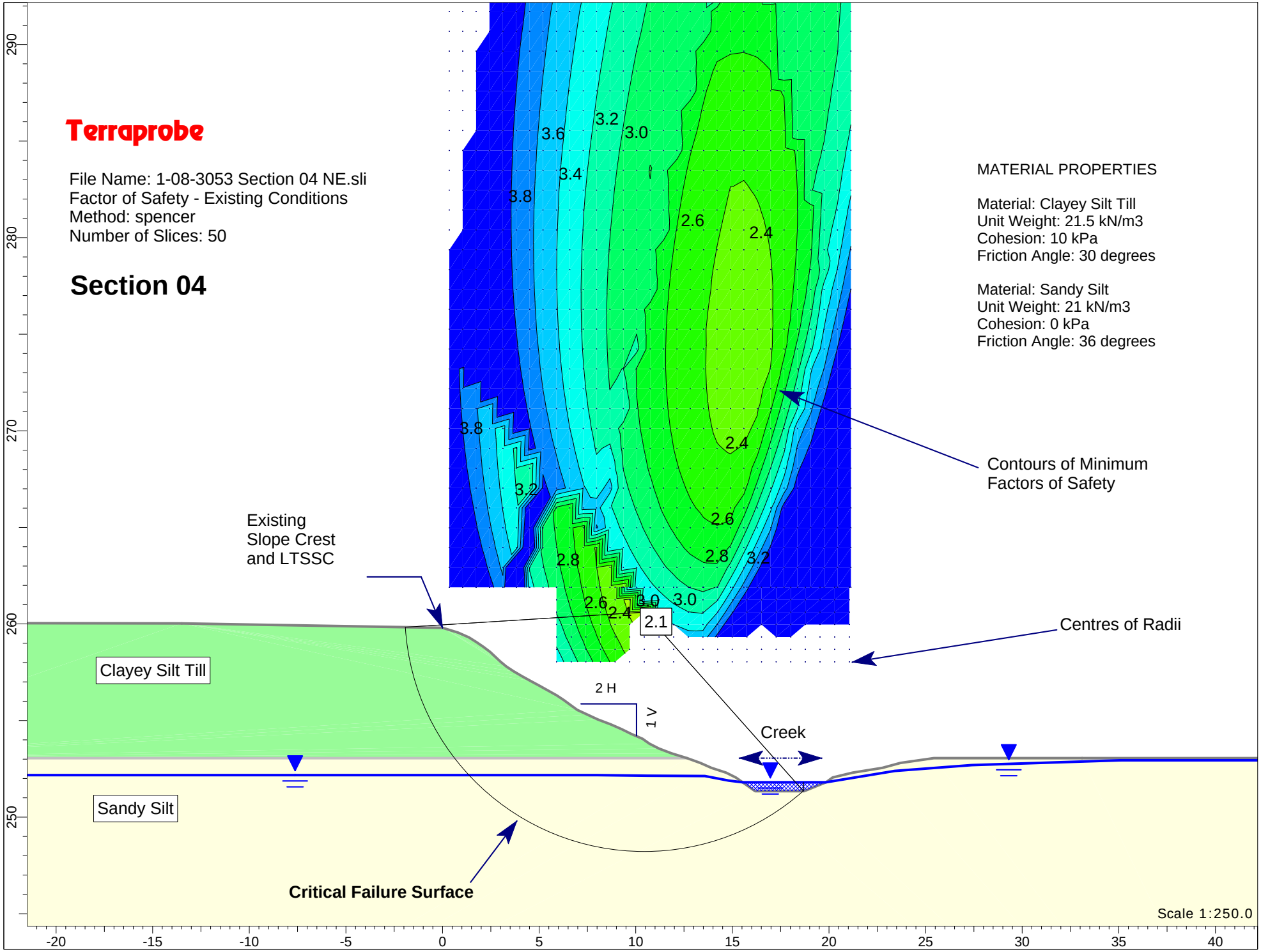
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Cohesion: 10 kPa
Friction Angle: 30 degrees
Material: Sandy Silt
Unit Weight: 21 kN/m3
Cohesion: 0 kPa
Friction Angle: 36 degrees
Contours of Minimum Factors of Safety
Existing Slope Crest and LTSSC
Centres of Radii
Clayey Silt Till
Sandy Silt
2 H
1 V
Creek
Critical Failure Surface
Scale 1:250.0
290
280
270
260
250
-20
-15
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-5
0
5
10
15
20
25
30
35
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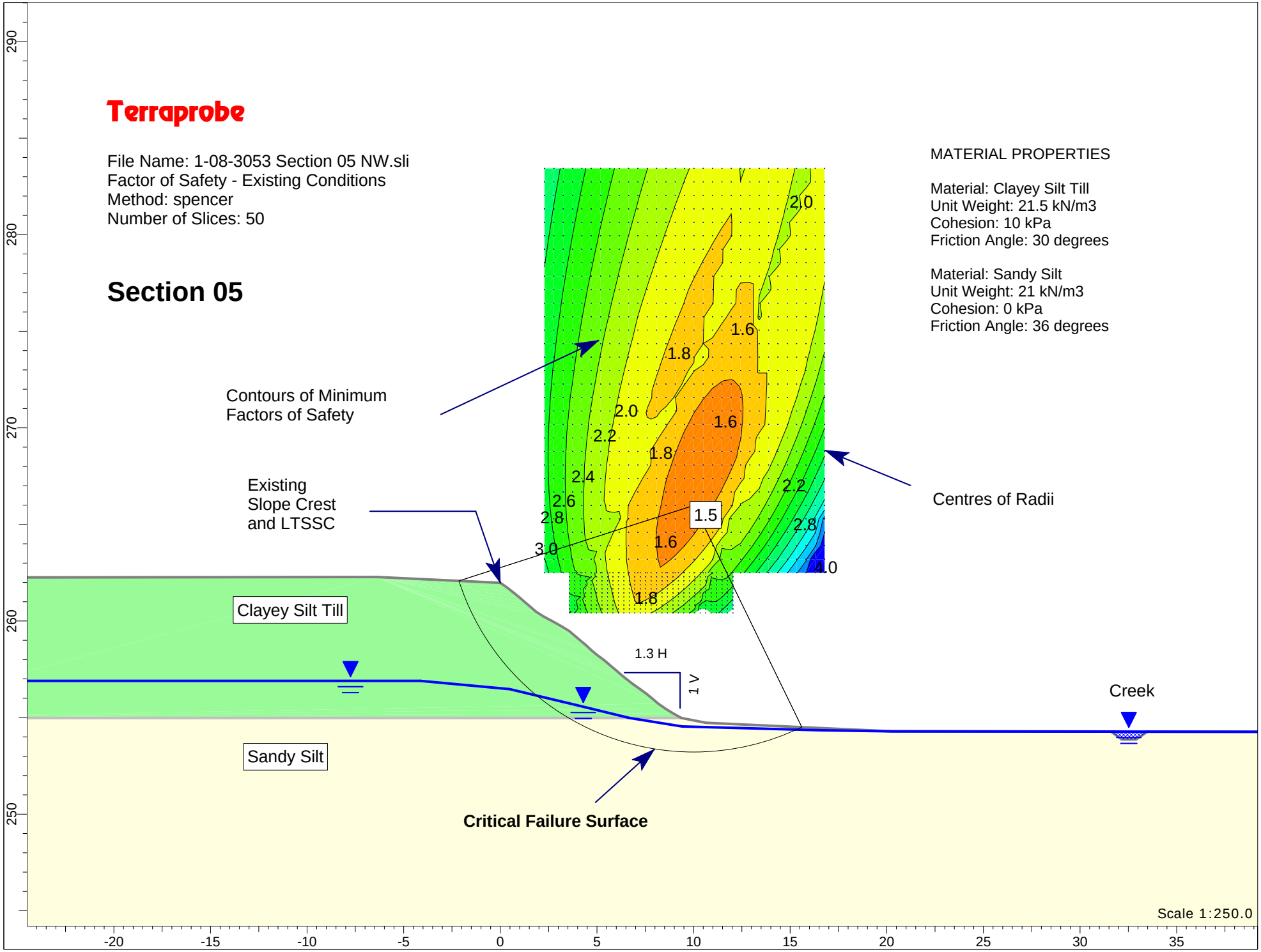
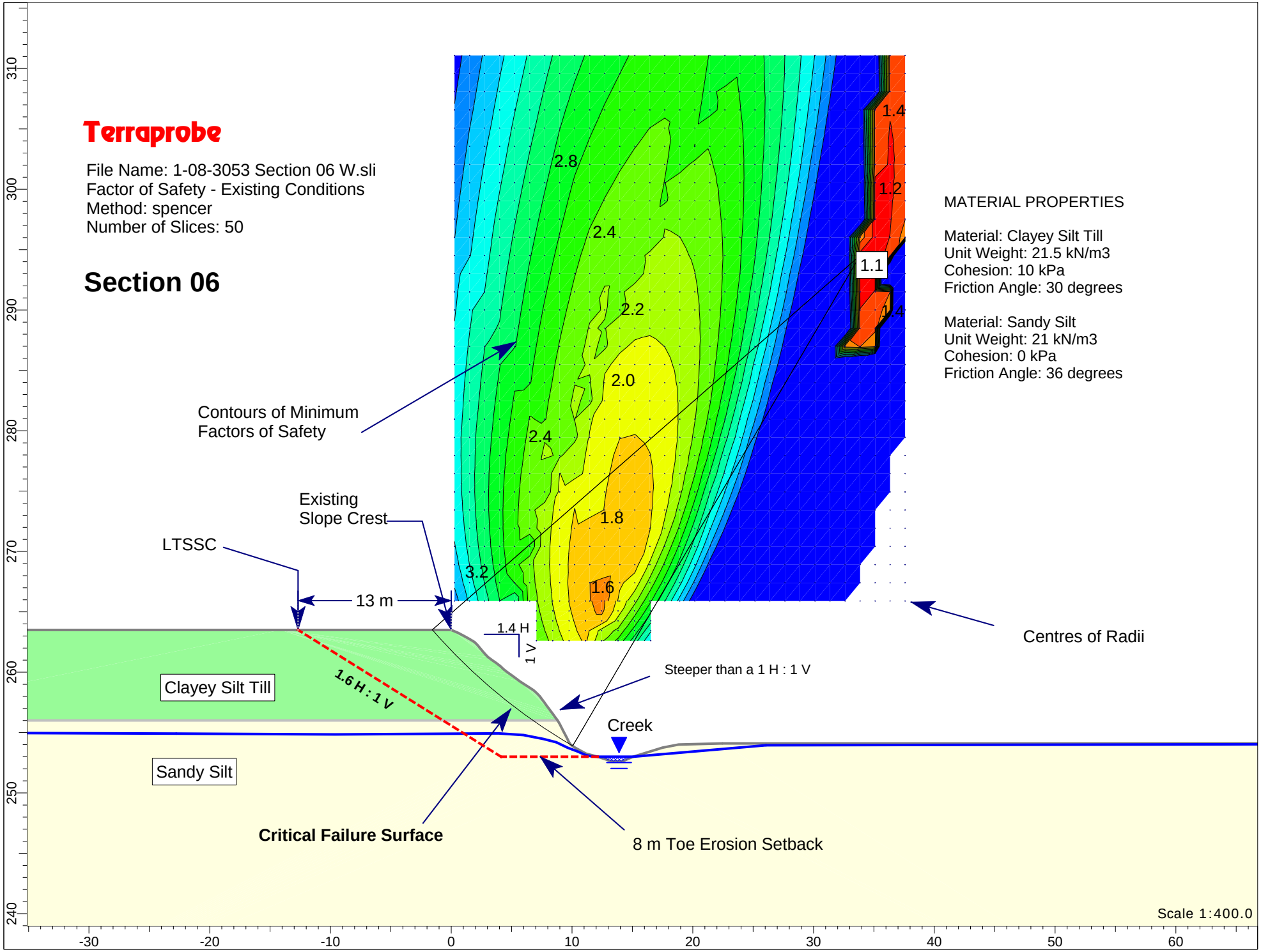
Terraprobe

File Name: 1-08-3053 Section 05 NW.sli
Factor of Safety - Existing Conditions
Method: spencer
Number of Slices: 50

Section 05

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Factor of Safety - Existing Conditions
Method: spencer
Number of Slices: 50
Section 06
MATERIAL PROPERTIES
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Unit Weight: 21.5 kN/m3
Cohesion: 10 kPa
Friction Angle: 30 degrees
Material: Sandy Silt
Unit Weight: 21 kN/m3
Cohesion: 0 kPa
Friction Angle: 36 degrees
Contours of Minimum Factors of Safety
Existing Slope Crest
LTSSC
13 m
1.4 H
1 V
Steeper than a 1 H : 1 V
Centres of Radii
Clayey Silt Till
1.6 H : 1 V
Creek
Sandy Silt
Critical Failure Surface
8 m Toe Erosion Setback
Scale 1:400.0
1.4
1.2
1.1
1.4
2.8
2.4
2.2
2.0
2.4
1.8
3.2
1.6
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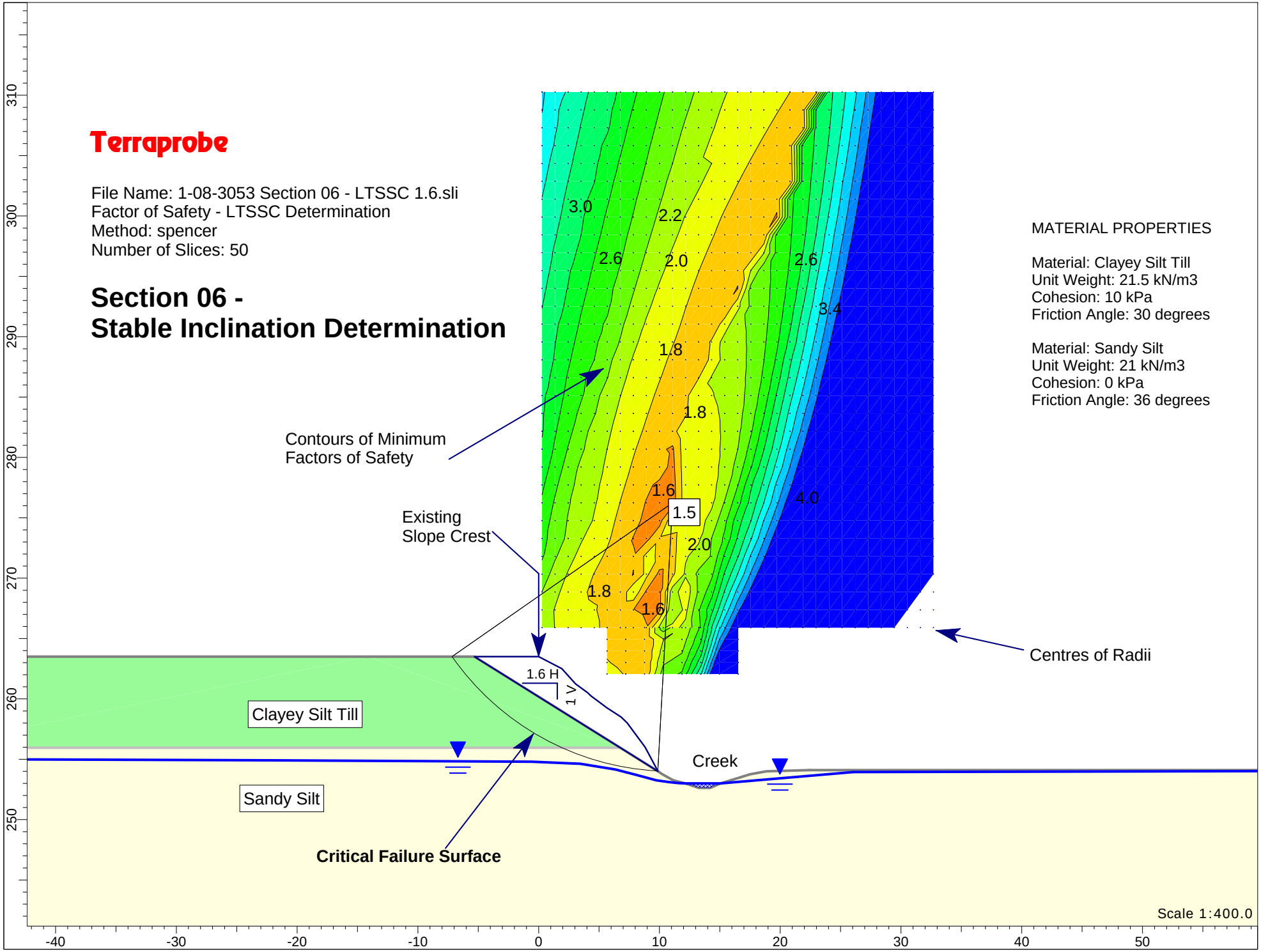
30
40
50
60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Factor of Safety - LTSSC Determination
Method: spencer
Number of Slices: 50
Section 06 -
Stable Inclination Determination
MATERIAL PROPERTIES
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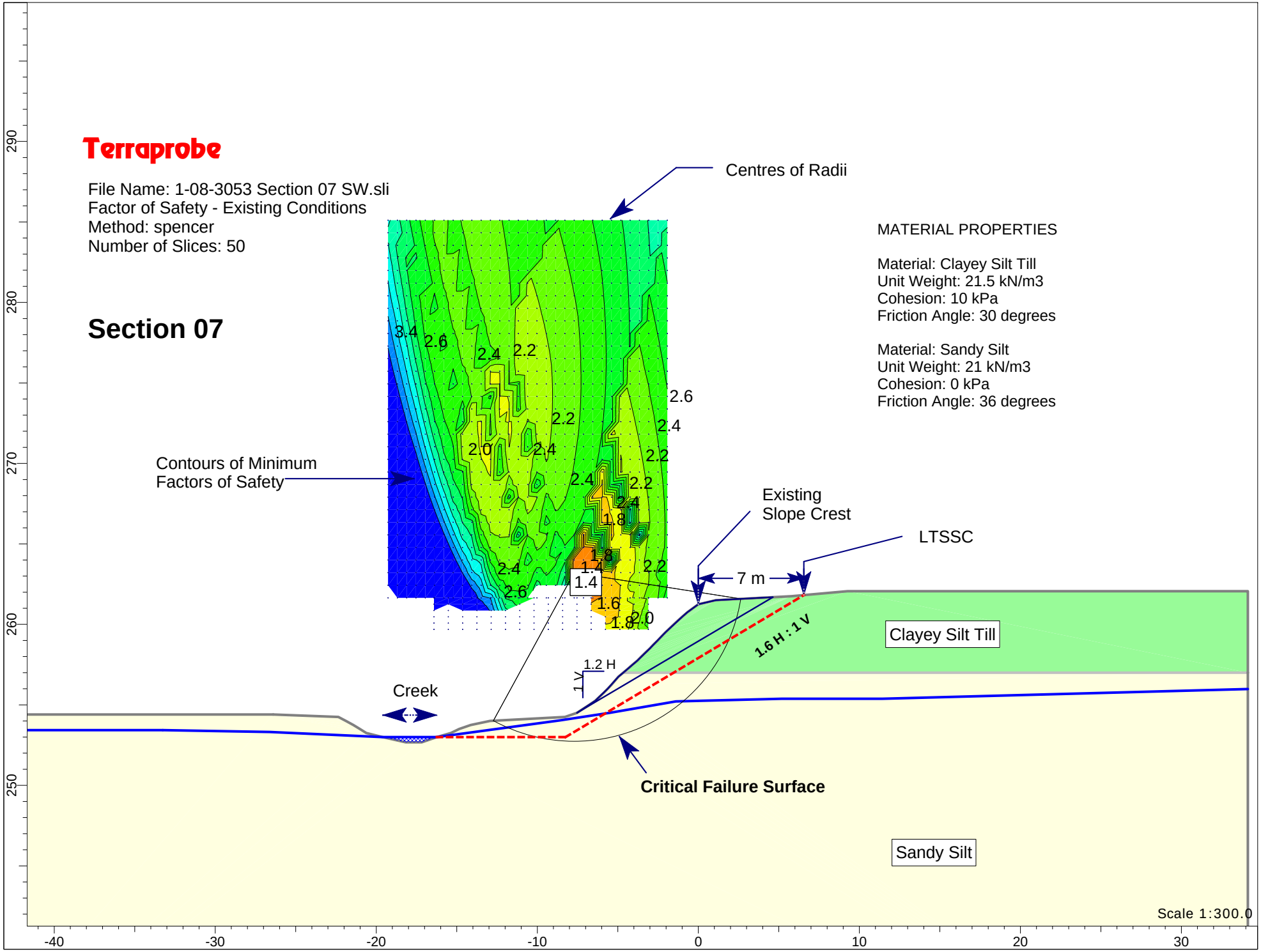
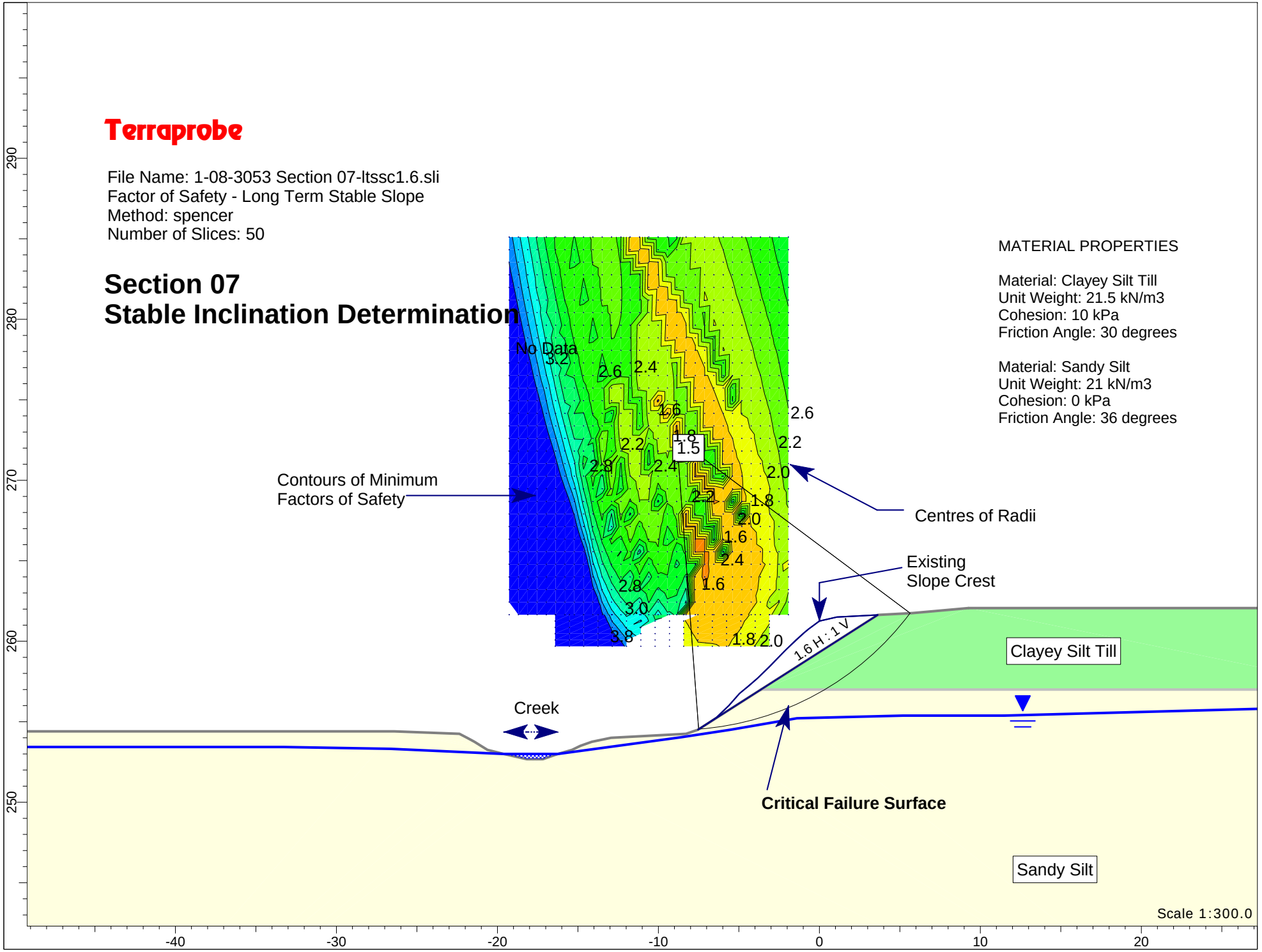
Unit Weight: 21.5 kN/m3
Cohesion: 10 kPa
Friction Angle: 30 degrees
Material: Sandy Silt
Unit Weight: 21 kN/m3
Cohesion: 0 kPa
Friction Angle: 36 degrees
Contours of Minimum
Factors of Safety
Existing
Slope Crest
Centres of Radii
1.6 H
1 V
Clayey Silt Till
Sandy Silt
Creek
Critical Failure Surface
Scale 1:400.0
3.0
2.2
2.6
2.0
2.6
3.4
1.8
1.8
1.6
1.5
4.0
2.0
1.8
1.6
310
300
290
280
270
260
250
-40
-30
-20
-10
0
10
20
30
40
50


Terraprobe
File Name: 1-08-3053 Section 07 SW.sli
Factor of Safety - Existing Conditions
Method: spencer
Number of Slices: 50
Section 07
Centres of Radii
Contours of Minimum
Factors of Safety
MATERIAL PROPERTIES
Material: Clayey Silt Till
Unit Weight: 21.5 kN/m3
Cohesion: 10 kPa
Friction Angle: 30 degrees
Material: Sandy Silt
Unit Weight: 21 kN/m3
Cohesion: 0 kPa
Friction Angle: 36 degrees
Existing
Slope Crest
LTSSC
7 m
1.6 H : 1 V
1.2 H
1 V
Creek
Clayey Silt Till
Sandy Silt
Critical Failure Surface
Scale 1:300.0
290
280
270
260
250
-40
-30
-20
-10
0
10
20
30

Terraprobe

File Name: 1-08-3053 Section 07-ltssc1.6.sli
Factor of Safety - Long Term Stable Slope
Method: spencer
Number of Slices: 50

Section 07
Stable Inclination Determination



MATERIAL PROPERTIES

Material: Clayey Silt Till
Unit Weight: 21.5 kN/m3
Cohesion: 10 kPa
Friction Angle: 30 degrees

Material: Sandy Silt
Unit Weight: 21 kN/m3
Cohesion: 0 kPa
Friction Angle: 36 degrees

Terraprobe

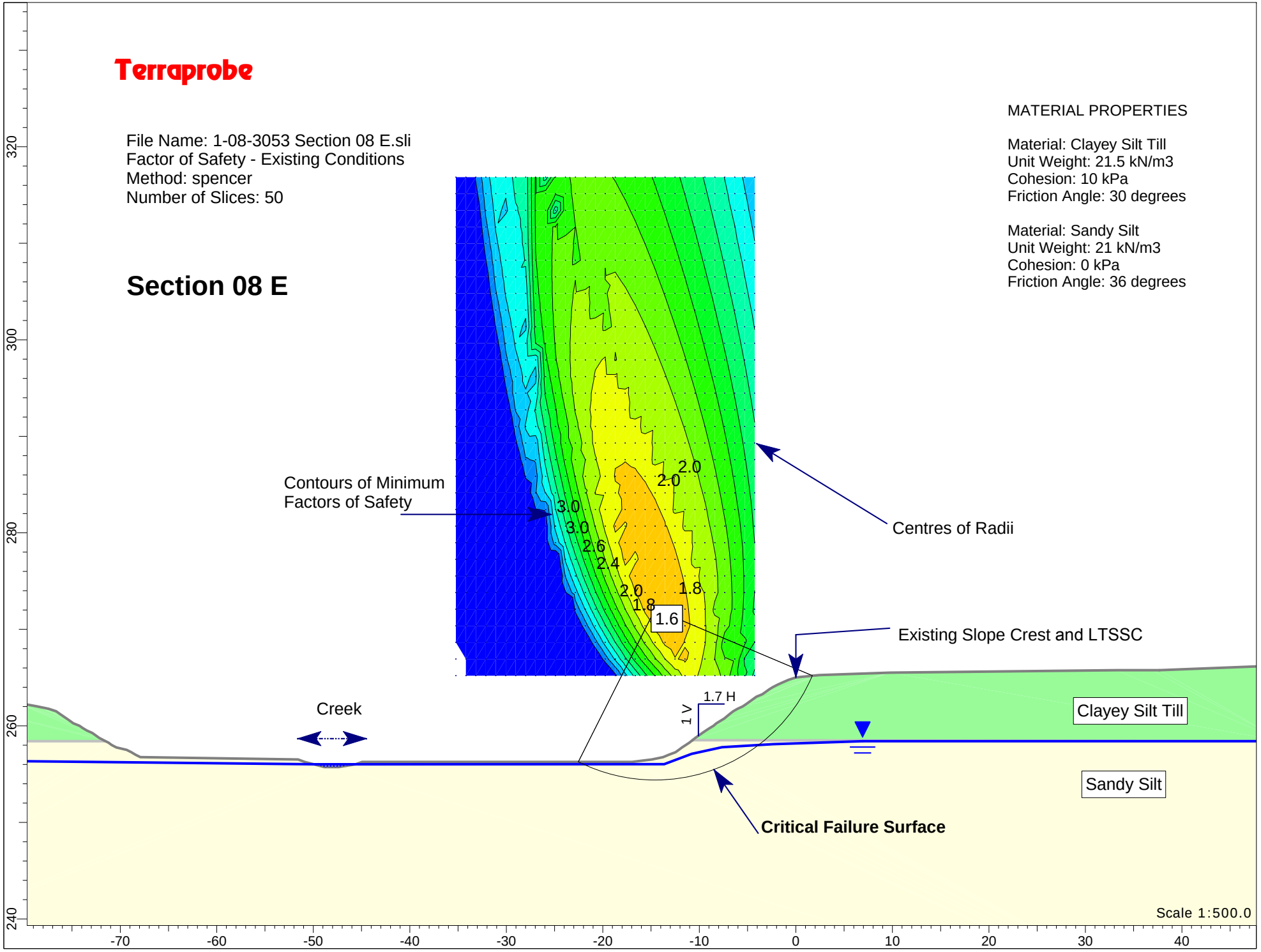
File Name: 1-08-3053 Section 08 E.sli
Factor of Safety - Existing Conditions
Method: spencer
Number of Slices: 50

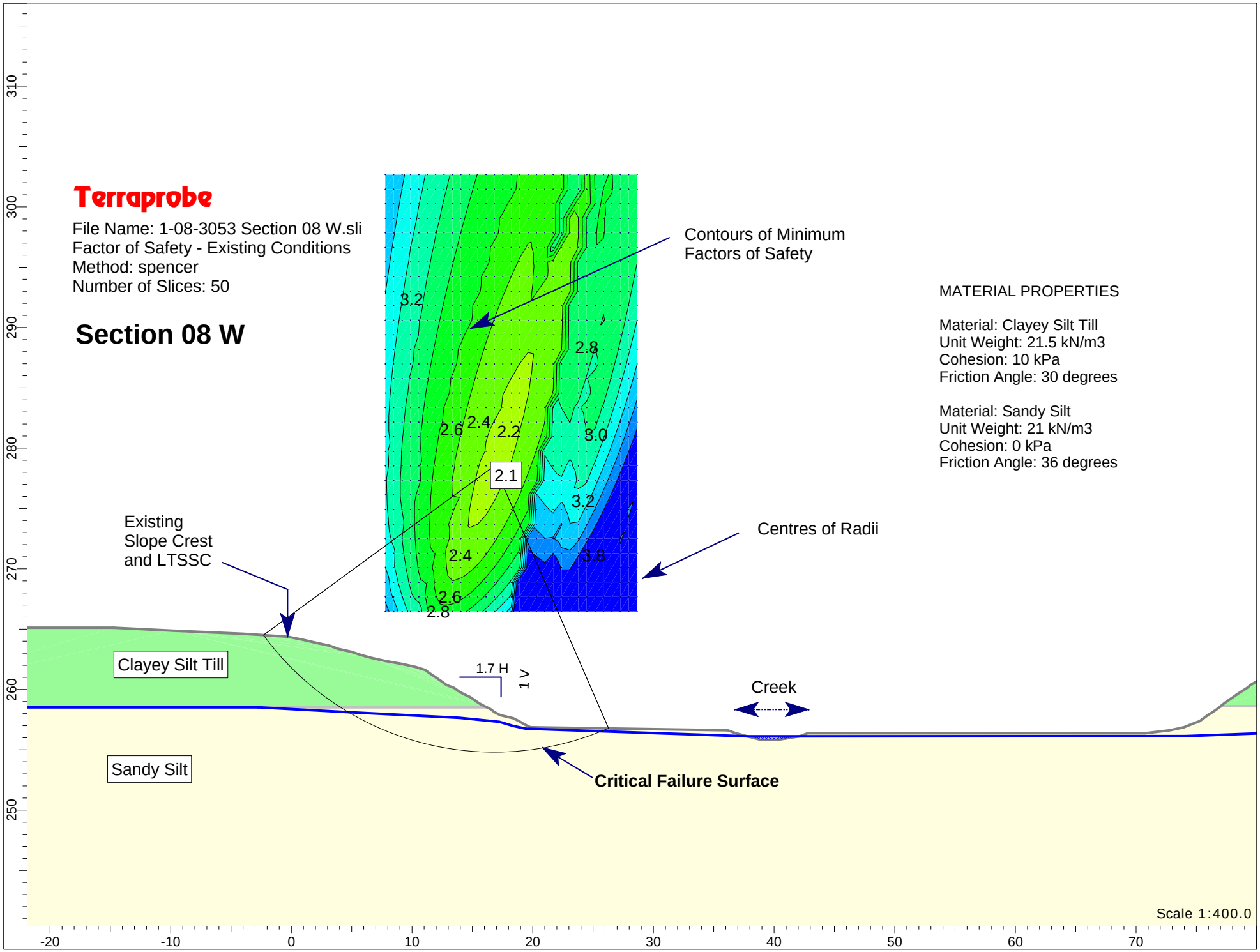
Section 08 E

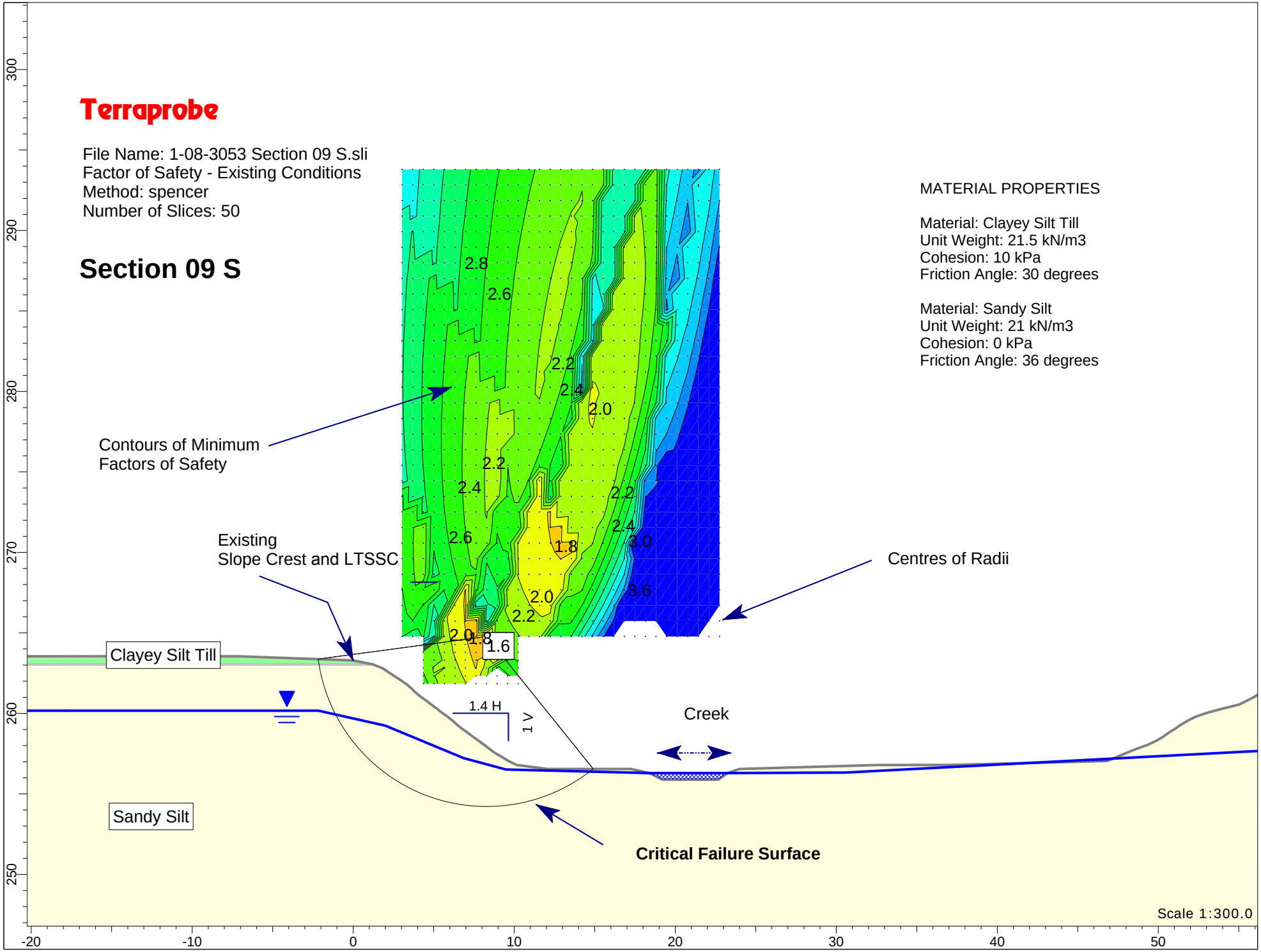
MATERIAL PROPERTIES

Material: Clayey Silt Till
Unit Weight: 21.5 kN/m3
Cohesion: 10 kPa
Friction Angle: 30 degrees

Material: Sandy Silt
Unit Weight: 21 kN/m3
Cohesion: 0 kPa
Friction Angle: 36 degrees




Terraprobe
File Name: 1-08-3053 Section 08 W.sli
Factor of Safety - Existing Conditions
Method: spencer
Number of Slices: 50
Section 08 W
Contours of Minimum
Factors of Safety
3.2
2.8
2.6
2.4
2.2
3.0
2.1
3.2
2.4
3.8
2.6
2.8
MATERIAL PROPERTIES
Material: Clayey Silt Till
Unit Weight: 21.5 kN/m3
Cohesion: 10 kPa
Friction Angle: 30 degrees
Material: Sandy Silt
Unit Weight: 21 kN/m3
Cohesion: 0 kPa
Friction Angle: 36 degrees
Existing
Slope Crest
and LTSSC
Centres of Radii
Clayey Silt Till
1.7 H
1 V
Creek
Sandy Silt
Critical Failure Surface
Scale 1:400.0
310
300
290
280
270
260
250
-20
-10
0
10
20
30
40
50
60
70


Terraprobe
File Name: 1-08-3053 Section 09 S.sli
Factor of Safety - Existing Conditions
Method: spencer
Number of Slices: 50
Section 09 S
MATERIAL PROPERTIES
Material: Clayey Silt Till
Unit Weight: 21.5 kN/m3
Cohesion: 10 kPa
Friction Angle: 30 degrees
Material: Sandy Silt
Unit Weight: 21 kN/m3
Cohesion: 0 kPa
Friction Angle: 36 degrees
Contours of Minimum
Factors of Safety
Existing
Slope Crest and LTSSC
Centres of Radii
Clayey Silt Till
Sandy Silt
Creek
1.4 H
1 V
Critical Failure Surface
Scale 1:300.0
2.8
2.6
2.2
2.4
2.0
1.8
1.6
3.6
3.0
300
290
280
270
260
250
-20
-10
0
10
20
30
40
50

Terraprobe

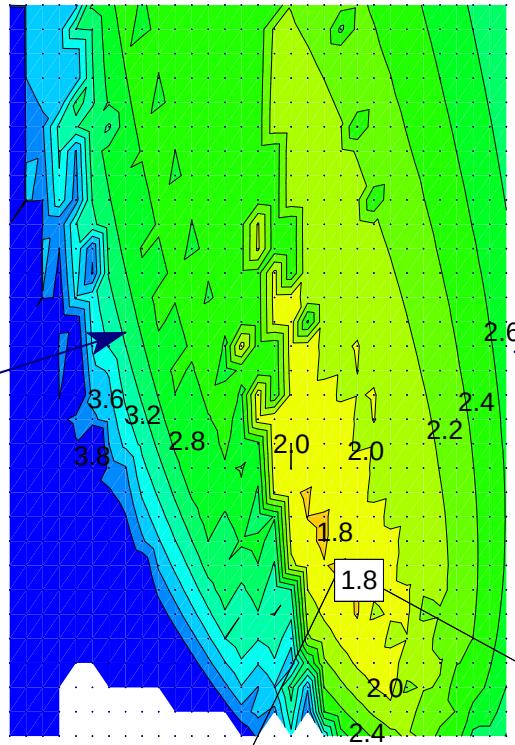
File Name: 1-08-3053 Section 09 N.sli
Factor of Safety - Existing Conditions
Method: spencer
Number of Slices: 50

Section 09 N

MATERIAL PROPERTIES

Material: Clayey Silt Till
Unit Weight: 21.5 kN/m3
Cohesion: 10 kPa
Friction Angle: 30 degrees

Material: Sandy Silt
Unit Weight: 21 kN/m3
Cohesion: 0 kPa
Friction Angle: 36 degrees



Contours of Minimum Factors of Safety

Centres of Radii

Existing Slope Crest and LTSSC

Clayey Silt Till

Sandy Silt

Creek

2.2 H

1 V

Critical Failure Surface

Scale 1:300.0

300
290
280
270
260
250

10
20
30
40
50
60
70
80

Terraprobe

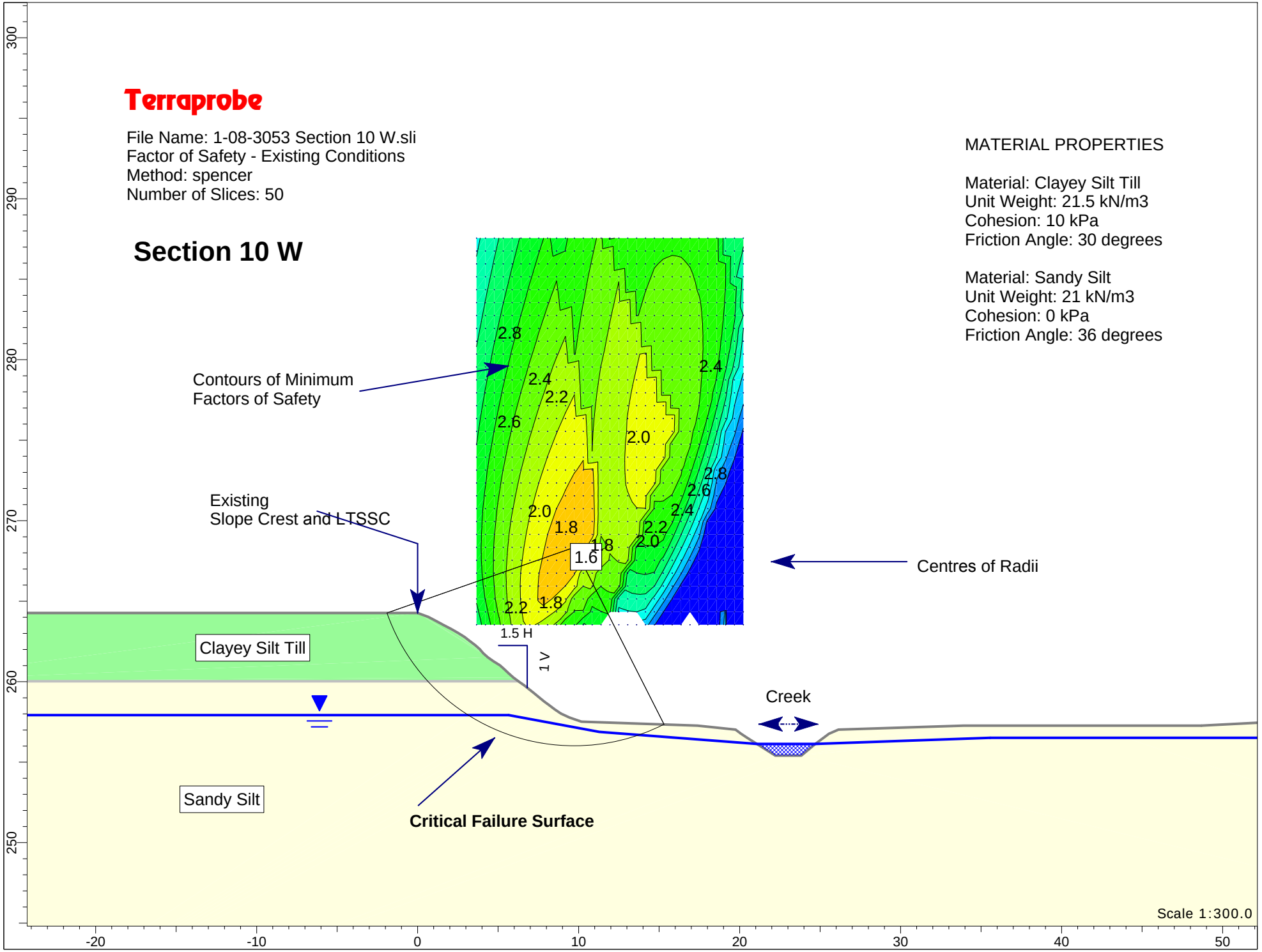
File Name: 1-08-3053 Section 10 W.sli
Factor of Safety - Existing Conditions
Method: spencer
Number of Slices: 50

Section 10 W

MATERIAL PROPERTIES

Material: Clayey Silt Till
Unit Weight: 21.5 kN/m3
Cohesion: 10 kPa
Friction Angle: 30 degrees

Material: Sandy Silt
Unit Weight: 21 kN/m3
Cohesion: 0 kPa
Friction Angle: 36 degrees



Appendix G

Preliminary Feature Based Water Balance Risk Assessment

Feature Based Water Budget Risk Assessment

MAGNITUDE OF HYDROLOGICAL CHANGE (Preliminary)

Wetland No.	Contributing Catchments (Figure 16)	Wetland Feature (ELC number - Figure 2)	On-Site Impervious Cover Score (%) [S]	On-Site Impervious Cover Magnitude	On-Site Catchment Area Change (%)	On-Site Catchment Area Change Magnitude	Off -Site Catchment Area of Riverine Wetland (ha)	TOTAL Catchment Area Change of Riverine Wetland (%)	TOTAL Catchment Area Change Magnitude	Water Taking or Discharge (L/day)	Water Taking or Discharge Magnitude	Impact to Recharge Areas	Magnitude of Impact to Recharge Areas	Magnitude of Hydrological Change
1	T,M,R,W,V,U	Riverine Wetland SWD4 **(81)**	5.3	Low	<5%	Low	3.20	0%	Low	0%	Low	0%	Low	Low
2	I	Riverine Wetland SAS1 **(59)**	0.1	Low	<5%	Low	123.70	0%	Low	0%	Low	0%	Low	Low
3	L	Riverine Wetland MAM2 **(122)**	13.9	Medium	-63%	High	34.23	-144%	High	0%	Low	0%	Low	High
4	O,Q,K,F,A,B,C,E,D ,G,J,H, plus additional US catchments	Contiguous Riverine SWT3 & MAM2 **(62,63, 64, 121, 76)**	15.3	Medium	<5%	Low	19.66	0%	Low	0%	Low	0%	Low	Low
5	O,F,K,A,B,C, E,D,G,J,H, plus additional US catchments	Contiguous Riverine Wetland MAM2, SWD3 **(17, 103, 46)**	0.1	Low	<5%	Low	39.47	0%	Low	0%	Low	0%	Low	Low
6	K (northwestern part)	Contiguous Isolated Wetland MAM2, SWD3 **(35, 36)**	25.0	High	-25%	High	0.00	0%	N/A	0%	Low	0%	Low	High
7	H,J	Contiguous Riverine MAM2, SWT2, SWD4, SWD -MA **(27, 53, 54, 57, 107, 108, 110, 111)**	0.1	Low	<5%	Low	186.80	0%	Low	0%	Low	0%	Low	Low
8	C	Contiguous Riverine SWD2 MAS2 **(50, 105)**	0.0	Low	<5%	Low	94.67	0%	Low	0%	Low	0%	Low	Low

*Interpreted to be medium hydrological risk due to the negligable degree of change to the total catchment area of the riverine controlled contiguous wetland but recognizing that some water does originate from the site.

WETLAND SENSITIVITY (Preliminary)

Wetland No.	Contributing Catchments (Figure 16)	Wetland Feature (ELC number - Figure 2)	Vegetation Community		High Sensitivity Fauna		High Sensitivity Flora		Signficant Habitat (OMNRF, 2014)		Hydrological Classification		Wetland Sensitivity
			Type	Sensitivity	Presence	Ranking	Presence	Ranking	Presence	Ranking	Type	Sensitivity	
1	T,M,R,W,V,U	Riverine Wetland SWD4 **(81)**	SWD4		No amphibans or wetland reptiles present. Birds: C. Yellowthroat Low (plus non-breeding Canada Goose)	Low	No High Acer saccharinum, Arisaema triphyllum Boehmeria cylindrica, , Chelone glabra, Cicuta bulbifera, Dryopteris carthusiana, Fraxinus nigra, Impatiens capensis, Lobelia siphilitica, Onoclea sensibilis and others- Medium Several Low	Medium to Low	No SWH for hydrologically sensitive species	Low	Riverine	Low	Low
2	I	Riverine Wetland SAS1 **(59)**	SAS1		No amphibans or wetland reptiles present. Birds: C. Yellowthroat Low (plus non-breeding Canada Goose)	Low	No High Acer saccharinum, Arisaema triphyllum Boehmeria cylindrica, , Chelone glabra, Cicuta bulbifera, Dryopteris carthusiana, Fraxinus nigra, Impatiens capensis, Lobelia siphilitica, Onoclea sensibilis and others- Medium Several Low	Medium to Low	No SWH for hydrologically sensitive species	Low	Riverine	Low	Low

3	L	Riverine Wetland MAM2 **(122)**	MAM2		No amphibans or wetland reptiles present. Birds: C. Yellowthroat Low (plus non-breeding Canada Goose)	Low	No High Acer saccharinum, Arisaema triphyllum Boehmeria cylindrica, , Chelone glabra, Cicuta bulbifera, Dryopteris carthusiana, Fraxinus nigra, Impatiens capensis, Lobelia siphilitica, Onoclea sensibilis and others- Medium Several Low	Medium to Low	No SWH for hydrologically sensitive species	Low	Riverine	Low	Low
4	O,Q,K,F,A,B,C,E,D ,G,J,H, plus additional US catchments	Contiguous Riverine SWT3 & MAM2 **(62,63, 64, 121, 76)**	SWT3, MAM2		No amphibans or wetland reptiles present. Birds: C. Yellowthroat Low (plus non-breeding Canada Goose)	Low	No High Acer saccharinum, Arisaema triphyllum Boehmeria cylindrica, , Chelone glabra, Cicuta bulbifera, Dryopteris carthusiana, Fraxinus nigra, Impatiens capensis, Lobelia siphilitica, Onoclea sensibilis and others- Medium Several Low	Medium to Low	No SWH for hydrologically sensitive species	Low	Riverine	Low	Low
5	O,F,K,A,B,C, E,D,G,J,H, plus additional US catchments	Contiguous Riverine Wetland MAM2, SWD3 **(17, 103, 46)**	MAM2, SWD3		No amphibans or wetland reptiles present. Birds: C. Yellowthroat Low (plus non-breeding Canada Goose)	Low	No High Acer saccharinum, Arisaema triphyllum Boehmeria cylindrica, , Chelone glabra, Cicuta bulbifera, Dryopteris carthusiana, Fraxinus nigra, Impatiens capensis, Lobelia siphilitica, Onoclea sensibilis and others- Medium Several Low	Medium to Low	No SWH for hydrologically sensitive species	Low	Riverine	Low	Low
6	K (northwestern part)	Contiguous Isolated Wetland MAM2, SWD3 **(35, 36)**	MAM2, SWD3		No amphibans or wetland reptiles present. Birds: C. Yellowthroat Low (plus non-breeding Canada Goose)	Low	No High Acer saccharinum, Arisaema triphyllum Boehmeria cylindrica, , Chelone glabra, Cicuta bulbifera, Dryopteris carthusiana, Fraxinus nigra, Impatiens capensis, Lobelia siphilitica, Onoclea sensibilis and others- Medium Several Low	Medium to Low	No SWH for hydrologically sensitive species	Low	Isolated/ Palaustrine	High	High

7	H,J	Contiguous Riverine MAM2, SWT2, SWD4, SWD -MA **(27, 53, 54, 57, 107, 108, 110, 111)**	MAM2, SWT2, SWD4, SWD		No amphibans or wetland reptiles present. Birds: C. Yellowthroat Low (plus non-breeding Canada Goose)	Low	No High Acer saccharinum, Arisaema triphyllum Boehmeria cylindrica, , Chelone glabra, Cicuta bulbifera, Dryopteris carthusiana, Fraxinus nigra, Impatiens capensis, Lobelia siphilitica, Onoclea sensibilis and others- Medium Several Low	Medium to Low	No SWH for hydrologically sensitive species	Low	Riverine	Low	Low
8	C	Contiguous Riverine SWD2 MAS2 **(50, 105)**	SWD2, MAS2		No amphibans or wetland reptiles present. Birds: C. Yellowthroat Low (plus non-breeding Canada Goose)	Low	No High Acer saccharinum, Arisaema triphyllum Boehmeria cylindrica, , Chelone glabra, Cicuta bulbifera, Dryopteris carthusiana, Fraxinus nigra, Impatiens capensis, Lobelia siphilitica, Onoclea sensibilis and others- Medium Several Low	Medium to Low	No SWH for hydrologically sensitive species	Low	Riverine	Low	Low

FBWB RISK ASSIGNMENT (Preliminary)

Wetland No.	Contributing Catchments (Figure 16)	Wetland Feature (ELC number - Figure 2)	Hydrological Change Risk Classification	Wetland Sensitivity	Risk Assignment	
1	T,M,R,W,V,U	Riverine Wetland SWD4 **(81)**	Low	Low	Low	
2	I	Riverine Wetland SAS1 **(59)**	Low	Low	Low	
3	L	Riverine Wetland MAM2 **(122)**	High	Low	Medium	
4	O,Q,K,F,A,B,C,E,D ,G,J,H, plus additional US catchments	Contiguous Riverine SWT3 & MAM2 **(62,63, 64, 121, 76)**	Low	Low	Low	
5	O,F,K,A,B,C, E,D,G,J,H, plus additional US catchments	Contiguous Riverine Wetland MAM2, SWD3 **(17, 103, 46)**	Low	Low	Low	
6	K (northwestern part)	Contiguous Isolated Wetland MAM2, SWD3 **(35, 36)**	High	High	High	
7	H,J	Contiguous Riverine MAM2, SWT2, SWD4, SWD -MA **(27, 53, 54, 57, 107, 108, 110, 111)**	Low	Low	Low	
8	C	Contiguous Riverine SWD2 MAS2 **(50, 105)**	Low	Low	Low	