BEACON ENVIRONMENTAL

GUIDING SOLUTIONS IN THE NATURAL ENVIRONMENT

6620 Rothschild Trail
Scoped Environmental Impact Study
Block 21 Vintages Select, City of Mississauga
Part of Lot 21 and 22, Registered Plan 43M-1710

Prepared For:

DiBlasio Homes

Prepared By:

Beacon Environmental Limited

Date: *Project:*

March 2019 **215194**

MARKHAM
80 Main Street North
Markham, ON L3P 1X5
T)905.201.7622❖ F)905.201.0639

BRACEBRIDGE
126 Kimberley Avenue
Bracebridge, ON P1L 1Z9
T)705.645.1050

GUELPH
373 Woolwich Street
Guelph, ON N1H 3W4
T)519.826.0419

PETERBOROUGH
305 Reid Street
Peterborough, ON K9J 3R2
T) 705.243.7251

Executive Summary

Beacon Environmental Limited (Beacon) was retained by DiBlasio Homes to prepare a Scoped Environmental Impact Study (EIS) in support of a proposal to re-develop an approximately 0.9287 ha property located at 6620 Rothschild Trail in the City of Mississauga. The legal description of the property is Part of Lot 9, Concession 2, WHS. The property is part of Registered Plan 43M-1710. The subject property is located within the jurisdiction of the Credit River Valley Conservation Authority (CVC) and is situated adjacent to two watercourses: the main branch of Fletchers Creek and a small ravine tributary. Both of these features have been characterized as confined valley systems.

The primary objective of this Scoped EIS is to demonstrate that the proposed development and/or site alteration will not have a negative impact on natural heritage features or ecological functions associated with the property. Policy 6.3.27 of the City of Mississauga Official Plan lists an EIS as one of the types of studies that may be required as part of a complete application submission for an official plan amendment, rezoning, draft plan of subdivision or condominium or consent application. The scope of work required in support of this Scoped EIS was identified in consultation with the City of Mississauga and CVC. Terms of Reference for the EIS were approved in March 2017.

This Scoped EIS was prepared using an integrated approach. Biophysical features are characterized using background information, technical reports from other consultants on the multi-disciplinary project team, and field investigations to fill in data gaps.

Background information that was reviewed included but were not limited to:

Current and Historical Aerial Photographs
NHIS Databases
MNRF SAR Screening
CVC Reports

Site specific technical studies relied upon included:

The study team and their respective roles are described below:

A. Beacon Environmental Limited – EIS coordination, fluvial geomorphology, aquatic and terrestrial ecology;
B. Soil Engineers Ltd. 2014 - Soil Investigation;
C. Soil Engineers Ltd. 2017 – Geotechnical Investigation and Slope Stability Assessment; and
D. SKIRA & Associates 2018 – Functional Servicing Report and Site Grading and Servicing Plan.

Field investigations and ecological surveys undertaken by the study team to characterize existing conditions on the subject property and the immediate adjacent lands included:

Soil Investigation
Vegetation Assessment
Tree Inventory
Wildlife Habitat Suitability Assessment

The findings of the background review and field studies were used to identify potential environmental constraints to development, and to identify opportunities for enhancement. The constraint analysis was also used to establish potential development limits. A summary of the key study findings is provided below:

- A **geotechnical investigation** was completed by Soil Engineers (2017) to characterize subsurface conditions within the tableland portion of the subject property. Results presented in the report indicated that subsurface conditions within the subject property generally consist of a layer of earth fill, underlain by a layer of silty sand till/silty clay till, beyond which shale bedrock was encountered.

- **Ecological surveys** were undertaken by Beacon Environmental Limited. Vegetation communities on the subject property and adjacent lands were mapped and classified according to the Southern Ontario Ecological Land Classification System (ELC) (Lee *et al*. 1998). The majority of the subject property was characterized as existing development and associated cultural vegetation, with forest and plantation ELC communities along the edges. Floristic surveys of the subject property and adjacent valleylands were conducted on October 13, 2015. A total of 60 species of vascular plants were identified on the subject property, of which 21 are non-native to Ontario and 42 are native. Of the 42 native species, 40 are ranked S5 by the Natural Heritage Information Centre (NHIC), indicating that they are common and secure in Ontario. Two species, Honey Locust (*Gleditsia triacanthos*) and Butternut (*Juglans cinerea*), are ranked S2 (imperilled). In Ontario, natural occurrences of Honey Locust are rare; however, Honey Locust is a commonly planted landscape tree. The trees on the property are a planted variety. A single Butternut tree was identified in the woodland adjacent to the subject property. Based on a review of *Plants of the Credit River Watershed* (CVC 2002), no regionally rare or uncommon species occur on or adjacent to the subject property.

  A tree inventory was also completed for the subject property and lands immediately adjacent to it. All trees with stems measuring 10 cm in diameter at breast height (DBH) were tagged and assessed. A total of 111 trees (≥ 10 cm DBH) were documented.

  A desktop wildlife habitat assessment was completed to identify potential habitat for birds, reptiles and mammals that may be associated with the property. General field observations were documented on November 11, 2015. A total of 89 species of birds have been recorded within OBBA Square 17PJ03, the square in which the subject property is located. A total of 30 species of birds were identified that could potentially breed on, or immediately adjacent to, the subject property. A total of 64 species of birds were identified that could potentially breed within 120 m of the subject propertyHabitat for the majority of these species is associated with the forested, wetland and meadow habitats associated with the valleylands within 120 m of the subject property.

  Habitat on the subject property was not considered to be suitable for turtles. Potentially suitable habitat for Snapping Turtle (*Chelydra serpentina*) and Midland Painted Turtle (*Chrysemys picta marginata*) could be present within Fletchers Creek adjacent the subject property, which could be used by turtles to migrate to and from other suitable basking / nesting habitats upstream and downstream of the subject property.

Based on correspondence with MNRF, potential habitat for endangered bats (i.e., Little Brown Myotis (*Myotis lucifugus*), Northern Myotis (*Myotis septentrionalis*) and Tricolored Bat (*Perimyotis subflavus*)) in cavities was identified. A snag survey was undertaken for the subject property during leaf-off conditions (April 18, 2017). As no cavity trees were documented that have the potential to provide maternity roost habitat within the limit of development. As such, impacts to SAR bat species are not anticipated.

No breeding habitat for frogs or toads is present on the subject property. Potentially suitable habitat for these species could be present in valleyland wetland habitats located within 120 m of the subject property.

A total of 21 species of mammals were identified as having the potential to occur on, or within 120 m of the subject property. All identified species are commonly associated with natural or naturalized areas within urban or rural environments in southern Ontario.

- A **Fish Community Assessment** was completed using existing fisheries information for Fletchers Creek which was obtained from CVC fish records and the Fletchers Creek Characterization report (CVC 2012). A total of 34 fish species have been recorded in Fletchers Creek. Fish community sampling within the vicinity of the subject property was undertaken in 1965, 1982, 1989, and 2010 and documented a total of 13 fish species. The fish species composition data indicates that Fletchers Creek supports a diverse coolwater community with some warmwater native species. Fletchers Creek is classified as a coolwater system (CVC 2002). The main branch of Fletchers Creek is classified by MNRF as occupied Redside Dace (*Clinostomus elongatus*) habitat. No historical fish sampling data was available for the tributary of Fletchers Creek, but the tributary has been identified by MNRF as contributing to downstream occupied habitat within the main branch of Fletchers Creek.

- A **Fluvial Geomorphic Assessment** was completed by Beacon to confirm existing geomorphic conditions along the portions of Fletchers Creek and the tributary of Fletchers Creek adjacent to the subject property on October 7, 2015. Rapid assessment results indicated that Reach FC-1 exhibited minor evidence of stress ('in transition') with a score of 0.28. Widening was identified as the dominant mode of adjustment, with indicators of planimetric form adjustment, degradation and aggradation also observed. Reach FC-2 of Fletchers Creek also exhibited minor evidence of stress ('in transition') with a score of 0.26. Widening was identified as the dominant mode of adjustment, with indicators of planimetric form adjustment, degradation and aggradation also observed. Rapid assessment results indicated that Reach FCT-1 was stable ('in regime') with a score of 0.02. Existing channel disturbances included the Amarone Court trail crossing.

- A **Site Based Water Balance and Stormwater Management Plan** was completed by SKIRA as part of the FSR. Based on the CVC water balance criteria, the site is to retain a 5 mm rainfall and allow it to evaporate and infiltrate back into the ground. A water balance of 23.03 m^3 is required for the subject property. To maintain site infiltration and to mitigate for increased stormwater runoff from the site, it is proposed that runoff from the proposed development will be discharged into the Fletchers Creek tributary via an existing outfall. The proposed lower level parking will have foundation drains that will be connected to the storm sewer. The stormwater management plan will ensure that the 100-year storm event will not exceed the pre-development release rates of the 2 year storm event.

The subject property was designated for residential development in 1997 by the City. In 1998, the lands were included within an approved Draft Plan of Subdivision and were zoned to permit detached dwellings. In recognition of the 'grandfathered' nature of the development application, CVC and the City have agreed to reduced (variable) buffers to existing environmental features relative to current policies and regulations.

Consultation with MNRF regarding the subject property has been ongoing since 2013. On June 4, 2014, a site meeting was held with MNRF staff to review existing site conditions and to confirm Redside Dace regulated habitat limits for the main branch of Fletchers Creek.

In accordance with direction provided through the agency consultation process, the proposed development limit was defined based on the following criteria:

- 6.0 m setback to the long term stable slope limit;
- 10.0 m setback to Regulatory Floodline (CVC 2015);
- 5.0 m buffer to the dripline (woodland boundary); and
- Redside Dace Occupied Habitat Limit.

There are no significant wetlands, ANSIs located on the subject property. The Fletchers Creek valley and its tributary would qualify as significant valleylands and Candidate Significant Wildlife Habitat (SWH) as it contains habitat for bat maternity colonies and habitat for Special Concern species. Natural hazards relevant to the subject property include: the regional floodline, and erosion hazards, including long-term stable slope line and Redside Dace Occupied Habitat Limit (Fletchers Creek).

The proposed development consists of a residential four (4) storey apartment building with access from Rothschild Trail in the City of Mississauga. The existing building on the property will be demolished. For additional information regarding the proposed development, refer to the FSR (SKIRA & Associates 2018).

The impact assessment has determined that the proposed development will not negatively impact the natural heritage system or its functions and is being undertaken in a manner that complies with applicable environmental legislation, regulations and policies.

Monitoring recommendations are provided in the EIS to ensure that the various protection and mitigation measures are implemented and performing the desired functions to acceptable levels. Monitoring will be undertaken during construction and post-construction to evaluate performance of the proposed erosion and sediment controls and the storm outlet. Monitoring requirements will be reviewed and refined, as appropriate, during the detailed design phase and based on input from MNRF and CVC.

The findings and recommendations of this report should be read in conjunction with, the limitations set out in 6620 Rothschild Trail Functional Servicing Report (**Appendix J**; SKIRA & Associates 2018).

Table of Contents

page

1. Introduction 1
2. Policy Review 1
   - 2.1 Provincial Policy Statement (2014) 2
   - 2.2 Regional Municipality of Peel Official Plan (2016) 4
   - 2.3 City of Mississauga Official Plan (2018) 4
   - 2.4 Credit Valley Conservation Authority Policies and Regulations 7
     - 2.4.1 Slope Stability Definition and Determination Guideline (CVC 2014) 9
   - 2.5 Ontario Endangered Species Act (2007) 10
   - 2.6 Species at Risk Act (2002) 10
   - 2.7 Migratory Birds Convention Act 11
   - 2.8 Agency Consultation 11
     - 2.8.1 City of Mississauga and Credit Valley Conservation 11
     - 2.8.2 MNRF 12
3. Background Review 12
   - 3.1 Fletchers Creek Characterization Report (Draft 2012) 12
   - 3.2 City of Mississauga Natural Areas Survey 13
4. Methodology 13
   - 4.1 Soils Investigation (Soil Engineers Ltd. 2014) 14
   - 4.2 Vegetation Communities and Flora Inventory 14
   - 4.3 Tree Inventory 14
   - 4.4 Wildlife Habitat 15
     - 4.4.1 Breeding Birds 15
     - 4.4.2 Reptiles 15
     - 4.4.3 Mammals 15
   - 4.5 Aquatic Habitat 15
   - 4.6 Fluvial Geomorphology 15
     - 4.6.1 Reach Delineation 15
     - 4.6.2 Rapid Assessments 16
5. Existing Conditions 16
   - 5.1 Topography 16
   - 5.2 Soils 17
   - 5.3 Hydrogeology 18
   - 5.4 Surface Drainage 18
   - 5.5 Vegetation Communities and Flora Inventory 18
   - 5.6 Flora 19
   - 5.7 Tree Inventory 20
   - 5.8 Wildlife Habitat 20
     - 5.8.1 Breeding Birds 20
       - *5.8.1.1 Reptiles 21*

5.8.1.2 Amphibians 21
5.8.1.3 Mammals 21
5.9 Aquatic Habitat 22
5.9.1 Fish Community 22
5.10 Fluvial Geomorphology 22
5.10.1 Reach Delineation 22
5.10.1 Results 23
5.10.1.1 Reach FC-1 23
5.10.1.2 Reach FC-2 24
5.10.1.3 Reach FCT-1 25
5.11 Endangered Species and Species of Conservation Concern 25
5.11.1 Redside Dace 25
5.11.2 Butternut 26
5.11.3 Bats 26
6. Evaluation of Significance 27
6.1 Significant Wetlands 27
6.2 Significant Habitat for Threatened or Endangered Species 27
6.2.1 Redside Dace 27
6.2.2 Butternut 27
6.2.3 Bats 28
6.3 Significant Areas of Natural and Scientific Interest (ANSI) 28
6.4 Significant Valleylands 28
6.5 Significant Woodlands 28
6.6 Significant Wildlife Habitat 29
6.7 Fish Habitat 29
6.8 Summary 29
7. Constraints Analysis 29
7.1 Physical Top of Bank 30
7.2 Woodland Boundary (Dripline) 30
7.3 Natural Heritage Constraints 30
7.4 Redside Dace Regulated Habitat 30
7.5 Natural Hazards 31
7.5.1 Regulatory Floodline 31
7.5.2 Long Term Stable Top of Slope 31
7.6 Development Limit 32
8. Description of Proposed Development 32
8.1 Site Servicing 33
8.1.1 Water and Sanitary 33
8.1.2 Stormwater Management 33
9. Impact Assessment and Mitigation 33
9.1 Grading 34
9.2 Tree Removals 34
9.3 Species at Risk 34
9.3.1 Redside Dace 34

9.3.2 SAR Bat Species 35
9.3.3 Butternut 35
9.6 Tree Preservation and Protection 36
9.7 Opportunities for Compensation and Enhancement 36
10. Policy Conformity 36
10.1 Permit Requirements 39
10.1.1 MNRF Endangered Species Act (2007) 39
10.1.2 CVC Ontario Regulation 160/06 39
10.1.3 City of Mississauga 39
10.1.4 DFO Fisheries Act (Section 35) 39
11. Monitoring 39
12. Conclusion 43
13. References 45

Figures

Figure 1. Site Location ..... after page **Error! Bookmark not defined.**
Figure 2a. Existing Conditions Geomorphology and Aquatic ..... after page 16
Figure 2b. Existing Conditions Terrestrial ..... after page 18
Figure 3. Environmental Constraints ..... after page 20
Figure 4. Constraints and Proposed Development ..... after page 32
Figure 5. Compensation and Enhancement Opportunities ..... after page 36

Tables

Table 1. Minimum Toe Erosion Allowance based on Existing Conditions (MNR 2002). 3
Table 2. Suggested Design Toe Erosion Allowance (CVC 2014). 9
Table 3. Summary of Field Investigations 14
Table 4. Groundwater Levels (Soil Engineers Ltd. 2014) 18
Table 5. General Reach Characteristics 23
Table 6. Rapid Assessment Results 24
Table 7. Policy Compliance Assessment 37
Table 8. Proposed Monitoring Framework 41

Appendices

A. Scoped Environmental Impact Study Approved Terms of Reference
B. MNRF ESA Screening Response
C. Soil Investigation Report
D. Plant List
E. Arborist Report
F. Bird Habitat Assessment
G. Wildlife Habitat Assessment
H. Fluvial Geomorphology Photographic Record
I. Slope Stability Assessment
J. Functional Servicing Report

1. Introduction

Beacon Environmental Limited (Beacon) was retained by DiBlasio Homes to prepare a Scoped Environmental Impact Study (EIS) in support of the re-development of 6620 Rothschild Trail in the City of Mississauga (hereto referred as the subject property. The legal description of the property is Part of Lot 9, Concession 2, WHS. The property is part of Registered Plan 43M-1710. The subject property (shown on **Figure 1**) is located within the jurisdiction of the Credit River Valley Conservation Authority (CVC) and is situated adjacent to two watercourses: the main branch of Fletchers Creek and a small ravine tributary. Both of these features have been characterized as confined valley systems.

The majority of the subject property is identified within the City of Mississauga Land Use Schedule as Low Density Residential. Presently, land use within the subject property consists of an estate lot with a single residential dwelling. The subject property also contains components of the City's Natural Heritage System (NHS). The valleylands are designated as "Significant Natural Areas and Natural Green Spaces" on Schedule 3 of the City's Official Plan, which corresponds with the boundary of Natural Area MV2 in the City's Natural Area Survey. The valleylands are also identified as "Natural Hazards" on Schedule 3.

The policies of the City of Mississauga Official Plan require that an EIS be prepared in support of development and site alteration that are within or adjacent to Significant Natural Areas and Natural Green Spaces. The purpose of the EIS is to demonstrate that the proposed development and/or site alteration will not have a negative impact on natural heritage features or ecological functions associated with the property. Policy 6.3.27 of the City of Mississauga Official Plan lists an EIS as one of the types of studies that may be required as part of a complete application submission for an official plan amendment, rezoning, draft plan of subdivision or condominium or consent application.

The scope of work required in support of this Scoped EIS was identified in consultation with the City of Mississauga and CVC. The approved Scoped EIS Terms of Reference is provided in **Appendix A.**

2. Policy Review

This section includes an overview of key federal, provincial, and local environmental policies, legislation, and regulations that are directly relevant to this Scoped EIS and land use planning for the subject property:

- Provincial Policy Statement (2014);
- Region of Peel Official Plan (2016);
- City of Mississauga Official Plan (2017);
- Conservation Authorities Act – O. Reg. 166/06;
- Ontario Endangered Species Act (2007); and
- Species at Risk Act (2002).

2.1 Provincial Policy Statement (2014)

Section 2.1 of the Provincial Policy Statement (PPS) provides direction to municipalities regarding planning policies specifically for the protection and management of natural heritage features and resources. The PPS identifies seven natural heritage components of interest and establishes policies to ensure their protection as part of land use planning exercises. Natural heritage features include:

a) Significant wetlands;
b) Significant coastal wetlands;
c) Significant habitat of endangered and threatened species;
d) Fish habitat;
e) Significant woodlands;
f) Significant valleylands;
g) Significant Areas of Natural and Scientific Interest (ANSIs); and
h) Significant wildlife habitat.

The policies of Section 2.1 are as follows:

2.1.1 Natural features and areas shall be protected for the long term.

2.1.2 The diversity and connectivity of natural features in an area, and the long-term ecological function and biodiversity of natural heritage systems, should be maintained, restored or, where possible, improved, recognizing linkages between and among natural heritage features and areas, surface water features and ground water features.

2.1.3 Natural heritage systems shall be identified in Ecoregions 6E & 7E1, recognizing that natural heritage systems will vary in size and form in settlement areas, rural areas, and prime agricultural areas.

2.1.4 Development and site alteration shall not be permitted in:
- *a) significant wetlands in Ecoregions 5E, 6E and 7E 1 ; and*
- *b) significant coastal wetlands.*

2.1.5 Development and site alteration shall not be permitted in:
- *a) significant wetlands in the Canadian Shield north of Ecoregions 5E, 6E and 7E 1;*
- *b) significant woodlands in Ecoregions 6E and 7E (excluding islands in Lake Huron and the St. Marys River); significant valleylands in Ecoregions 6E and 7E (excluding islands in Lake Huron and the St. Marys River) significant wildlife habitat; significant areas of natural and scientific interest; andcoastal wetlands in Ecoregions 5E, 6E and 7E 1 that are not subject to policy 2.1.4(b) unless it has been demonstrated that there will be no negative impacts on the natural features or their ecological functions.*

2.1.6 Development and site alteration shall not be permitted in fish habitat except in accordance with provincial and federal requirements.

Site Location	Figure 1
Block 21 Vintages Selected Scoped EIS	
BEACON ENVIRONMENTAL	Project: 215194 Last Revised: March, 2019
Client: DiBlasio Homes	Prepared by: DU Checked by: SG
N 1:1,200	Inset Map:1:20,000
Contains information licensed under the Open Government License–Ontario Orthoimagery Baselayer: FBS Peel 2018	

C:\Dropbox\Dropbox (Beacon)\All GIS Projects\2015\215194\MXD\2019-03-18_Fig1_SiteLocation_215194.mxd

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

2.1.8 Development and site alteration shall not be permitted on adjacent lands to the natural heritage features and areas identified in policies 2.1.4, 2.1.5, and 2.1.6 unless the ecological function of the adjacent lands has been evaluated and it has been demonstrated that there will be no negative impacts on the natural features or on their ecological functions.

Policy 3.1 of the PPS provides direction to municipalities regarding land use planning in natural hazard areas. These policies generally prohibit or restrict development in areas prone to flooding and erosion. In support of the Policy Statement, a Technical Guide - Rivers and Streams: Erosion Hazard Limit document was prepared (MNR 2002) to outline standardized procedures for the delineation and management of riverine erosion hazards in the Province of Ontario. The guide presents erosion hazard protocols based on two generalized landform systems through which watercourses flow: confined and unconfined valley systems. Through this approach, the meander belt width plus an erosion access allowance is defined to determine the erosion hazard limit of an unconfined valley system. For confined valley systems, the erosion hazard limit is governed by geotechnical considerations, including the stable slope allowance and an applicable toe erosion allowance (i.e., channel migration component).

The intent of the toe erosion allowance is to mitigate risk to the adjacent tablelands by accounting for the potential of the stream to migrate laterally into the valley wall and erode the toe of slope. This process can result in subsequent slope adjustments or failure and cause the loss of property or pose a risk to human life. Policy dictates that, for confined valley systems, an initial screening must be undertaken to determine whether the valley wall is less than 15 m from the watercourse. Where soil conditions are not known, a 15 m toe erosion allowance is recommended. Based on a more detailed evaluation, the Technical Guide provides recommendations for the toe erosion allowance referencing existing soil structure and channel stability conditions (**Table 1**).

Table 1. Minimum Toe Erosion Allowance based on Existing Conditions (MNR 2002).

Type of Material Native Soil Structure	Evidence of Active Erosion or where the Bankfull Flow Velocity is Greater than Competent Flow Velocity	No Evidence of Active Erosion		
		Bankfull Width		
		<5m	5-30m	>30m
Hard Rock (e.g. granite)	0-2 m	0 m	0 m	1 m
Soft Rock (shale, limestone), cobbles, boulders	2-5 m	0 m	1 m	2 m
Clays, clay-silt, gravels	5-8 m	1 m	2 m	4 m
Sand, silt	8-15 m	1-2 m	5 m	7 m

2.2 Regional Municipality of Peel Official Plan (2016)

Peel Region's Official Plan (2016 Consolidation) contains policies aimed at protecting, maintaining, and restoring a Regional Greenlands System consisting of Core Areas, Natural Areas and Corridors (NACs), and Potential Natural Areas and Corridors (PNACs).

Core Areas represent those features and areas that are considered to be significant at the provincial and regional levels. They generally correspond with significant features and areas listed in the PPS and include Core Valley and Stream Corridors. Policy 2.3.2.6 prohibits development and site alteration within the Core Areas of the Greenlands System in Peel except for conservation activities, essential infrastructure, passive recreation and minor development or site alteration. Further, to the greatest extent possible, it must be shown that impacts to the Core Area feature are minimized and any impact to the feature or its functions that cannot be avoided are mitigated through restoration or enhancement.

Natural Areas and Corridors (NAC) include the following (policy 2.3.2.9) that apply in the Study Area: significant wildlife habitat (SWH), fish habitat and valley and stream corridors not defined as part of the Core Areas.

Potential Natural Areas and Corridors (PNACs) include the following (policy 2.3.2.10) that apply in the Study Area: unevaluated wetlands (considered other wetlands by the City and CVC).

NACs and PNACs represent natural features and areas that are considered locally significant. Regional policies pertaining to NACs and PNACs defer their interpretation, protection, restoration, enhancement, proper management and stewardship to local municipalities.

The subject property includes lands identified as Core Areas in the Region's Greenlands mapping (Schedule A).

2.3 City of Mississauga Official Plan (2018)

The Mississauga Official Plan (City of Mississauga 2018a) in effect at the time of writing this report has been considered as the basis for the policy review. The Official Plan Land Use Designations Schedule (Schedule 10) identifies the subject property as Residential Low Density II. The Official Plan Natural System Schedule 3 identifies Fletchers Creek and the Fletchers Creek tributary valley systems adjacent to the subject property as Natural Hazard lands and as Significant Natural Area / Natural Green Space. Policies specific to the Official Plan relevant to the subject property are discussed in this section. An assessment of existing environmental features within and adjacent to the subject property in accordance with the noted applicable policies is provided in **Section 8**.

Chapter 6 of the City's Official Plan provides policies pertaining to the natural environment. General policies (Section 6.1) include commitments to, among other things:

- Protect, enhance, restore and expand the NHS (policy 6.1.1a);
- Protect life and property from natural and human made hazards (policy 6.1.1c);
- Promote education and awareness for the protection and enhancement of the environment (policy 6.1.5); and

- Improve air quality (policy 6.1.6) and address climate change mitigation and adaptation (policy 6.1.7).

Section 6.3 of the Mississauga Official Plan contains policies pertaining to the protection of the Green System. The Green System is comprised of:

1) The Natural Heritage System;
2) The Urban Forest;
3) Natural Hazard Lands; and
4) Parks and Open Spaces.

Each of these categories is relevant to the subject property and may overlap with one or more of the other three categories. Key policies from each are presented in the following subsections.

Natural Heritage System (NHS) and Urban Forest

The City's NHS consists of:

1) Significant Natural Areas;
2) Natural Green Spaces;
3) Special Management Areas;
4) Residential Woodlands; and
5) Linkages.

The City's Urban Forest consists of the wooded portions of any of these five categories as well as trees outside of wooded natural areas of the NHS.

Significant Natural Areas include one or more of the following features:

- Provincially or regional significant life science areas of natural and scientific interest (ANSIs);
- Environmentally sensitive or significant areas (as inventoried and designated by the Conservation Authorities and Provincial government;
- Habitat of threatened species or endangered species;
- Fish habitat;
- Significant wildlife habitat (SWH);
- Significant woodlands;
- Significant wetlands, including PSWs, coastal wetlands, and other wetlands greater than 0.5 hectares; and
- Significant valleylands, including the main branches, major tributaries and other tributaries and watercourse corridors draining directly to Lake Ontario including the Credit River, Etobicoke Creek, Mimico Creek and Sixteen Mile Creek.

The subject property does not contain and is not adjacent to any ANSIs, environmentally sensitive or significant areas or significant wetlands, but is located adjacent to the habitat of threatened species or endangered species, SWH, significant woodlands and significant valleylands (refer to Section 5).

Policy 6.3.27 states:

> *Development and site alteration as permitted in accordance with the Greenlands designation within or adjacent to a Significant Natural Area will not be permitted unless all reasonable alternatives have been considered and any negative impacts minimized. Any negative impact that cannot be avoided will be mitigated through restoration and enhancement to the greatest extent possible. This will be demonstrated through a study in accordance with the requirements of the Environmental Assessment Act. When not subject to the Environmental Assessment Act, an Environmental Impact Study will be required.*

Natural Green Spaces are areas that meet one or more of the following criteria:

- Woodlands greater than 0.5 hectares that do not qualify as significant woodland;
- Wetlands that do not qualify as significant wetland;
- Watercourses that do qualify as significant valleyland; and
- All natural areas greater than 0.5 hectares that have vegetation that is uncommon in the City.

Policy 6.3.32 states that development and site alteration will not be permitted within or adjacent to Natural Green Spaces unless it has been demonstrated through an EA or an Environmental Impact Study (EIS) that there will be no negative impact to the natural heritage features and their ecological functions and development opportunities for their protection, restoration, enhancement and expansion have been identified.

As per policy 6.3.7 and 6.3.8, buffers will be determined for NHS components on a site-specific basis as part of an EIS to the satisfaction of the City and appropriate Conservation Authority.

Special Management Areas "*are lands adjacent to or near Significant Natural Areas or Natural Green Spaces and will be managed or restored to enhance and support the Significant Natural Area or Natural Green Space*" (policy 6.3.15).

The Official Plan also states that "*Mississauga will protect, enhance, restore and expand the Urban Forest*" (policy 6.3.42) through a variety of tools and approaches including strategic tree planting and maintenance on public lands and "*ensuring development and site alteration will not have negative impacts on the Urban Forest*". Policy 6.3.44 specifically states that:

> *Development and site alteration will demonstrate that there will be no negative impacts to the Urban Forest. An arborist report and tree inventory that demonstrates tree preservation and protection both pre and post construction, and where preservation of some trees is not feasible, identifies opportunities for replacement, will be prepared to the satisfaction of the City in compliance with the City's tree permit by-law*.

In general, the City "*will have regard for the maintenance of the long term ecological integrity of the Natural Heritage System in all decisions*" (policy 6.3.23) and is committed to using native and non-invasive species for plantings (policy 6.3.24c) and to working with the Conservation Authorities to encourage enhancement of natural areas and naturalize City-owned lands "*particularly where they abut or directly connect areas within the Natural Heritage System*" (policy 6.3.4).

Natural Hazard Lands

Natural Hazard lands are associated with valley and watercourse corridors, as well as the Lake Ontario shoreline. These areas are prone to flooding and erosion and are generally unsuitable for development. Land use in Natural Hazard lands is limited to conservation, flood and/or erosion control, essential infrastructure and passive recreation.

Development and site alternation are not permitted within the erosion hazard lands associated with valleylands and watercourses (policy 6.3.47). Development proposed adjacent to erosion hazard lands may need to be supported by slope stability and/or stream erosion studies (policy 6.3.48) as well as an Erosion and Sediment Control Study (policy 6.3.63).

With respect to flood plains, it is the policy of the City that lands subject to flooding are a danger to life and property and, as such, development is generally prohibited. However, it is recognized that some historic development has occurred within flood plains and may be subject to special flood plain policy consideration.

As per policy 6.3.7 and 6.3.8, buffers will be determined for Natural Hazard Lands on a site-specific basis as part of an EIS to the satisfaction of the City and appropriate Conservation Authority.

2.4 Credit Valley Conservation Authority Policies and Regulations

CVC regulates activities within and adjacent to wetlands, watercourses and hazard lands under Ontario Regulation 160/06 - *Regulation of Development, Interference with Wetlands and Alterations to Shorelines and Watercourses* under Section 28 of the Conservation Authorities Act. A permit must be obtained from CVC for development or site alteration within regulated areas.

CVC's *Watershed Planning and Regulation Policies* (CVC 2010) document contains policies pertaining to the protection of natural heritage features and natural hazards. In general, CVC will not support development or site alteration within the NHS, including natural heritage features and areas (valleylands, environmentally significant areas, ANSI, woodlands, wetlands, watercourse and fish habitat), significant natural areas, or natural hazards except in accordance with Chapters 6 and 7.

The policies contained in Chapter 6 provide guidance for CVC's review of proposals submitted pursuant to the Planning Act.

Policy 6.1(j) states:

> *CVC will not support modifications to components of the natural heritage system, including natural heritage features and areas, significant natural areas, hazardous land, erosion access allowances and associated buffers, to create additional useable area or to accommodate or facilitate development and site alteration unless the modifications have been appropriately addressed through an environmental assessment, comprehensive environmental study or technical report, to the satisfaction of CVC.*

Policy 6.1(l) states: *CVC recognizes that certain types of development and site alteration by their nature must locate within the natural heritage system, including natural heritage features and areas, significant*

natural areas, hazardous land, erosion access allowances and associated buffers. Considering this, CVC may support such works where they have been addressed through an environmental assessment, comprehensive environmental study or technical report, completed to the satisfaction of CVC. This may include, but is not limited to, the following:

i. infrastructure, including stormwater management facilities;
ii. development and site alteration associated with passive or low intensity outdoor recreation and education;
iii. development which by its nature must locate within hazardous land;
iv. development and site alteration associated with conservation or restoration projects or management activities following sustainable management practices;
v. hazardous land remediation or mitigation works required to protect existing development; and
vi. modifications to components of the natural heritage system to implement the recommendations of an environmental assessment, comprehensive environmental study or technical report that has been completed to the satisfaction of CVC.

According to Section 6.2.1:

> *CVC will not support the creation of new lots through plan of subdivision or consent that extend into, or fragment ownership of, the natural heritage system, including natural heritage features and areas, significant natural areas, hazardous land and erosion access allowances, in consideration of the long term management concerns related to risks to life and property and natural heritage protection.*

CVC will recommend that lots created through plan of subdivision or consent are set back a minimum of whichever is the greatest of the following buffers:

i. 10 metres from the limit of flood hazards;
ii. 10 metres from the limit of erosion hazards;
iii. 10 metres from the limit of dynamic beach hazard;
iv. 10 metres from the drip line of significant woodlands;
v. 10 metres from the limit of other wetlands;
vi. 30 metres from the limit of provincially significant wetlands;
vii. 30 metres from the bankfull flow location of watercourses; and/or
viii. A distance to be determined through the completion of a comprehensive environmental study or technical report, to the satisfaction of CVC, from the limit of the following:
    a. Significant wildlife habitat;
    b. Significant habitat of threatened species and endangered species;
    c. Regionally and provincially significant life science ANSIs;
    d. ESAs; and/or
    e. Significant habitat of species of conservation concern.

CVC may recommend lots be set back a distance other than those identified [above] based on the results of a comprehensive environmental study or site-specific technical report completed to the satisfaction of CVC, and consistent with provincial and municipal policy.

2.4.1 Slope Stability Definition and Determination Guideline (CVC 2014)

The CVC (2014) Slope Stability Definition and Determination Guideline defines the Long Term Stable Slope Line as consisting of a Stability Component and the Erosion Component. The Erosion Component is further defined as:

> *The regression of the slope toe/channel bank due to erosion over the design life of the structure at the crest of the slope and is measured as a horizontal distance.*

Factors for identified within the Guideline for consideration in the determination of the Erosion Component include:

- Proximity of the slope toe to the watercourse;
- Sediment load carried by the watercourse;
- Average and peak flow rates and velocities of the watercourse;
- Fluvial geomorphological processes affecting the reach within which the site is located;
- Susceptibility of the soils to erosion;
- Increases in surface runoff over the slope;
- Type and extent of vegetation; and
- Weathering of slope face.

As illustrated in Figure 4a of the Guideline, delineation of the Erosion Component consists of two separate factors:

1. Determination of the distance from the toe of the valley wall to the watercourse channel bank; and
2. Determination of the design toe erosion allowance.

The design toe erosion allowance can either be calculated based on historical records for the site or based on suggested allowances as identified in the guideline (**Table 2**).

Table 2. Suggested Design Toe Erosion Allowance (CVC 2014).

Material at Channel Bank or Bankfull	Bank Condition		
	Active Erosion of Bank	Erosion Not Currently Evident	Existing Bank Protection in Place and Maintained Along Bank
Limestone/Dolostone	2 m	1 m	0 m
Shale	5 m	2 m	0 m
Cohesive Soils (Silty Clays, Clayey Silts)	8 m	4 m	0 m
Cohesionless Soils (Silts, Sands)	15 m	7 m	0 m

2.5 Ontario Endangered Species Act (2007)

Species at Risk in Ontario are those listed as provincially Endangered, threatened or special concern at the provincial level, however the act only regulates the habitat of those that are Endangered or Threatened.

The Ontario Endangered Species Act (2007) (ESA) provides legal protection to Endangered and Threatened species and their habitat. The ESA states that no person shall:

- *kill, harm, harass, capture or take a living member of a species that is listed on the Species at Risk in Ontario List as an extirpated, endangered or threatened species.*
- *damage or destroy the habitat of a species that is listed on the Species at Risk in Ontario list as an endangered or threatened species.*

However, under subsection 17(1) of the ESA, MNRF may authorize a person to engage in an activity that would otherwise be prohibited under the ESA. Such activities would require a permit, agreement, or regulatory exemption.

A Species at Risk screening letter was received from Aurora District MNRF on April 26th, 2017 (**Appendix B**). The following species have been recorded in the vicinity of the study area:

- Butternut – Endangered
- Redside Dace (occupied habitat in Fletchers Creek) – Endangered

There is also potential habitat for endangered bats (i.e., Eastern Small-footed Myotis, Little Brown Myotis, Northern Myotis, Tri-colored Bat).

2.6 Species at Risk Act (2002)

The Federal *Species at Risk Act* – SARA (2002) is intended to prevent federally endangered or threatened wildlife (including plants) from becoming extinct from the wild, and to help in the recovery of these species. SARA is also intended to help prevent species listed as special concern federally from becoming endangered or threatened. To ensure the protection of Species at Risk (SAR), SARA contains prohibitions that make it an offence to kill, harm, harass, capture, take, possess, collect, buy, sell or trade an individual of a species listed in Schedule 1 of SARA as endangered, threatened or extirpated. However, this legislation applies primarily to lands under Federal jurisdiction, and relies on Provincial laws to protect Federal SAR habitat. For lands not under Federal jurisdiction, SARA prohibitions apply only to aquatic species and migratory birds that are also listed in the *Migratory Birds Convention Act* (1994). The intent of SARA is to protect critical habitat as much as possible through voluntary actions and stewardship measures.

Redside Dace habitat is listed as a federally endangered species. Therefore, the regulations of SARA (2002) apply to the subject property in relation to direct (occupied) Redside Dace habitat in Fletchers Creek.

2.7 Migratory Birds Convention Act

The Federal *Migratory Birds Convention Act* – MBCA (1994) protects the nests, eggs and young of most bird species from harassment, harm or destruction. In the Park, this legislation would apply in relation to any proposed vegetation clearing as part of the implementation of the proposed Preferred Concept, once approved. Although there are no permitting requirements, proponents must comply with the legislation and may be fined if found to be in contravention of this act.

Environment Canada broadly considers the "high risk" period for encountering nesting birds to be from mid-March to late August. However, in southern Ontario the peak period for encountering most types of nesting birds is from mid-May until mid to late July. Therefore, to ensure compliance with the MBCA, vegetation clearing from March 16 or April 1 and August 31 is typically discouraged, particularly in natural or naturalized areas. However, vegetation clearing within this window may be permissible as long as there is no evidence of nesting birds in the areas to be disturbed.

It is the general practice of Beacon to encourage approved removal of natural vegetation and trees outside of natural areas in southern Ontario between September 1 and March 31, but to provide screenings for nesting birds (and bats if required) from April 1 to May 15 and August 1 to August 31 in natural areas if needed. Screenings in natural areas between May 16 and July 31 are generally discouraged because it can be very difficult to detect all active nests in well-vegetated natural areas during the peak breeding season. However, screenings of individual trees or anthropogenic structures and screenings of natural areas in some situations can be done at any time of year, including between May 16 and July 31. Site-specific review and consultation is required to make this determination.

Regardless of the date, any nest and habitat supporting nesting birds is protected under the MBCA whenever an active nest is present, and it is the proponent's responsibility to comply with the Act.

2.8 Agency Consultation

The following section provides an overview of agency consultation undertaken do date in support of the project.

2.8.1 City of Mississauga and Credit Valley Conservation

Consultation meetings were held with staff from the City of Mississauga (City) and CVC on the following dates in support of the Scoped EIS:

- May 26, 2015 - Site meeting with City and CVC staff to stake the limit of environmental features within the subject property (dripline and physical top of bank);
- July 6, 2015 - Consultation meeting with the City and CVC to discuss work completed to date in support of the EIS, the Scoped EIS Terms of Reference, opportunities and constraints;
- July 21, 2015 - Site meeting with CVC ecology staff and City staff to review existing site conditions; and

- April 4, 2017 – Consultation meeting with the City and CVC to review the approved Scoped EIS Terms of Reference and constraint mapping for the subject property.

During the April 4, 2017 consultation meeting, both CVC and the City acknowledged the unique history of the subject property, which were designated for residential development in 1997 by the City. In 1998, the lands were included within an approved Draft Plan of Subdivision and were zoned to permit detached dwellings. As a result, CVC and the City agreed to reduced (variable) buffers to existing environmental features relative to current policies and regulations in recognition of the 'grandfathered' nature of the development application.

2.8.2 MNRF

Consultation with MNRF regarding the subject property has been ongoing since 2013. On June 4, 2014, a site meeting was held with MNRF staff to review existing site conditions and to confirm Redside Dace regulated habitat limits for the main branch of Fletchers Creek. Based on a discussion of the proposed development plan, MNRF indicated that the development plan could likely be dealt with through the issuance of a Letter of Advice (LOA) under the *Endangered Species Act* (2007), but that a formal submission that included details regarding the development plan, stormwater servicing, erosion and sediment control would be required.

3. Background Review

The following section summarizes background information and available reporting relevant to the subject property. The following background information resources were also reviewed in support of this study:

- City of Mississauga Natural Areas Inventory data and associated Fact Sheets;
- MNRF Natural Heritage Information Centre (NHIC) database;
- Available Data on Fish Records and Habitat from CVC;
- Natural heritage species records from CVC;
- Ontario Breeding Bird Atlas (OBBA) data;
- Ontario Herpetofaunal Summary Atlas data;
- Historical and current aerial photography; and
- Soils and topographic mapping.

3.1 Fletchers Creek Characterization Report (Draft 2012)

Fletchers Creek is a major tributary of the Credit River and the subject property is located within the lower watershed of Fletchers Creek. The Fletchers Creek subwatershed is located on the gently sloping glacial till plain known as South Slope of the Peel Plain. The surficial geology in this area is mainly Halton Till, with lake deposits and valley fill with moderate slopes that dip perpendicular to the Credit River.

As part of the characterization report, a geomorphology assessment was completed on Fletchers Creek. Rapid field assessments were completed for 32 reaches along the main channel. The RGA results indicate that the reach of Fletchers Creek adjacent to the subject property (FC1-5) is in transition, widening is the dominant mode of adjustment.

CVC classifies ecosystems primarily via the Ecological Land Classification system. Within the study area, the woodlands are identified as Riparian Forests, which are described as having tree species tolerant of fluctuating moisture and disturbances associated with floodplains. These ecosystems are critical for controlling erosion, filtering run-off, providing thermoregulation and providing habitat.

CVC's Landscape Scale Analysis evaluates specific characteristics by looking at their configuration, connectivity and importance at a broader scale. Based on this analysis, the woodlands adjacent to the subject property were given a score of 6 and classified as 'Highly Supporting biofunction habitats'.

The fishery in Fletchers Creek is managed as mixed water, with coolwater species that can tolerate temperatures up to 23°C for short periods of time. A total of 108 stations have been sampled across the Fletchers Creek watershed, dating back to 1982. Majority of sampling sites were stream stations with some sampling completed in stormwater management ponds. A total of 34 fish species were recorded during these surveys. Redside Dace have been recorded in Fletchers Creek, with known captures in the Meadowvale and north Brampton areas of the wastershed. CVC completed a sampling survey in historically occupied reaches in 2010. The lower reaches of Fletchers Creek are categorized as 'Mixed Water' which includes coolwater species with warm water tolerances. The overall Management Zone is Mixed Water and is to be managed as such with respect to buffers and construction timing windows.

3.2 City of Mississauga Natural Areas Survey

The City of Mississauga undertook the Natural Areas Survey (NAS) to identify and inventory 144 natural areas within the City. This included an assessment of woodlands, wetlands, creeks and streams. The goal of the NAS is to maintain the long-term ecological integrity of remnant natural areas to the extent that is feasible.

The subject property is located within Natural Area MV2 – Meadowvale Station Woods and Fletchers Creek. Overburden conditions within Natural Area MV2 consist of Oneida clay loam and Chinguacousy clay loam. Biota identified adjacent to the subject property included Ecological Land Classification (ELC) community FOD7-3.

4. Methodology

Field investigations undertaken in support of this study to characterize existing conditions, natural heritage features and functions are described in detail below and summarized in **Table 3**.

Table 3. Summary of Field Investigations

Survey	Date of Survey(s)
Bat Habitat Suitability Assessment (Snag Survey)	November 11, 2015
Geomorphic Assessment	October 7, 2015
Aquatic Habitat Assessment	N/A – Desktop Assessment
Wildlife Habitat Suitability Assessment	November 11, 2015
Breeding Bird Survey	N/A – Desktop Assessment
Reptiles Survey	N/A – Desktop Assessment
Amphibians Survey	N/A – Desktop Assessment
Ecological Land Classification & Floristic Inventory	October 13, 2015
Tree Inventory	October 13, 2015 and January 21, 2019
Species at Risk	October - November 2015

4.1 Soils Investigation (Soil Engineers Ltd. 2014)

A Soil Investigation was completed by Soil Engineers Ltd. (2014) to confirm subsurface conditions and determine the engineering properties of soils within the subject property for the design and construction of the proposed development. Field work for the study was undertaken on July 25, 2014 and consisted of seven (7) boreholes to depths ranging from 4.7 to 5.3 m.

4.2 Vegetation Communities and Flora Inventory

A vegetation inventory of the subject property was conducted on October 13, 2015. Vegetation communities on the subject property were mapped and described following the protocols of the Ecological Land Classification (ELC) system for Southern Ontario (Lee *et al.* 1998). This involved delineating vegetation communities on aerial photos of the property and recording pertinent information on the community structure and composition. A floristic inventory was also completed on the subject property in conjunction with ELC survey.

4.3 Tree Inventory

All trees measuring ≥10 cm diameter at breast height (DBH, measured 1.4 m above grade) within the proposed development area were assessed by an ISA Certified Arborist on October 13, 2015 and January 21, 2019. In addition, trees measuring ≥15 cm DBH located along the edge of the woodland adjacent to the subject property were also inventoried. Trees were marked with numbered aluminum forestry tags. All tagged trees were surveyed by an Ontario Land Surveyor (OLS). Data was collected for each tagged tree, including the species, trunk diameter (DBH), approximate crown diameter, and health and condition.

This information was used to prepare an Arborist Report and Tree Inventory and Preservation Plan (TIPP) that includes recommendations for tree preservation and tree removal based on the potential to integrate the trees with the proposed development. A copy of the Arborist Report and TIPP is provided in **Appendix E**.

4.4 Wildlife Habitat

4.4.1 Breeding Birds

A desktop assessment was completed referencing the Ontario Breeding Bird Atlas (OBBA) and general field observations documented during the November 11, 2015 wildlife habitat assessment to determine the probability of various reported bird species breeding on or within 120 m of the subject property.

4.4.2 Reptiles

A desktop assessment was completed to determine the probability of potentially suitable habitat for reptile species within and adjacent to the property, referencing the Ontario Reptile Atlas (2019) records.

4.4.3 Mammals

A wildlife habitat assessment was completed on November 11, 2015 to determine what species could potentially occur on, or in general proximity to, the subject property and to document their relative significance and sensitivity. This assessment utilized various publicly available resources to identify species that are known to occur in the vicinity of the subject property. Habitat preferences of species that were identified through this review were compared to conditions on, and in general proximity to, the subject property to determine if they could potentially occur. The focus of this assessment was primarily to identify species listed as Threatened or Endangered under the Ontario Endangered Species Act (2007) or identify habitat that could be considered Significant Wildlife Habitat under the Provincial Policy Statement (2014) as per the Significant Wildlife Habitat Criteria Schedules for Ecoregion 7E (MNRF 2015) and the Region of Peel SWH criteria (Region of Peel 2016).

4.5 Aquatic Habitat

No specific surveys for aquatic species were completed within Fletchers Creek or the tributary. Instead, the aquatic assessment was reliant upon fisheries information available through data requests made to CVC and MNRF.

4.6 Fluvial Geomorphology

4.6.1 Reach Delineation

To facilitate a systematic evaluation of the relevant portions of Fletchers Creek and a Tributary of Fletchers Creek, the watercourses were delineated into reaches (**Figure 2a**). Reaches are homogenous sections of channel with regard to form and function and can, therefore, be expected to behave consistently along their length to changes in hydrology and sediment inputs, as well as to other modifying factors (Montgomery and Buffington 1997; Richards et al. 1997).

4.6.2 Rapid Assessments

In order to confirm existing geomorphic conditions along the portions of Fletchers Creek and the tributary of Fletchers Creek adjacent to the subject property, a field investigation was conducted on October 7, 2015. The following standardized rapid visual assessment methods were applied:

i. Rapid Geomorphic Assessment (RGA – MOE 2003)

The RGA documents observe indicators of channel instability by quantifying observations using an index that identifies channel sensitivity. Sensitivity is based on evidence of aggradation, degradation, channel widening and planimetric form adjustment. The index produces values that indicate whether the channel is stable/in regime (score <0.20), stressed/transitional (score 0.21-0.40) or in adjustment (score >0.41).

ii. Rapid Stream Assessment Technique (RSAT – Galli 1996)

The RSAT uses an index to quantify overall stream health and includes the consideration of biological indicators (Galli 1996). Observations concerning channel stability, channel scouring/sediment deposition, physical in-stream habitat, water quality, and riparian habitat conditions are used to calculate a rating that indicates whether the channel is in poor (<13), fair (13-24), good (25-34), or excellent (35-42) condition.

iii. Downs Classification Method (Downs 1995)

The Downs (1995, outlined in Thorne et al. 1997) classification method infers present and future potential adjustments based on physical observations, which indicate the stage of evolution, and type of adjustments that can be anticipated based on the channel evolution model. The resultant index classifies streams as stable, laterally migrating, enlarging, undercutting, aggrading, or recovering.

5. Existing Conditions

5.1 Topography

The subject property has an area of approximately 0.9287 hectares. Existing land use consists of a 2 ½ storey detached residential building. Fletchers Creek flows along the east side of the property while a tributary of Fletchers Creek flows along the west side of the property. Valley slopes associated with the two watercourses are located along the east and west property boundaries (Soil Engineers Ltd. 2017). Under existing conditions, surface runoff from the subject property drains as sheet flow in a northerly, westerly and southerly direction towards Fletchers Creek and its tributary (SKIRA and Associates Ltd. 2018).

Existing Conditions Geomorphology and Aquatic

Figure 2A

6620 Rothschild Trail Scoped EIS

Legend

- Subject Property
- Photo Location
- Reach Breaks
- Extent Assessed

Aquatic Habitat

- Redside Dace - Occupied Habitat (Beacon, 2019)
- Redside Dace - Contributing Habitat (Beacon, 2019)
- Redside Dace - Occupied Habitat Limit (Beacon, 2019)
- Meander Belt Width (for Redside Dace Occupied Habitat Limit - 80 m (Beacon 2019)

BEACON ENVIRONMENTAL

Project: 215194
Last Revised: March, 2019

Client: DiBlasio Homes

Prepared by: DU
Checked by: SG

N

1:2,500

0 50 100 m

C:\Dropbox\Dropbox (Beacon)\All GIS Projects\2015\215194\MXD\2019-03-19_Fig2A_ExistingConditionsGeomorph_215194.mxd

5.2 Soils

The Soil Investigation (Soil Engineers Ltd. 2014) report generally characterizes subsurface conditions within the City of Mississauga as follows:

> *The City of Mississauga is located on Halton-Peel till plain where drift beds onto a shale bedrock at shallow to moderate depths. In places, the drift has been partly eroded by Peel Ponding (glacial lake) and filled with lacustrine sand, silt, clay and reworked tills.*

Results of the borehole investigation were reported as follows:

- *The existing ground surface (Boreholes 2 to 6, inclusive) was covered with a grass lawn and a minor topsoil fill layer. The revealed topsoil thickness varies between 2.5 cm and 7.5 cm.*
- *A layer of earth fill was encountered in all borehole locations; in Boreholes 2 to 6, inclusive, the fill lies beneath the topsoil till. It extended to depths ranging from 0.2± m to 2.4± m from the prevailing ground surface.*
    - *In Boreholes 1, 2 and 7, the fill consisted of sand and gravel with traces to some concrete or brick fragments. Traces of rootlets were also observed in the fill.*
    - *In Boreholes 3, 4, 5, 6 and 7, the fill consisted of sandy silt with some clay and traces of gravel and rootlets.*
- *Silty sand till was encountered below the earth fill in all boreholes, except Borehole 7, where it was found below a silt deposit. It consists of a random mixture of soil particle sizes ranging from clay to gravel, with the sand being the predominant fraction. The material is heterogeneous, showing that it is a glacial till. It extends to depths ranging from 3.4 to 4.6 m from prevailing ground surface. In places, the upper 0.5± m of the till has been weathered.*
- *A silt deposit was encountered beneath the silty sand till in Borehole 6 and extended to the maximum investigated depth of 5.0 m from grade; it was encountered below the earth fill in Borehole 7 and extended to 2.7 m below grade. The upper layer of the silt in Borehole 7 has been weathered.*
- *A sand and gravel layer was encountered below the silty sand till deposit in Borehole 7 which extended to the maximum investigation depth of 4.7 m below grade.*
- *Silty clay till was encountered (Boreholes 1 to 3, inclusive) below the silty sand till at a depth of 4.6 m from grade. It is reddish-brown in colour and contains clay with low plasticity, seams of fine sand and a trace of gravel.*
- *Shale bedrock was found in Boreholes 4 and 5 at a depth of 4.6± m from the prevailing ground surface and extended to the auger and sample refusal depth of 4.7 m below grade.*
- *Refusal to augering occurred at depths ranging from 4.9 to 5.3± m at Boreholes 1, 2 and 3, which indicates that boulders and/or bedrock occurred at these depths.*

The complete Soil Investigation (Soil Engineers Ltd. 2014) report, including recommendations for construction, is provided in **Appendix C**.

5.3 Hydrogeology

The Soil Investigation (Soil Engineers Ltd. 2014) also summarized groundwater levels, or the occurrence of cave-in) as reported at the completion of field work for Boreholes 1 to 7. Groundwater levels are summarized in **Table 4**. Results of the assessment were reported as follows:

- *Groundwater was not observed in the majority of boreholes upon completion with the exception of Borehole 7, where groundwater was detected at a depth of 4.6± m in the sand and gravel layer;*
- *Signs of wetness were observed within the silt layer in Boreholes 6 and 7 at depths of 4.5 m and 1.5 m below grade, respectively; and*
- *Perched water derived from infiltrated precipitation may occur at shallower depths in the wet seasons.*

The complete Soil Investigation (Soil Engineers Ltd. 2014) report, including recommendations for construction, is provided in **Appendix C**.

Table 4. Groundwater Levels (Soil Engineers Ltd. 2014)

BH No.	Borehole Depth (m)	Soil Colour Changes Brown to Grey	Seepage Encountered During Augering		Measured Groundwater on Completion	
		Depth (m)	Depth (m)	Amount	Depth (m)	El (m)
1	5.3	5.3+	-	-	Dry	-
2	4.9	4.9+	-	-	Dry	-
3	5.0	5.0+	-	-	Dry	-
4	4.7	0.8	-	-	Dry	-
5	4.7	4.6	-	-	Dry	-
6	5.0	4.6	4.5	Small	Dry	-
7	4.7	4.7+	1.5	Small	4.6	174.1

5.4 Surface Drainage

Surface drainage within the subject property follows the existing topography and drains to both the main branch of Fletchers Creek and the Fletchers Creek Tributary.

5.5 Vegetation Communities and Flora Inventory

ELC communities identified on and adjacent to the subject property are illustrated on **Figure 2b**. The following is a description of each community.

Existing Conditions Terrestrial

Figure 2B

6620 Rothschild Trail Scoped EIS

Legend

- Subject Property
- ELCCommunities
- Watercourse (Beacon 2018)
- Butternut (Beacon, 2015)

ELC Unit	ELC Community Type	ELC Code
1	Dry-Fresh Oak-Hardwood Deciduous Forest	FOD2-4
2	Coniferous Plantation	CUP3
3	Fresh-Moist Ash Lowland Deciduous Forest	FOD7-2
4	Anthropogenic	ANT

BEACON ENVIRONMENTAL

Project: 215194
Last Revised: March, 2019

Client: DiBlasio Homes

Prepared by: DU
Checked by: SG

N

1:1,000

0 10 20 m

C:\Dropbox\Dropbox (Beacon)\All GIS Projects\2015\215194\MXD\2019-03-19_Fig2B_ExistingConditionsTerrestrial_215194.mxd

ELC Unit 1. Dry-Fresh Oak-Hardwood Deciduous Forest (FOD2-4)

This community occurs along the east side of the subject property. The canopy is dominated by Red Oak (*Quercus rubra*), Bur Oak (*Quercus macrocarpa*), Sugar Maple (*Acer saccharum*), and American Basswood (*Tilia Americana*), and Shagbark Hickory (*Carya ovata*). The subcanopy consists of Red Oak, Ironwood (*Ostrya virginiana*), American Beech (*Fagus grandifolia*), Sugar Maple, and Bitternut Hickory (*Carya cordiformis*). The understory consists of Common Buckthorn (*Rhamnus cathartica*), Choke Cherry (*Prunus virginiana*), Wild Red Raspberry (*Rubus idaeas* ssp. *strigosus*), and Tartarian Honeysuckle (*Lonicera tatarica*). Ground covers are generally typical of edge environments and disturbed areas, including Garlic Mustard (*Alliaria petiolata*), Thicket Creeper (*Parthenocissus vitacea*), Tall Goldenrod (*Solidago altissima*), Aven (*Geum* sp.), Zig-Zag Goldenrod (*Solidago flexicaulis*), Smooth Brome Grass (*Bromus inermis*), and Wild Strawberry (*Fragaria virginiana*).

ELC Unit 2. Coniferous Plantation (CUP3)

This community occurs along the west side of the subject property. It is dominated by White Spruce (*Picea glauca*) and White Pine (*Pinus strobus*). The understory consists of Common Buckthorn and Green Ash (*Fraxinus pennsylvanica*). Ground covers are sparse but include Garlic Mustard, Thicket Creeper, Avens, and Bittersweet Nightshade (*Solanum dulcamara*).

ELC Unit 3. Fresh-Moist Ash Lowland Deciduous Forest (FOD7-2)

This community occurs to the west of the subject property. It is dominated by Green Ash in association with Crack Willow (*Salix x fragilis*), Manitoba Maple (*Acer negundo*), and American Basswood. Groundcovers include Tall Goldenrod, White Vervain (*Verbena urticifolia*), Calico Aster (*Symphyotrichum lateriflorum*), Panicled Aster (*Symphyotrichum lanceolatum*), Garlic Mustard, avens, and Dame's Rocket (*Hesperis matronalis*).

ELC Unit 4. Anthropogenic

The majority of the subject property consist of existing development, including a building with associated lawn and driveway. Vegetation predominantly consist of introduced weeds and ornamental species.

5.6 Flora

A total of 63 species of vascular plants were identified on and adjacent to the subject property, of which there were identified to genus. A complete list is provided in **Appendix D**.

Of the 60 species identified, 21 are non-native to Ontario and 42 are native. Of the 42 native species, 40 are ranked S5 by the Natural Heritage Information Centre (NHIC), indicating that they are common and secure in Ontario. Two species, Honey Locust (*Gleditsia triacanthos*) and Butternut (*Juglans cinerea*), are ranked S2 (imperilled). In Ontario, natural occurrences of Honey Locust are rare; however, Honey Locust is a commonly planted landscape tree. The trees on the property are a planted variety.

A single Butternut tree was identified in the woodland adjacent to the subject property (**Figure 3**). Butternut is an Endangered species in Ontario.

Based on a review of *Plants of the Credit River Watershed* (CVC 2002), no regionally rare or uncommon species occur on or adjacent to the subject property.

5.7 Tree Inventory

A total of 111 trees were inventoried on and adjacent to the subject property. Trees range in size from 10 to 100 cm DBH. The majority of trees are in fair to good condition. Detailed findings of the tree inventory are provided in the Arborist Report (Beacon 2019) (**Appendix E**).

5.8 Wildlife Habitat

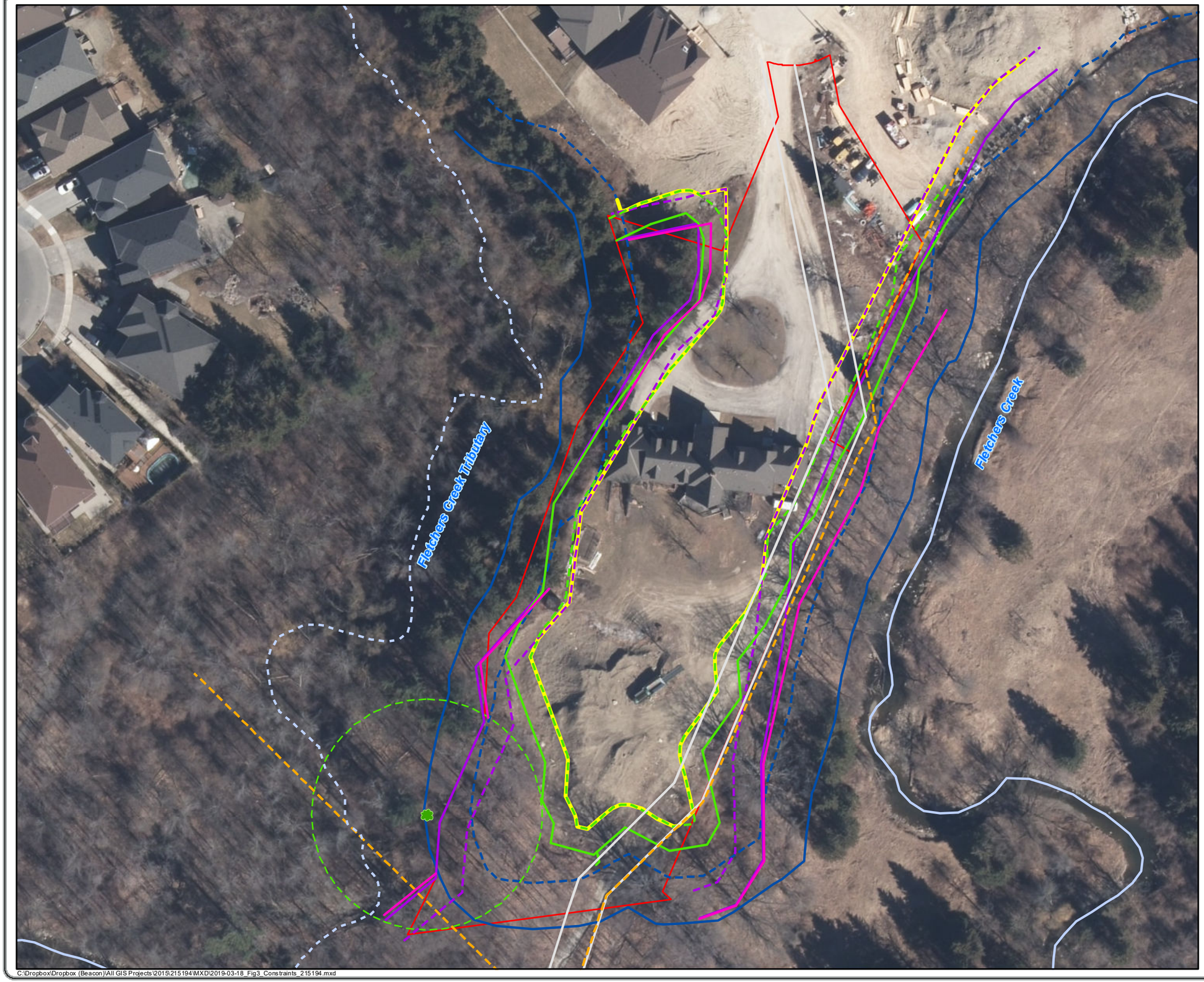
5.8.1 Breeding Birds

A total of 89 species of birds have been recorded within OBBA Square 17PJ03, the square in which the subject property is located. An assessment to determine the probability of these species breeding on or within 120 m of the subject property was completed. Through this assessment species were classified as having a high, moderate or low chance of being documented as breeding on or within 120 m of the subject property. Species that were considered unlikely to be breeding on or within 120 m of the subject property were not assigned a classification.

A total of 30 species of birds were identified that could potentially breed on, or immediately adjacent to, the subject property. This included 16 species that were considered to have a high probability of breeding on the subject property, seven species that were considered to have a moderate probability of breeding on the subject property and seven species that were considered to have a low probability of breeding on, or immediately adjacent, the subject property.

Two species identified as having a low probability of being present on the subject property, American Redstart (*Setophaga ruticilla*) and White-breasted Nuthatch (*Sitta carolinensis*), are considered Area Sensitive by the MNRF (2000). American Redstart is also considered to be a Regional Species of Concern by the TRCA (2016). As with most of the species that were identified as having the potential to breed on the subject property, if these species were too occur, they would be associated with the forested habitat within the valleylands that border the subject property.

A total of 64 species of birds were identified that could potentially breed within 120 m of the subject property. This included 30 species that were considered to have a high probability of breeding within 120 m of the subject property, 19 species that were considered to have a moderate probability of breeding within 120 m of the subject property and 15 species that were considered to have a low probability of breeding within 120 m of the subject property. This included 9 species that are considered Area Sensitive by the MNRF (2000) and 12 species that are considered to be a Regional Species of Concern by the TRCA (2010). Habitat for the majority of these species is associated with the forested, wetland and meadow habitats associated with the valleylands within 120 m of the subject property.



Environmental Constraints

Figure 3

6620 Rothschild Trail Scoped EIS

Legend

- Subject Property
- Proposed Limit of Development (Beacon, 2019)
- Existing Sewer Easement (Searles, 2015)

Environmental Constraints - Terrestrial

- Woodland Boundary (Staked by CVC, May 26, 2015) Significant Wildlife Habitat Limit
- 5.0 m Buffer to Woodland Boundary (Beacon 2019)
- Butternut (Beacon, 2015)
- Butternut + 25 m

Environmental Constraints - Terrestrial

- Redside Dace - Occupied Habitat (Beacon, 2019)
- Redside Dace - Contributing Habitat (Beacon, 2019)
- Redside Dace Occupied Habitat Limit (Beacon, 2019)

Hazard Constraints - Slope Stability

- Long Term Stable Slope Line (Soil Engineers, 2017)
- 6.0 m Setback to Long Term Stable Slope Line
- Top of Bank (Staked by CVC, May 26, 2015)

Hazard Constraints - Flooding

- Regulatory Floodline (CVC, 2015)
- 10 m Setback to Regulatory Floodline

BEACON ENVIRONMENTAL

Project: 215194
Last Revised: March, 2019

Client: DiBlasio Homes	Prepared by: DU Checked by: SG

N | 1:800 | 0 10 20 m

C:\Dropbox\Dropbox (Beacon)\All GIS Projects\2015\215194\MXD\2019-03-18_Fig3_Constraints_215194.mxd

A list of the birds identified through the desktop review, and the probability assigned to them as described above is included in **Appendix F**.

5.8.1.1 Reptiles

Four reptile species have been recorded within Ontario Reptile Atlas (2019) Square 17PJ03. They include Eastern Gartersnake (*Thamnophis sirtalis*), Dekay's Brownsnake (*Storeria dekayi*) Snapping Turtle (*Chelydra serpentina*) and Red-bellied Snake (*Storeria occipitomaculata*).

Habitat on the subject property was not considered to be suitable for turtles. Potentially suitable habitat for Snapping Turtle and Midland Painted Turtle (*Chrysemys picta marginata*) could be present within Fletchers Creek adjacent the subject property, which could be used by turtles to migrate too and from other suitable basking / nesting habitats upstream and downstream of the subject property.

The forested habitat that borders the outer edge of the subject property could provide habitat for Eastern Gartersnake, Dekay's Brownsnake and Red-bellied Snake.

5.8.1.2 Amphibians

Six amphibian species of amphibian have been recorded within Ontario Reptile Atlas (2019) Square 17PJ03. They include American Toad (*Anaxyrus americanus*), Green Frog (*Lithobates clamitans*), Eastern Red-backed Salamander (*Plethodon cinereus*), Northern Leopard Frog (*Lithobates pipiens*), Gray Treefrog (*Hyla versicolor*) and Jefferson Salamander (*Ambystoma jeffersonianum*). The record for Jefferson Salamander, which is listed as an endangered species under the ESA, is from July 1952.

No breeding habitat for frogs or toads is present on the subject property. Potentially suitable habitat for these species could be present within wetland habitat within the valleylands within 120 m of the subject property.

The forested habitat that borders the outer edge of the subject property could provide habitat for Eastern Red-backed Salamander.

5.8.1.3 Mammals

In order to identify which mammals could potentially occur on, or within 120 m of the subject property, the Natural Heritage Information Centre (NHIC) (2019) data base was accessed and the habitat requirements of mammals that are known or assumed to be present within the area in which the subject property is located was compared to the conditions on the subject property.

Through this analysis a total of 21 species of mammals were identified as having the potential to occur on, or within 120 m of the subject property. Included in this list a three species of bat, Little Brown Myotis (*Myotis lucifugus*), Northern Myotis (*Myotis septentrionalis*) and Tricolored Bat (*Perimyotis subflavus*), that are listed as endangered under the ESA. Roosting habitat for these species could occur in the forested habitat that borders the outer edge of the subject property.

All other species identified are commonly associated with natural or naturalized areas within urban or rural environments in southern Ontario. A list of the mammals identified through this analysis with the potential to occur on or within 120 m of the subject property is included in **Appendix G**.

5.9 Aquatic Habitat

The main branch of Fletchers Creek and a small ravine tributary are located adjacent to the subject property (**Figure 2a**). The Fletchers Creek subwatershed drains an area of approximately 45 km^2 (CVC 2012). Fletchers Creek drains into the Credit River south of Highway 401 in the City of Mississauga (CVC 2012), approximately 3 km downstream from the subject property.

5.9.1 Fish Community

Existing fisheries information for Fletchers Creek was obtained from CVC fish records and the Fletchers Creek Characterization report (CVC 2012). A total of 34 fish species have been recorded in Fletchers Creek. Fish community sampling within the vicinity of the subject property was undertaken in 1965, 1982, 1989, and 2010 and documented a total of 13 fish species. The fish species composition data indicates that Fletchers Creek supports a diverse coolwater community with some warmwater native species. Fletchers Creek is classified as a coolwater system (CVC 2002).

As discussed in **Section 2.5**, the main branch of Fletchers Creek is classified by MNRF as occupied Redside Dace habitat. Redside Dace has been historically found in Fletchers Creek with the most recent record in 2010 found in north Brampton (CVC 2012). Other species of interest captured near the subject property include Northern Hog Sucker (*Hypentelium nigricans*), Longnose Dace (*Rhinichthys cataractae*), Rainbow Darter (*Etheostoma caeruleum*) and Fantail Darter (*Etheostoma flabellare*). Several species have been recorded that are known to be sensitive to environmental degradation, such as siltation and pollution, including the provincially Endangered Redside Dace.

No historical fish sampling data was available for the tributary of Fletchers Creek, but the tributary has been identified by MNRF as contributing to downstream occupied habitat within the main branch of Fletchers Creek.

5.10 Fluvial Geomorphology

5.10.1 Reach Delineation

For the purposes of this study, the portion of Fletchers Creek from McLaughlin Road to the Fletchers Creek tributary confluence was delineated as Reach FC-1. The section of Fletchers Creek between the tributary confluence and the trail crossing approximately 125 m west of Mavis Road was delineated as Reach FC-2 (**Figure 2a**). The determination of reach extents was based on a desktop assessment of transitions in valley form, riparian vegetation and meander geometry (channel planform), referencing available aerial imagery and topographic mapping.

5.10.1 Results

Rapid assessment results are summarized in **Table 5** and **Table 6** below. A photographic record of site conditions at the time of the assessment is provided in **Appendix H**.

5.10.1.1 Reach FC-1

Reach FC-1 was characterized as a low sinuous, well-defined channel situated within a confined valley setting. Within the extent assessed, the reach displayed a moderate gradient and low degree of entrenchment. Riparian vegetation was generally characterized as fragmented, measuring 1-5 channel widths in dimension. Vegetation consisted of herbaceous plants and deciduous trees. Bank angles ranged between 30-60 degrees with 30-60% of banks identified as exhibiting evidence of erosion. Banks exhibited evidence of mass failure and where present, bank undercuts measured in the range of 1.20 m. Bank materials were comprised of clay, silt and shale.

Bankfull widths and depths ranged from 10.1-10.5 m and 0.60-0.50 m, respectively. Riffle substrate consisted of gravel, cobble and boulders. Pool substrate consisted of clay/silt, sand and gravel. Channel morphology was influenced locally by the presence of instream large woody debris.

Rapid assessment results indicated that Reach FC-1 exhibited minor evidence of stress ('in transition') with a score of 0.28. Widening was identified as the dominant mode of adjustment, with indicators of planimetric form adjustment, degradation and aggradation also observed. Evidence of widening included leaning/fallen trees, occurrence of large organic debris, exposed tree roots, basal scour on inside meander bends and both side of channel through the riffle and an outflanked pedestrian crossing. Existing channel disturbances included an informal pedestrian crossing and the McLaughlin Road crossing.

An RSAT score of 21.5 indicated a 'fair' degree of overall ecological health, with channel stability identified as the primary limiting factor. The Downs model reflected the RGA evaluation of this reach through a classification of U – 'undercutting' based on evidence of widening and erosion (largely at valley wall contact points).

Table 5. General Reach Characteristics

Reach	Bankfull Width (m)	Bankfull Depth (m)	Substrate	Riparian Vegetation	Notes
FC-1	10.1-10.5	0.50-0.60	gravel, cobble, boulder	Deciduous trees, herbaceous plants.	• Valley wall contact points observed • Existing disturbances: informal pedestrian and McLaughlin Road crossings
FC-2	8.6-11.6	0.60-1.05	gravel, cobble, boulder	Deciduous trees, herbaceous plants.	• Valley wall contact points observed • Existing disturbances: formal trail and Mavis Road crossings

FCT-1	1.40-2.75	0.25-0.35	Clay, silt, sand, shale fragments	Trees, shrubs and herbaceous plants	• Intermittently defined • Secondary/multiple flow paths • Existing disturbances: formal trail crossing • Exposed underlying shale

Table 6. Rapid Assessment Results

Reach	Rapid Geomorphic Assessment			Rapid Stream Assessment Technique			Downs Classification Method
	Score	Condition	Dominant Mode of Adjustment	Score	Condition	Limiting Feature	
FC-1	0.28	In Transition	Widening	21.5	Fair	Channel Stability	U – 'undercutting'
FC-2	0.26	In Transition	Widening	22	Fair	Physical Instream Habitat and Riparian Habitat Conditions	U – 'undercutting'
FCT-1	0.02	In Regime	N/A	32	Good	Physical Instream Habitat	S – 'stable'

5.10.1.2 Reach FC-2

Reach FC-2 was characterized as a moderately sinuous, well-defined channel situated within a confined valley setting. Within the extent assessed, the reach displayed a moderate gradient and a moderate degree of entrenchment. Riparian vegetation was generally characterized as fragmented, measuring 1-5 channel widths in dimension. Vegetation consisted of herbaceous plants and deciduous trees. Bank angles ranged between 30-60 degrees with 30-60% of banks identified as exhibiting evidence of erosion. Banks exhibited evidence of mass failure and where present, bank undercuts measured in the range of 0.60 m. Bank materials were comprised of clay, silt and shale.

Bankfull widths and depths ranged from 8.60-11.6 m and 0.60-1.05 m, respectively. Riffle substrate consisted of gravel, cobble and boulders. Pool substrate consisted of sand, gravel and cobble. Channel morphology was influenced locally by the presence of instream large woody debris.

Rapid assessment results indicated that Reach FC-2 exhibited minor evidence of stress ('in transition') with a score of 0.26. Widening was identified as the dominant mode of adjustment, with indicators of planimetric form adjustment, degradation and aggradation also observed. Evidence of widening included leaning/fallen trees, occurrence of large organic debris, exposed tree roots and basal scour on inside meander bends and both side of channel through the riffle. Existing channel disturbances included a formal trail crossing and the Mavis Road crossing.

An RSAT score of 22 indicated a 'fair' degree of overall ecological health, with physical instream habitat and riparian habitat conditions identified as the primary limiting factor. The Downs model reflected the

RGA evaluation of this reach through a classification of U – 'undercutting' based on evidence of widening and erosion (largely at valley wall contact points).

5.10.1.3 Reach FCT-1

Reach FCT-1 was characterized as an intermittently defined, slightly sinuous channel situated within a confined valley setting. Within the extent assessed, the reach displayed a moderate gradient and a low degree of entrenchment. Riparian vegetation was generally characterized as continuous, measuring >5 channel widths in dimension. Vegetation consisted of trees, shrubs and herbaceous plants. Bank angles ranged between 30-60 degrees with 5-30% of banks identified as exhibiting evidence of erosion. Bank materials were comprised of clay, silt and sand.

Where defined, bankfull widths and depths ranged from 1.40-2.75 m and 0.25-0.35 m, respectively. Bed substrate consisted of clay, silt, sand and shale. Channel morphology was influenced locally by the presence of large woody debris and saturated floodplain conditions that resulted in the formation of secondary and multiple flow paths.

Rapid assessment results indicated that Reach FCT-1 was stable ('in regime') with a score of 0.02. Existing channel disturbances included the Amarone Court trail crossing. An RSAT score of 32 indicated a 'good' degree of overall ecological health, with physical instream habitat identified as the primary limiting factor. The Downs model reflected the RGA evaluation of this reach through a classification of S – 'stable' based on a general lack of observable morphological adjustment.

5.11 Endangered Species and Species of Conservation Concern

5.11.1 Redside Dace

The Redside Dace (*Clinostomus elongatus*) is a small colourful minnow that reaches a maximum length of about 12 cm. In Canada, this species is present only in southern Ontario where it occurs most frequently in streams between Oshawa and Hamilton, in the Holland River drainage, one tributary of the Grand River and three tributaries of Lake Huron.

The Redside Dace is listed as Endangered by the Committee on the Status of Species at Risk in Ontario (COSSARO). It has an S-rank of S2 indicating that it is imperilled and vulnerable to extirpation (NHIC 2012). The species is protected under the Ontario ESA *(2007).* The Committee on the Status of Endangered Wildlife in Canada (COSEWIC) also lists it as Endangered, but it has not yet been listed on the federal *Species at Risk Act*.

As an Endangered species, the following two key provisions in the ESA apply to Redside Dace:

1. Section 9 prohibits the killing, harming, harassing, possession, collection, buying and selling of extirpated, endangered, and threatened species on the SARO List; and
2. Section 10 prohibits the damage or destruction of protected habitat of species listed as extirpated, endangered or threatened on the SARO List. Under the ESA, "habitat" is defined as either:

- General Habitat (based on the general definition in clause 2(1)(b) of the Act) - an area on which a species depends directly or indirectly to carry on its life processes including life processes such as reproduction, rearing, hibernation, migration or feeding; or
- Regulated Habitat (as defined in clause 2(1)(a) of the Act) - the area prescribed for a specific species in a habitat regulation.

The Redside Dace Recovery Strategy was prepared in February 2010 and provides a framework for action for responsible jurisdictions to secure the sustainability of Redside Dace in Ontario. Ontario Regulation 242/08 was updated in July 2011 and Section 29.1(1) defines Redside Dace habitat as follows:

i. any part of a stream or other watercourse that is being used by a redside dace,
ii. any part of a stream or other watercourse that was used by a redside dace at any time during the previous 20 years and that provides suitable conditions for a redside dace to carry out its life processes,
iii. the area encompassing the meander belt width of an area described in subparagraph i or ii,
iv. the vegetated area or agricultural lands that are within 30 metres of an area described in subparagraph iii, and
v. a stream, permanent or intermittent headwater drainage feature, groundwater discharge area or wetland that augments or maintains the baseflow, coarse sediment supply or surface water quality of a part of a stream or other watercourse described in subparagraph i or ii, provided the part of the stream or watercourse has an average bankfull width of 7.5 metres or less.

Section 23.1 of this regulation also identifies circumstances where Clause 9(1) and subsection 10(1) of the Act do not apply with respect to Redside Dace. It relates to timing of approvals including *Planning Act,* Draft Plan, Class EA or *Condominium Act* provided that impacts to Redside Dace were considered as part of that approval.

Based on our correspondence with MNRF, we understand that the main branch of Fletchers Creek (occupied habitat) and its tributary (contributing habitat) are regulated under the Endangered Species Act as they support habitat for provincially Endangered Redside Dace.

Redside Dace is also protected under the federal Species at Risk Act, where it is listed as Endangered.

5.11.2 Butternut

One Butternut was identified in the forest adjacent to the subject property (**Figure 2b**).

5.11.3 Bats

Based on correspondence with MNRF (**Appendix B**), potential habitat for endangered bats (i.e., Eastern Small-footed Myotis, Little Brown Myotis, Northern Myotis, Tri-colored Bat) in tree cavities were identified. A survey of tree snags was undertaken for the subject property during leaf-off conditions (November 11, 2015) to evaluate for potential maternity roost habitat for bat species. No cavity trees

were documented that have the potential to provide maternity roost habitat within the limit of development. Roosting habitat for these species could occur in the forested habitat that borders the outer edge of the subject property.

6. Evaluation of Significance

The findings of the background review and field investigations have been relied upon to determine if the subject property supports any of the natural heritage components recognized under the PPS, as well as the Region's and City's Official Plans. The *Natural Heritage Reference Manual* (MNR, 2010) was consulted to provide additional technical guidance, where required. The subject property was screened for the following natural heritage features:

1. Significant Wetlands;
2. Habitat for Threatened or Endangered Species;
3. Significant Areas of Natural and Scientific Interest (ANSI);
4. Significant Valleylands;
5. Significant Woodlands;
6. Significant Wildlife Habitat; and
7. Fish Habitat.

6.1 Significant Wetlands

No significant wetlands were identified on or adjacent to the subject property.

6.2 Significant Habitat for Threatened or Endangered Species

There are no Threatened or Endangered species associated with the tableland portion of the subject property. The adjacent forested lands associated with the Fletchers Creek and tributary valleylands provide habitat for several species at risk.

6.2.1 Redside Dace

As discussed in **Section 5.10.1**, Fletchers Creek is classified as occupied habitat for Redside Dace, while the tributary has been classified as providing contributing habitat to the downstream occupied reaches of Fletchers Creek.

6.2.2 Butternut

One Butternut was identified in the forest adjacent to the subject property. In Ontario, the general habitat of Butternut includes suitable areas within a 50 m radius around the trunk of an individual Butternut tree. Suitable area within 25 m of a Butternut tree is considered to be the most critical for the

tree to carry out its life processes and has the lowest tolerance to alteration. Suitable areas between 25 m – 50 m from a tree are considered important for nut dispersal and seedling establishment and have a moderate tolerance to alteration.

6.2.3 Bats

There is no potential roosting habitat for bats on the subject property. Forested habitat that surrounds the subject property could contain roosting habitat for bat species that are listed as endangered under the ESA.

There are no other provincially endangered or threatened species with habitat known to be directly associated with the subject property or adjacent lands

6.3 Significant Areas of Natural and Scientific Interest (ANSI)

There are no ANSIs on or adjacent to the subject property.

6.4 Significant Valleylands

Policy 6.3.12 g The City of Mississauga Official Plan defines significant valleylands as follows:

> *Significant valleylands are associated with the main branches, major tributaries and other tributaries and watercourse corridors draining directly to Lake Ontario including the Credit River, Etobicoke Creek, Mimico Creek and Sixteen Mile Creek.*

Both Fletchers Creek and its tributary located adjacent to the subject property are considered Significant Valleylands.

6.5 Significant Woodlands

Significant woodlands are defined by the City of Mississauga as any woodland greater than 0.5 hectares that:

- Supports old growth trees (greater than or equal to 100 years old);
- Supports a significant linkage function as determined through an Environmental Impact Study approved by the City in consultation with the appropriate conservation authority;
- Is located within 100 metres of another Significant Natural Area supporting a significant ecological relationship between the two features;
- Is located within 30 metres of a watercourse or significant wetland; or
- Supports significant species or communities.

The woodlands on and adjacent to the subject property qualify as Significant Woodlands on the basis that they contain watercourses (Fletchers Creek and tributary).

6.6 Significant Wildlife Habitat

According to the significant Wildlife Habitat Technical Guidelines (MNR 2000), there are four broad categories of Significant Wildlife Habitat (SWH):

1. Seasonal Concentration Areas of Animals;
2. Rare Vegetation Communities or Specialized Habitat for Wildlife;
3. Habitat for Species of Conservation Concern; and
4. Animal Movement Corridors.

Within each of these categories, there are multiple types of SWH, each intended to capture a specialized type of habitat that may or may not be captured by other existing feature-based categories (e.g., significant wetlands, significant woodlands). Within the Significant Wildlife Habitat Criteria Schedules for Ecoregion 7E (MNRF 2015) are recommended criteria to identify SWH within Ecoregion 7E.

Two types of candidate SWH could occur within the forested habitat that borders the subject property. They include bat maternity colonies and habitat for Special Concern and rare wildlife species, such as Eastern Wood-Pewee.

6.7 Fish Habitat

Both Fletchers Creek and its tributary are considered fish habitat.

6.8 Summary

In summary, the valley lands adjacent to the property support the following significant natural heritage features:

- Significant Valleylands;
- Significant Woodlands;
- Candidate Significant Wildlife Habitat for Animal Movement Corridor; and
- Fish Habitat.

7. Constraints Analysis

The purpose of the constraint analysis is to identify natural heritage features that require protection and/or natural hazards that must be considered in the context of future development. While impact avoidance is considered the primary method for environmental protection, it is also recognized that constrained areas cannot always be avoided, and that other effective methods exist that can mitigate potential adverse impacts of development on the environment. Constraint limits associated subject property have been discussed in depth with the City and CVC through the project's agency consultation process and are illustrated in **Figure 3**.

7.1 Physical Top of Bank

Based on the pre-consultation site meeting held with CVC and the City of Mississauga on May 26, 2015, the top of bank associated with the Fletchers Creek and tributary of Fletchers Creek valley systems was staked within the subject property. The staked limit, as established by CVC in consultation with Beacon, was surveyed by David B. Searles Surveying Ltd. This information was incorporated in the topographic survey and constraint mapping for the subject property (**Figure 3**).

7.2 Woodland Boundary (Dripline)

The outermost leaves on a tree define its dripline. Based on the pre-consultation site meeting held with CVC and the City of Mississauga on May 26, 2015, the drip line associated with the Fletchers Creek and tributary of Fletchers Creek valley systems was staked within the subject property. The staked limit, as established by CVC in consultation with Beacon, was surveyed by David B. Searles Surveying Ltd. This information was incorporated in the topographic survey and constraint mapping for the subject property (**Figure 3**).

7.3 Natural Heritage Constraints

Based on the background information and the data gathered through field investigations, as well as the natural heritage assessment, it was determined that the tableland portions of the subject property (ELC Unit 4) are relatively unconstrained from a natural heritage perspective and is suitable for development.

Natural heritage constraints identified on or adjacent to the subject property include:

- Candidate Significant Wildlife Habitat (SWH) (Fletcher Creek valleylands);
- Significant Valleylands (defined by the presence of endangered species); and
- Significant Woodland (defined on the basis that they contain watercourses).

These features collectively make up the Regional Greenlands System and the City's Natural Heritage System.

7.4 Redside Dace Regulated Habitat

As noted in **Section 5.10.1**, the main branch of Fletchers Creek has been classified by MNRF as occupied habitat for Redside Dace, while the tributary has been classified as contributing to this downstream occupied habitat. In accordance with O.Reg. 242/08, **Figure 2A** identifies the tributary (limit of feature) as regulated under the Endangered Species Act (2007). Regulated occupied habitat is delineated on **Figure 2A** referencing the meander belt.

The meander belt width is generally defined as the lateral extent that a meandering channel has historically occupied and will likely occupy in the future. In cases such as Reach FC-1 and Reach FC-2, where the watercourse is confined, the valley wall acts a constraint to channel migration. As Ontario

Regulation 242/08 does not distinguish between confined and unconfined systems, the procedure to delineate the meander belt referenced the lateral extent of the outermost meander bends within each reach, but also considered valley floor (floodplain) dimensions. This resulted in a recommended meander belt width of 80 m for both reaches. It is our opinion that this procedure is in accordance with applicable guidelines (TRCA 2004).

In accordance with O.Reg. 242/08, a 30 m setback was then applied to the meander belt in order to delineate the limit of occupied Redside Dace habitat along the main branch of Fletchers Creek. In consultation with MNRF, this limit was then revised to reflect the limit of existing vegetated area as:

- Limit of disturbed area along the existing sewer easement; and
- Limit of disturbed area beyond the existing sewer easement (property limit).

7.5 Natural Hazards

Natural hazard constraints relevant to the subject property include:

- Regulatory Floodline (CVC 2015); and
- Long term stable top of slope (Soil Engineers Ltd 2017).

7.5.1 Regulatory Floodline

The Regional Floodline delineated for Fletchers Creek and the Fletchers Creek tributary represents the Regulatory Floodplain Limit relevant to the subject property. Floodplain mapping was obtained from the CVC on December 1, 2015.

7.5.2 Long Term Stable Top of Slope

Soil Engineerings Ltd. (2017) carried out a slope stability assessment to determine the stability of the existing slopes along the east and west property boundaries of the subject property. The assessment referenced the seven boreholes advanced for the Soil Investigation (Soil Engineers 2014) report, as well as a visual inspection of slope conditions. Slope conditions were reported as follows:

- *The site inspection indicates that the slopes are well vegetated with shrubs and trees.*
  - *Bare spots were observed occasionally along the slopes.*
  - *No signs of sloughing and creep was evident along the slopes at the time of inspection.*
- *Fletchers Creek is located at the bottom of slope along the east side of the property.*
  - *Active erosion along the edge of creek is evident.*
- *The tributary at the west side of the property is at least 6 m away from the bottom of the slope and no erosion is evident along the tributary.*

Slope stability analysis was completed at two cross-sections along the Fletchers Creek valley slope. The surface profile for each section was interpolated based on topographic mapping from 2007 and

2014, and subsurface soil information derived from the borehole findings. Slope stability analysis results were reported as follows:

- *In accordance to the CVC toe erosion allowance requirement, the visual inspection along the creek and the borehole information, a toe erosion allowance of 5.0 m is considered adequate for shale with active erosion at the east slope near Fletchers Creek.*
- *Since the tributary along the west slope is located at least 6.0 m away from the bottom of slope, which exceeded the recommended toe erosion allowance of 4.0 m for silty sand till, it was not necessary to incorporate a toe erosion allowance setback component for the west slope.*
- *The slope at Cross Section A-A is remodeled and re-analyzed for its stability. The resulting Factor of Safety (FOS) of the remodeled slope are 1.607 (Local) and 1.880 (Global), which meets the OMNR and CVC requirements. Therefore, the remodeled slope can be considered as geotechnically stable.*
- *The Long Term Stable Slope Line (LTSSL), [was] determined by incorporating the stability setback and toe erosion allowance.*

The complete Slope Stability Assessment (Soil Engineers Ltd. 2017) report, including recommendations for construction, is provided in **Appendix I**.

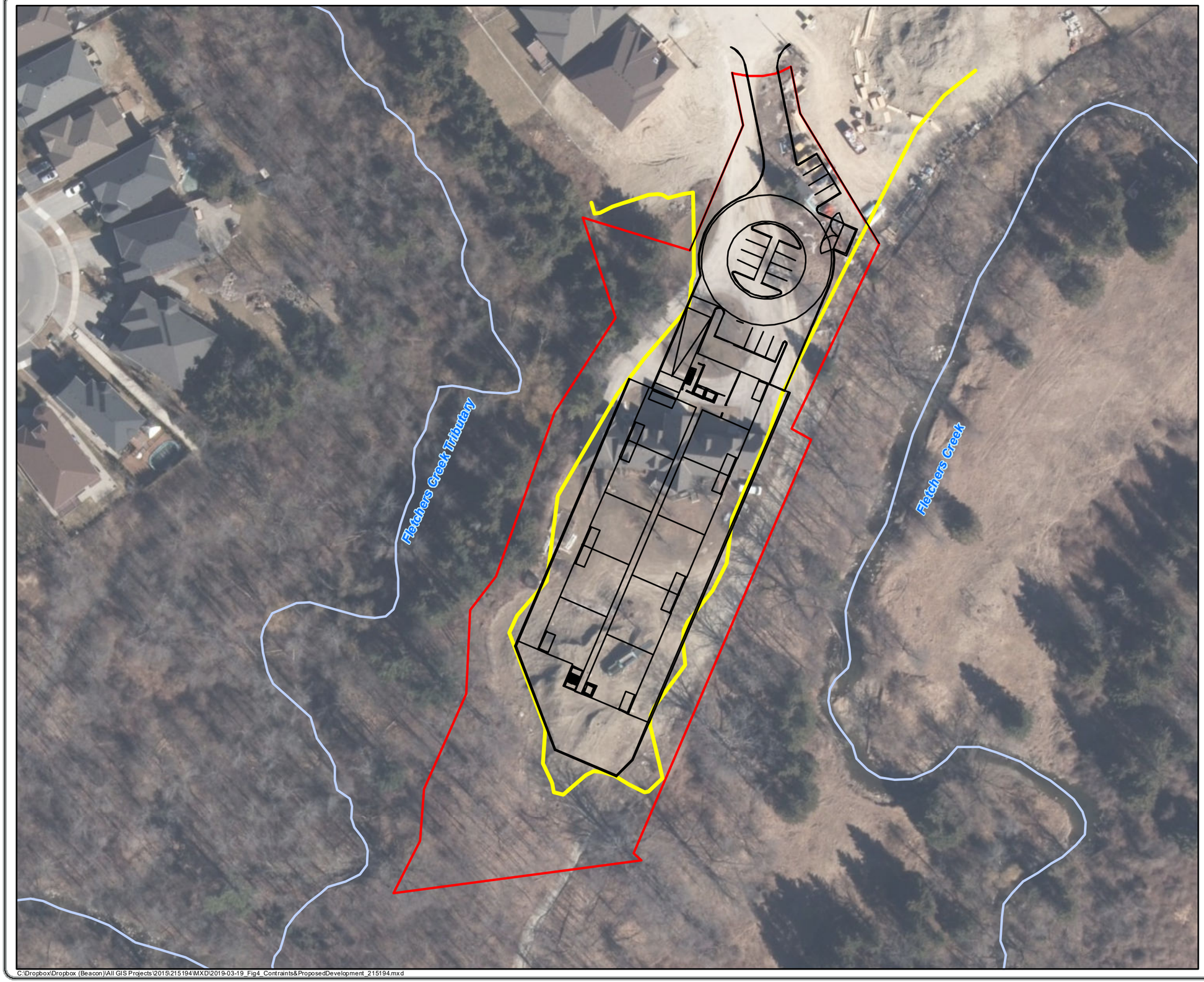
7.6 Development Limit

In accordance with direction provided through the agency consultation process, the proposed development limit (**Figure 3**) was defined based on the following criteria:

- 6.0 m setback to the long term stable slope limit;
- 10.0 m setback to Regulatory Floodline (CVC 2015);
- 5.0 m buffer to the dripline (woodland boundary); and
- Redside Dace Occupied Habitat Limit.

8. Description of Proposed Development

The proposed development consists of a residential four (4) storey apartment building with access from Rothschild Trail in the City of Mississauga. The existing building on the property will be demolished. For additional information regarding the proposed development, refer to the FSR (SKIRA & Associates 2018). The development plan is shown on **Figure 4** along with the proposed limit of development based on the identified environmental constraints.



Proposed Development Plan

Figure 4

6620 Rothschild Trail Scoped EIS

Legend

- Subject Property
- Proposed Limit of Development (Beacon, 2017)
- Proposed Development Plan
- Watercourse (Beacon 2018)

BEACON ENVIRONMENTAL

Project: 215194

Last Revised: March, 2019

Client: DiBlasio Homes

Prepared by: DU
Checked by: SG

N

1:850

0 10 20 m

Contains information licensed under the Open Government License–Ontario Orthoimagery Baselayer: FBS Peel 2018

C:\Dropbox\Dropbox (Beacon)\All GIS Projects\2015\215194\MXD\2019-03-19_Fig4_Contraints&ProposedDevelopment_215194.mxd

8.1 Site Servicing

8.1.1 Water and Sanitary

The proposed development will be serviced by a 200 mm diameter connection to an existing 200 mm watermain located on the west side of Rothschild Trail.

The sanitary drainage system will consist of a new 200 mm diameter sanitary connection to an existing 250 mm diameter sewer located on an easement that traverse the subject property. The system will be gravity fed.

8.1.2 Stormwater Management

Currently, storm runoff drains via sheet flow in a northerly, westerly and southerly direction toward Fletchers Creek and its tributary. Runoff from the proposed development will discharge into the Fletchers Creek tributary via an existing stormwater outfall (**Appendix J** - DWG C102). The proposed lower level parking will have foundation drains that will be connected to the sites storm sewer.

The stormwater management plan for the proposed development will ensure that the 100-year storm event will not exceed the pre-development release rates of the 2-year storm event (0.0496 m^3/s). A portion of the property along the southern and northern property limits will drain uncontrolled towards the valleylands (100-year total uncontrolled flow of 0.0355 m^3/s).

The roof will have controlled roof drains that will limit runoff discharge to 35 l/s/ha (0.035 $m^3/s/ha$) of roof area. The runoff from this area will be regulated by a 75 mm diameter orifice restrictor plate installed over the outlet pipe located upstream of the proposed oil/grit separator. The maximum allowable runoff release rate of 0.0141 m^3/s will be achieved.

Quality control for stormwater treatment of the drainage site of 0.4606 ha will consist of Oil/Grit Separators (OGS) prior to its release into an existing stormwater outlet to Fletchers Creek.

9. Impact Assessment and Mitigation

The impact assessment presented in this section includes the site-specific assessment for the subject property and adjacent lands. The impact assessment is based on:

- The most detailed level of information available related to biophysical resources based on primary and secondary data and analyses (as presented in **Section 4**); and
- The findings of the constraint analyses (presented in **Section 4.6**) to identify sensitive and significant natural features and ecological functions that require protection to maintain the integrity and biodiversity of the natural heritage within the study area.

One of the primary objectives followed in designing the proposed development was to protect the NHS features and functions. Since impact avoidance is generally the most effective means of reducing the risk of development impacts on the natural environment, it is recommended that development limits be

established outside of any significant natural heritage features. This can be achieved by establishing development limits outside the areas identified as being environmentally constrained in **Section 5**.

As with the other components of this Scoped EIS, an integrated multi-disciplinary approach has been applied to assessing the potential impacts of redeveloping the subject property.

9.1 Grading

All grading for the proposed development will be restricted to the limit of development (i.e., will not encroach within buffer zones).

9.2 Tree Removals

Based on a review of the draft plan, it will be necessary to remove 20 trees ≥10 cm DBH from the tablelands on the subject property to accommodate the proposed development as they are located within the limits of the proposed buildings, infrastructure, or grading. The majority of trees to be removed are young to mid-aged planted ornamental trees including Thornless Honey Locust (*Gleditsia triacanthos var. inermis*), White Spruce (*Picea glauca*), and Norway Maple (*Acer platanoide*). Trees to be removed are identified in **Appendix E**.

A total of 85 trees are identified for preservation (see **Figure 1** - **Appendix E**), all of which are located within the woodland along the edge of the proposed development. Trees to be retained shall be protected through the establishment of a tree protection zone (TPZ). The minimum recommended TPZ's are based on the DBH of the tree (**Figure 1** in **Appendix E**).

9.3 Species at Risk

9.3.1 Redside Dace

Fletchers Creek and its tributary adjacent to the subject property are designated occupied and contributing Redside Dace habitat, respectively. Stormwater will discharge via an existing outfall into the tributary and impacts to this endangered species may result if the SWM plan has not been designed for their protection. With this in mind, the stormwater servicing design, where feasible, must include best efforts to maintain the following conditions:

- Discharge temperature below 24°C;
- Dissolved oxygen concentration at discharge of at least seven milligrams per litre; and
- TSS of <25 mg/L above stream background (MNRF 2016).

Consultation with MNRF remains on-going to identify requirements under the ESA (2007) for Redside Dace in relation to the proposed development plan.

Standard Best Management Practices should be implemented during the construction of the site to prevent erosion and sedimentation into the watercourses. The following measures should be implemented on the site:

- Works within the regulated habitat (meander belt + 30 m for occupied and in water works for contributing features) must be conducted from July 1 to September 15, unless otherwise directed by MNRF; Develop Erosion and Sediment Control Plans including a multi-barrier approach with double-row sediment fencing with staked straw bales in between; and
- Regular site inspections by a qualified inspector during works near Redside Dace habitat.

9.3.2 SAR Bat Species

No cavity trees were documented that have the potential to provide maternity roost habitat within the limit of development. Consequently, impacts to SAR bat species are not anticipated in association with the proposed development plan.

9.3.3 Butternut

The development limit establishes a 25 m to the identified Butternut located adjacent to the property. While development is proposed within 50 m of the Butternut tree, this area has been subject to the historic placement of fill, and development/maintenance of the existing residential home. Based on this historic context, no future impacts to the Butternut or its habitat are anticipated as a result of the proposed development plan.

9.4 Water Balance

Runoff from the proposed development will be discharged into the Fletchers Creek tributary via an existing stormwater outfall. The proposed lower level parking will have foundation drains that will be connected to the storm sewer.

The stormwater management plan for the proposed development will ensure that the 100-year storm event will not exceed the pre-development release rates of the 2-year storm event. A portion of the landscaped area along the south and north property lines will drain uncontrolled towards Fletchers Creek.

The roof will have controlled roof drains that will limit runoff discharge to 35 l/s/ha (0.035 m^3/s/ha) of roof area. The runoff from this area will be regulated by a 75 mm diameter orifice restrictor plate installed over the outlet pipe located upstream of the proposed oil/grit separator. The maximum allowable runoff release rate of 0.0141 m^3/s will be achieved.

Quality control for stormwater treatment of the drainage site of 0.4606 ha will consist of Oil/Grit Separator (OGS) treatment prior to release.

9.5 Erosion and Sediment Control

Erosion and sediment control measures to be implemented during and following construction should comply with the Erosion and Sediment Control Guideline for Urban Construction (GGHCA 2006) and the MNRF (2016) guidance document for development activities in Redside Dace protected habitat. The FSR identifies that sediment fence will be installed along the limit of grading. Mud tracking control will consist of flushing and sweeping of roads, in accordance with the City of Mississauga guidelines. To prevent silt-laden runoff from entering municipal storm sewer system, sediment traps will be installed at all catchbasin and area drain locations once the storm sewer system has been constructed. To the greatest extent possible Best Management Practices (BMPs) for Redside Dace will be implemented on site.

9.6 Tree Preservation and Protection

Any tree removal or vegetation clearing and transplanting should be conducted so as to be in compliance with the *Migratory Birds Convention Act*. Generally, the clearing of vegetation should only take place between mid-August and March. For any proposed clearing of vegetation within the breeding bird season (early April to mid-August), or where birds may be suspected of nesting outside of typical dates, an ecologist should undertake detailed nest searches immediately prior (within two days) to site alteration to ensure that no active nests are present.

9.7 Opportunities for Compensation and Enhancement

To compensate for the removal of 19 live trees within the development limit, the woodland buffer along the north side of the proposed development will be planted with a variety of native trees. Trees removed from the subject property and adjacent lands will be replaced at a minimum ratio of 1:1 (one tree planted for each tree removed). For additional details refer to **Figure 5** (Proposed Compensation Area) and **Appendix E**.

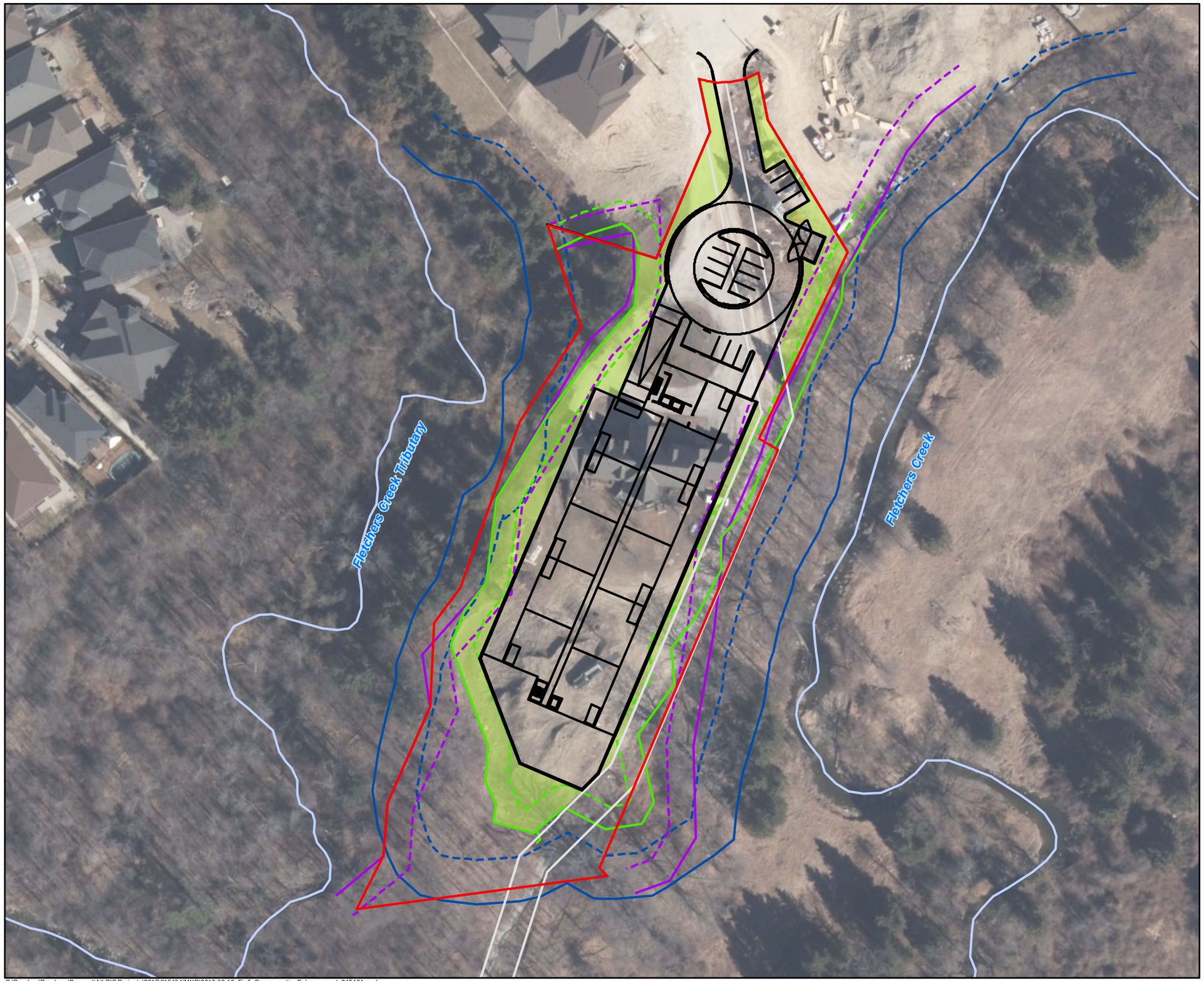
10. Policy Conformity

A summary of federal, provincial and municipal environmental protection and planning policies and regulations applicable to the subject property were discussed in **Section 2**. An evaluation of how the proposed re-development complies with the applicable environmental policies and legislation is summarized below in **Table 7**.

Compensation and Enhancement Opportunities

Figure 5

6620 Rothschild Trail Scoped EIS



Legend

- Subject Property
- Proposed Compensation Area (0.18 Ha)
- Existing Sewer Easement (Searles, 2017)
- Proposed Development Plan

Environmental Constraints - Terrestrial

- Woodland Boundary (Staked by CVC, May 26, 2015) Significant Wildlife Habitat Limit
- 5.0 m Buffer to Woodland Boundary

Hazard Constraints - Slope Stability

- Long-term Stable Top of Slope (Soil Engineers, 2017)
- 6.0 m Setback to Long-term Stable Slope Limit

Hazard Constraints - Flooding

- Regulatory Floodline (CVC, 2015)
- Watercourse (Beacon 2018)
- 10 m Setback to Regulatory Floodline

BEACON ENVIRONMENTAL

Project: 215194
Last Revised: March, 2019

Client: DiBlasio Homes

Prepared by: DU
Checked by: SG

N

1:850

0 10 20 m

Contains information licensed under the Open Government License–Ontario Orthoimagery Baselayer: FBS Peel 2018

C:\Dropbox\Dropbox (Beacon)\All GIS Projects\2015\215194\MXD\2019-03-19_Fig5_CompensationEnhancement_215194.mxd

Table 7. Policy Compliance Assessment

APPLICABLE POLICY / LEGISLATION	RELEVANT EIS FINDINGS AND RECOMMENDATIONS	Policy Compliance
Federal Fisheries Act (1985)	Fish habitat will not be impacted by the proposed development provided that the mitigation measure recommended in this report and the Functional Servicing Report are implemented.	Yes
Endangered Species Act (2007)	SAR Bat Habitat could be present adjacent to subject property within the NHS. This feature is being protected from development, so no contravention to the act is anticipated. One Butternut was identified in the adjacent NHS. This feature is being protected from development, so no contravention to the act is anticipated. Fletchers Creek and its Tributary are identified as occupied and contributing habitat, respectively. The proposed development respects the Redside Dace Regulated habitat. An existing stormwater outfall will discharge drainage into the Fletchers Creek tributary.	Yes. Requirements under the ESA (2007) will be addressed through the detailed design stage.
Provincial Policy Statement (2014) Section 2.1 – Natural Heritage		
1. Habitat for Threatened and Endangered Species	See above.	Yes
2. Significant Valleylands	Fletchers Creek and its tributary qualify as significant valleylands. No impacts are anticipated if mitigation measures are implemented.	Yes
3. Significant Wetlands	N/A. There is no wetland habitat.	N/A
4. Significant Woodlands	There are no Significant Woodlands on the subject property, but the Natural Area (MV2) adjacent to the subject property qualifies as significant. No development will occur in this feature. No impacts are anticipated if mitigation measures are implemented.	Yes
5. Significant Wildlife Habitat	The MV2 Natural Area northeast qualifies as SWH and will be protected from the development.	Yes
6. Significant Areas of Natural and Scientific Interest	N/A – There are no Areas of Natural of Scientific Interest.	N/A
7. Fish Habitat	No impacts to fish habitat are anticipated provided that the mitigation recommendations in this report are implemented.	Yes
Provincial Policy Statement (2014) Section 2.2 - Water	No impacts to sensitive water features anticipated. The EIS has identified mitigation measures to be implemented to reduce impacts to sensitive surface water.	Yes

APPLICABLE POLICY / LEGISLATION	RELEVANT EIS FINDINGS AND RECOMMENDATIONS	Policy Compliance
Provincial Policy Statement (2014) Section 2.3 – Natural Hazards	Development of the subject property will be limited to areas outside natural hazards (i.e. slopes, floodplains).	Yes
Region of Peel OP	There are no Core Areas the subject property, but the MV2 Natural feature adjacent to the subject property qualifies is considered a Core Area. No development will occur in this feature.	Yes
Mississauga OP (2018)		
1. Natural Heritage System		
Significant Natural Areas	Significant natural areas associated with the subject property and adjacent lands include: • Fish Habitat • Significant Woodland • Significant Valleyland • Significant Wildlife Habitat • Habitat of Threatened and Endangered Species No development is proposed the Significant Woodland, Significant Valleyland, SWH, or the Habitat of Threatened and Endangered Species; therefore, there no direct impacts are anticipated with the implementation of mitigation measures. Indirect impacts can be avoided or minimized by implementing the recommendations of his report.	Yes
2. Natural Hazard Lands	Development of the subject property will be limited to areas outside natural hazards (i.e. slopes, floodplains).	Yes
CVC Regulations and Policies		
Ontario Regulation 160/06 Watershed Planning and Regulation Policies (CVC, 2010) and Slope Stability Definition and Determination Guideline (2014)	Development of the subject property will be limited to areas outside features that are regulated by CVC including watercourses and natural hazards (i.e. valley slopes). Long term stable slope limit was determined in conformance with the PPS and CVC policies and guidelines.	Yes

10.1 Permit Requirements

10.1.1 MNRF Endangered Species Act (2007)

Based on correspondence with MNRF, requirements under the ESA (2007) for the proposed development plan can likely be addressed through the issuance of a LOA. To address this requirement, a formal submission including details regarding stormwater servicing, erosion and sediment control will be made to MNRF at the detailed design stage.

10.1.2 CVC Ontario Regulation 160/06

As the CVC Regulation Limit extends within the subject property, a permit under Ontario Regulation 160/06 will be required to undertake site alteration and grading for the proposed development.

10.1.3 City of Mississauga

A submission to the City will be required at the detailed design stage to show conformance with relevant City by-laws and the Official Plan. Tree removals will also require an approved permit under City by-law 0254-2012.

10.1.4 DFO Fisheries Act (Section 35)

The applicability of the Section 35 prohibition to particular water bodies is now determined on a case-by-case basis through a self-assessment process to evaluate impacts to fish and fish habitat and next steps. Development activities taking place in or near water may affect fisheries by adversely affecting fish or fish habitat. DFO recommends that proponents of these activities should:

- Understand the types of impacts their projects are likely to cause;
- Take measures to avoid and mitigate impacts to the extent possible; and
- Request authorization from the Minister and abide by the conditions of any such authorization, when it is not possible to avoid and mitigate impacts of projects that are likely to cause serious harm to fish.

As no activities are proposed within fish habitat, there are no requirements under Section 35.

11. Monitoring

To ensure compliance with the recommendations of the Scoped EIS, and to also evaluate the effectiveness of various mitigation and environmental management strategies identified through the Scoped EIS (i.e. buffers, LID's, etc.), it will be necessary to implement an environmental monitoring program. The program will be multidisciplinary and will include monitoring of surface water resources, aquatic habitat, geomorphology, and natural heritage resources.

Monitoring will be completed prior to development, during development and following development up to assumption. Monitoring before development is necessary to establish baseline conditions and a better understanding of the system. Monitoring during development is intended to verify that the development is in compliance with the recommendations of the Scoped EIS and that any mitigation measures that have been implemented are performing their intended function (i.e., sediment and erosion control, buffer enhancement plantings, SWM). Post-development monitoring is intended to evaluate compliance and ensure functionality of the overall system.

This Scoped EIS has proposed an environmental monitoring framework that identifies a suite of biophysical parameters that should be considered for inclusion in the future environmental monitoring program to be developed in consultation with the City and CVC following Draft Plan approval. The environmental monitoring framework presented in **Table 8** summarizes the various biophysical parameters to be monitored, protocols and analyses to be employed, as well as the anticipated frequency and duration of monitoring events. While the framework provides considerable detail, it should be noted that the plan is subject to approval by the City, CVC prior to implementation as a condition of Draft Plan approval. Consultation with MNRF regarding the environmental monitoring framework may also be required.

Table 8. Proposed Monitoring Framework

Ecosystem Component	Objective(s)/Rationale	Monitoring Parameter(s)	Monitoring Indicator(s)	Methods/Protocols/Analyses	Frequency & Duration*			Comments
					Pre-Development	During Construction	Post-Development	
Geomorphology	To assess for changes in channel morphology as a result of urbanization	General site conditions at the stormwater outfall and downstream receiving reach	Repeated, documented photographs	Photographic record of site conditions from common view point.	Once to establish baseline conditions	N/A	Years 1 and 5	Timing of Monitoring: Summeror fall. Season to remain consistent.
Terrestrial Resources	To assess changes in the type and extent of natural cover in the study area over the long term.	Natural Cover	Type and extent of natural vegetation cover	Vegetation resources will be classified according to ELC standards. The area of each ELC vegetation type will be estimated using aerial photography. GIS analyses will be used to compare changes in area over time.	None	N/A	Year 1 and 5	Timing of Monitoring: Summeror fall. Season to remain consistent.
	To evaluate the effectiveness of buffers in reducing encroachment related impacts to protected features within the natural heritage system.	Buffer Integrity	Human related disturbance	The interface between the development and natural heritage system will be surveyed to document evidence of human disturbance. Observations will be categorized according to disturbance type, extent and magnitude of effect.	Once to establish baseline condition	Once	Years 1, 3, 5	Timing of Monitoring: summeror fall. Season to remain consistent.
			Condition of buffer plantings	Buffers will be planted and naturalized using native species. The condition of these plantings will be assessed using standard vegetation plots.	None	Once	Years 1, 3, 5	Timing of Monitoring: summeror fall. Season to remain consistent.

Ecosystem Component	Objective(s)/Rationale	Monitoring Parameter(s)	Monitoring Indicator(s)	Methods/Protocols/Analyses	Frequency & Duration*			Comments
					Pre-Development	During Construction	Post-Development	
Aquatic Resources	To assess impacts to Redside Dace and habitat from construction.	Site Conditions	Erosion and sediment control measures.	Regular monitoring of erosion and sediment control measures and monitoring of surface water runoff	None	To be determined in consultation with CVC and MNRF	To be determined in consultation with CVC and MNRF	

12. Conclusion

This Scoped EIS was prepared in accordance with the Terms of Reference approved by the City and CVC. The information and materials provided in this report were based on a review of relevant background information, field assessments, analyses, and supporting studies provided by the study team.

Existing conditions of the subject property and surrounding area, where appropriate, were inventoried and documented. Currently, the site consists of 1 residential building and an associated access way. The property is bounded by the valleylands associated with the main branch of Fletchers Creek, and a Tributary to Fletchers Creek to the southeast and west, respectively. Fletchers Creek and its tributary have been classified by MNRF as occupied and contributing Redside Dace habitat, respectively.

The Draft Plan of Subdivision for the subject property identifies a residential four (4) storey apartment building with access from Rothschild Trail. There is no proposed trail system for the subject property.

In accordance with direction provided through the agency consultation process, the proposed development limit was defined based on the following criteria:

- 6.0 m Setback to Long-term Stable Slope Limit;
- 10.0 m setback to Regulatory Floodline (CVC 2015);
- 5.0 m Buffer to Wood land Boundary; and
- Redside Dace Occupied Habitat Limit.

The impact assessment examined the effects of site preparation activities (clearing, grading), construction (servicing, roads, buildings), and post-construction activities on physical and biological resources of the property and surrounding natural area. Based on the small-scale, low density development form and the provision of buffers to existing environmental features, impacts to terrestrial and aquatic habitat are not anticipated in association with the proposed development plan. No intrusions into the Fletchers Creek valleylands are proposed

From a natural heritage and natural hazard perspective, direct negative impacts on existing environmental features and ecological functions are not anticipated as a result of the proposed development due to the provision of appropriate buffers and setbacks, as well as the site-based water balance approach.

Report prepared by:
Beacon Environmental

Sarah Aitken, B.Sc.
Aquatic Ecologist

Report prepared by:
Beacon Environmental

Maureen Attard, M.Sc.
Geomorphic Systems Analyst

Report reviewed by:
Beacon Environmental

Shelley Gorenc, M.Sc., P.Geo.
Senior Geomorphologist

Report reviewed by:
Beacon Environmental

Ken Ursic
Senior Ecologist

13. References

Cadman, M.D., D.A. Sutherland, G.G. Beck, D. Lepage and A.R. Couturier (eds.). 2007.
Atlas of the Breeding Birds of Ontario, 2001–2005. Bird Studies Canada, Environment Canada, Ontario Field Ornithologists, Ontario Ministry of Natural Resources, and Ontario Nature, Toronto, ON. xxii + 706.

Chapman, L.J. and D.F. Putnam. 1984.
The Physiography of Southern Ontario, Third Edition. Ontario Geological Survey, Special Volume 2, 270p. Accompanied by Map P.2715 (coloured), scale 1:600,000.

City of Mississauga Natural Areas Survey. (2015).
Natural Areas Fact Sheet SV10.

City of Mississauga. 2018.
City of Mississauga Official Plan.

Credit Valley Conservation (CVC). 2010.
Watershed Planning and Regulation Policies. April 9, 2010.

Credit Valley Conservation. 2012.
Credit Valley Conservation: Stormwater Management Criteria. August 2012.

Dobbyn, J.S. (1994).
Atlas of the Mammals of Ontario. Federation of Ontario Naturalists, Don Mills, Ontario, 120 pp. ISBN 1-896059-02-3.

Downs, P.W. 1995.
Estimating the probability of river channel adjustment. Earth Surface Processes and Landforms. 20: 687-705.

Downs, P.W. and K.J. Gregory. 2004.
River Channel Management: Towards Sustainable Catchment Hydrosystems. Oxford University Press Inc., New York, New York.

Environment Canada. 2018.
Canadian Climate Normals 1981-2010
http://climate.weatheroffice.gc.ca/climate_normals/index_e.html. Accessed January 16, 2018.

Fisheries and Oceans Canada (FOC). 2013.
Fisheries Protection Policy Statement. October 2013. Available online at:
http://www.dfo-mpo.gc.ca/pnw-ppe/pol/PolicyStatement-EnoncePolitique-eng.pdf.

Galli, J. 1996.
Rapid stream assessment technique, field methods. Metropolitan Washington Council of Governments. 36pp.

Government of Canada. 1985.
Federal Fisheries Act. Available online at: http://laws-lois.justice.gc.ca/eng/acts/F-14/.

Government of Ontario. 1994.
Migratory Bird Convention Act. Available online at: http://laws-lois.justice.gc.ca/eng/acts/m-7.01/.

Government of Ontario. 2007.
Endangered Species Act. Available online at: https://www.ontario.ca/laws/statute/07e06.

Land Information Ontario. 2014.
Ministry of Natural Resources and Forestry, Make a Map: Natural Heritage Areas.

Lee, H.T., W.D. Bakowsky, J. Riley, J. Bowles, M. Puddister, P. Uhlig and S. McMurray. 1998.
Ecological Land Classification for Southern Ontario: First Approximation and Its Application. Ontario Ministry of Natural Resources. SCSS Field Guide FG-02. 225 pp.

Montgomery, D.R and J.M. Buffington. 1997.
Channel-reach morphology in mountain drainage basins. Geological Society of America Bulletin 109 (5): 596-611.

Ontario Ministry of Natural Resources. 2000.
Significant Wildlife Habitat Technical Guide. October 200.

Ontario Ministry of Natural Resources. 2002.
Technical Guide: River and Stream Systems: Erosion Hazard Limit.

Ontario Ministry of Natural Resources. 2010.
Natural Heritage Reference Manual for Natural Heritage Policies of the Provincial Policy Statement, 2005. Second Edition. March 18, 2010.

Ontario Ministry of Natural Resources. 2015.
Significant Wildlife Habitat Criteria for Ecoregion 7E. January 2015.

Ontario Ministry of Natural Resources and Forestry. 2016.
Guelph District. 2017. Bat and bat habitat surveys of treed habitats. Updated April 2017. 13 pp.

Ontario Ministry of Municipal Affairs and Housing (MMAH). 2014.
Provincial Policy Statement. Toronto, Ontario.

Ontario Nature. 2017.
Atlas of Ontario Herpetofauna. Available on-line through the Ontario Nature website, https://ontarionature.org/programs/citizen-science/reptile-amphibian-atlas/species/.

Region of Peel. 2016.
Peel Region Official Plan – December 2016 Consolidation.

Richards, C., R.J. Haro, L.B. Johnson, and G.E. Host. 1997.

Catchment and reach-scale properties as indicators of macroinvertebrate species traits. Freshwater Biology 37: 219-230.

Toronto and Region Conservation Authority. 2016.
Annual local occurrence and local rank update: terrestrial species and vegetation communities.

Ward, A. D. Mecklenberg, J. Mathews, and D. Farver. 2002.
Sizing Stream Setbacks to Help Maintain Stream Stability. 2002 ASAE International Meeting, Chicago, IL. July 28-21, 2002. Paper Number 0222239.

Williams, G.P. 1986.
River meanders and channel size. Journal of Hydrology, 88: 147-164.

Appendix A

Terms of Reference

March 10, 2017 BEL 215194

Lauren Eramo-Russo *Via email: Lauren.eramorusso@mississauga.ca*
Development Planner
City of Mississauga
Development and Design Division
Planning and Building Department
300 City Centre Drive
Mississauga, ON L5B 3C1

Re: Terms of Reference for Scoped Environmental Impact Study (EIS) - revised
Block 21 Vintages Select
Lot #21 (Plan 43M-1710) - 6620 Rothschild Trail, Mississauga, Ontario
Fletcher's Creek Watershed

Dear Ms. Eramo-Russo:

Beacon Environmental Limited (Beacon) has been retained by DiBlasio Homes to prepare a Scoped Environmental Impact Study (EIS) for the re-development of 6620 Rothschild Trail (Lot #21, Plan 43M-1710), in the City of Mississauga (hereto referred as the subject property). The subject property is situated adjacent to two watercourses: the main branch of Fletcher's Creek and a small ravine tributary. Both of these features have been characterized as confined valley systems.

As background, the subject lands were designated for residential development in 1997 by the City of Mississauga. In 1998, the lands were included within an approved Draft Plan of Subdivision and were zoned to permit detached dwellings. Subsequent to the Draft Plan approval process, a proposal has been put forth to redesign Lots 1-10 to allow for condominium townhouses rather than detached dwellings.

During the July 9, 2015 EIS pre-consultation meeting with the City and Credit Valley Conservation (CVC), it was agreed that the Terms of Reference for an EIS could be scoped to reflect the relatively small size of the subject property, and in recognition of the numerous technical studies completed to date in support of the proposed development plan. This letter outlines the proposed Terms of Reference for the Block 21 Vintages Select Scoped EIS and addressed comments provided by CVC (dated November 24, 2015).

Planning Context

The majority of the subject property is identified within the City of Mississauga Land Use Schedule as Low Density Residential. Presently, land use within the subject property consists of an estate lot with a single residential dwelling. The development proposal for this property will intensify use of the current

development area. The proposal will not directly encroach on the adjacent Natural Area of the Fletchers Creek valley (part of the City of Mississauga Natural Heritage System).

The City's Official Plan requires that an EIS be completed for any proposed development within or adjacent to a Natural Area. Specifically, policy 6.3.1.13 of the Mississauga Official Plan (2011) states that:

> *Development and site alteration will not be permitted within or adjacent to Natural Areas, Linkages and Special Management Areas unless it has been demonstrated that there will be no negative impacts to the features and ecological functions of the Natural Areas System. An Environmental Impact Study (EIS) will be required and the Terms of Reference will be provided by the City. The EIS will be approved by the City, in consultation with the relevant conservation authority, at the early stages of a proposal's consideration. The EIS will delineate the area to be analysed, describe existing physical conditions, identify environmental opportunities and constraints, and evaluate the ecological sensitivity of the area in relation to a proposal. It will also outline measures to protect, enhance, and restore the natural features, area and linkages including their ecological functions.*

To date, the following tasks have been completed to date in support of the Scoped EIS:

- Site meeting with CVC and City staff to stake the limit of environmental features (drip line and physical top of slope) within the subject property (May 26, 2015);
- Pre-consultation meeting with CVC and City staff to discuss development opportunities and constraints (July 9, 2015); and
- Site meeting with CVC ecology staff and City staff to review existing site conditions and confirm the EIS scope of work (July 21, 2015).

The Study Area for this Scoped EIS will include the subject property, and the existing Natural Areas associated with main branch of Fletcher's Creek and Fletcher's Creek tributary system.

Background Review

The background review will focus on summarizing all technical studies previously completed to date in support of the proposed redevelopment plan, including but not limited to:

- Fletcher's Creek Geomorphic Stream Bank Assessment Study (Geomorphic Solutions, 2007);
- Slope Stability Study (Soil Engineers Ltd., 2017);
- DiBlasio West Environmental Impact Study (Dougan and Associates, 2008);
- Endangered Species Act (ESA, 2007) Screening Request response letter (MNRF, 2013);
- Redside Dace Regulated Habitat Limit Assessment (GHD, 2014);
- Physical Top of Slope and Drip Line Staked Limits (D.B. Searles Surveying Ltd., 2015);
- Geomorphic Assessment (Beacon Environmental, 2015);

- Vegetation Assessment (Beacon Environmental, 2015); and
- Wildlife Habitat Assessment (Beacon Environmental, 2015).

Additionally, the following background resources to be reviewed as part of this study will include:

- City of Mississauga Natural Areas Inventory data and associated Fact Sheets;
- MNRF Natural Heritage Information Centre (NHIC) database;
- Available Data on Fish Records and Habitat from CVC;
- Natural heritage species records from CVC;
- Ontario Breeding Bird Atlas data;
- Ontario Herpetofaunal Summary Atlas data;
- Historical and current aerial photography;
- Soils and topographic mapping, and
- Fletchers Creek Restoration Study - Characterization Report (DRAFT).

Field Studies

Amphibian Surveys

Amphibian breeding surveys have not been included in the EIS scope of work as there is limited habitat available. Any relevant background information will be summarized in the EIS.

Vegetation Assessment (October 2015)

As the existing property consists of a single dwelling residential home, with manicured grass and landscape plantings, the vegetation assessment was scoped to a single site visit in October 2015 to assess terrestrial vegetation. This was completed by applying Ecological Land Classification (ELC) and mapping to "Vegetation Type" (the highest level of detail) for the study area. All rare or uncommon vegetation communities will be mapped regardless of size. The EIS will describe the location and distribution of all rare or uncommon species found in the vegetation assessment based upon "Vascular Plant Flora of the Region of Peel and the Credit River Watershed (Kaiser, 2001 and amendments). Observations pertaining to other features, such as cliffs, seeps or bluffs will be documented.

Additionally, an inventory of trees greater than 15 cm in diameter at breast height (dbh) was also completed for the subject property. The number, species, size and condition of each tree was noted in order to delineate the minimum Tree Protection Zone (minimum distance at which the tree can be preserved as measured from the base of each tree). This delineation will feed into the determination of the development limit for the Subject Property. The assessed and tagged trees will be surveyed and placed on the topographic base map.

Wildlife Habitat (October 2015)

To document the relative significance and sensitivity of terrestrial habitat within the subject property, a wildlife habitat suitability study was undertaken to determine whether the site supports habitat for any species requiring conservation. Based on the wildlife habitat suitability study findings, and a background review of available information, all potential significant wildlife habitat within the Study Area will be evaluated and discussed within the context of Provincial SWH criteria for Ecoregion 7E4 and the Region of Peel SWH criteria.

Other Wildlife

Other wildlife species (e.g., mammals, reptiles and amphibians) observed on the site during other field investigations will be recorded as incidental observations. We note that the City of Mississauga Natural Areas Survey for this site (MV2) indicates that several wildlife species of special concern have been noted in the area (snapping turtle, bobolink, eastern meadowlark, barn swallow, eastern wood pewee, wood thrush). Based on the wildlife habitat suitability study findings, and a background review of available information (including MNRF ESA information request data), the EIS will consider relevant species of special concern in relation to the proposed constraints, potential impacts and proposed mitigation measures for this project.

Breeding Bird Surveys

Based on pre-consultation discussions with CVC, it is our understanding that breeding bird surveys will not be required as part of the Scoped EIS.

Geomorphic Assessment (October 2015)

Geomorphic field work was originally completed along Fletcher's Creek by Geomorphic Solutions in 2007. In order to ensure that the Scoped EIS accurately depicts existing geomorphic conditions, a rapid field assessment of the main branch of Fletcher's Creek and the tributary will be undertaken. Field observations will be summarized in the EIS.

While the geotechnical study determines the erosion hazard limit for both the main branch of Fletchers Creek and the tributary due to the confined nature of the valley settings, technical support to the geotechnical study will be provided from a geomorphic perspective through the recommendation of a toe erosion allowance. In accordance with Provincial Policy (MMAH, 2014), and CVC policies and guidelines (i.e., 2014 Slope Stability Definition and Determination Guideline), a toe erosion allowance recommendation will be provided for both valley systems, referencing available information (including the 2007 Geomorphic Solutions report) and field observations regarding soil composition and watercourse stability.

Ontario Regulation 242/08 does not distinguish between confined and unconfined landform systems. For the purposes of this study, the meander belt width was delineated on a reach basis for the main branch of Fletchers Creek in order to establish the limit of occupied regulated Redside dace habitat.

Aquatic Assessment

No specific surveys for aquatic species will be completed within Fletchers Creek or the tributary. Fisheries information will be compiled from CVC and MNRF through the background review. It is understood that the main branch of Fletcher's Creek is classified as occupied Redside Dace habitat. The tributary has been identified as contributing to downstream occupied habitat.

Geotechnical Assessment

A slope stability study to determine the long-term stable top of slope was completed for the subject property (Soil Engineers Ltd., 2017). The EIS will summarize the findings of this study, and include relevant updates to reflect CVC policies and guidelines (i.e., 2014 Slope Stability Definition and Determination Guideline).

Species at Risk (SAR)

Consultation with MNRF Aurora District Office in support of the proposed development plan has been on-going since 2013. While the ESA (2007) review and approvals process does not stipulate or support review and sign-off on mapped regulated habitat limits, the scoped EIS will clearly demonstrate how the mapped limits of regulated habitat are in conformance with the ESA (2007) habitat regulation (O. Reg. 242/08). Additionally, the EIS will include record of correspondence with MNRF Aurora District Office confirming that efforts have been made at this level of the planning process to consult with MNRF Aurora District Office, and clarify authorization requirements.

A single Butternut has been documented from the subject property. Butternut is a provincially endangered tree species and its habitat is regulated under the provisions of the Ontario Endangered Species Act (ESA) (2007). The EIS will address this species to demonstrate compliance with the ESA.

Water Balance Analysis

Based on information presented in the Functional Servicing Report and geotechnical report, a water budget assessment will be completed to ensure that proposed stormwater measures achieve a water balance across the site, as well as feature-based water balance to the tributary.

Assessment and Reporting

The Scoped EIS submission will be prepared in accordance with City of Mississauga standards, with report sections as follows:

1. Introduction

   This section of the report will include the purpose, objectives, and scope of the study, as well as a general description of the site and the site location.

2. Description of the Proposal

   A concise overview of the development proposal with a conceptual site plan, historic and existing land uses of the subject property and adjacent lands, zoning, and general areas of filling and/or grading and/or drainage modifications.

3. Site Description and Landscape Context

   This section will include: a list of background information sources consulted, a description of the methods used and timing of field surveys to characterize the site's natural heritage features and functions. Targeted inventories completed for this Scoped EIS will provide current information about the aquatic and terrestrial resources within and adjacent to the natural area, applicable environmental designations, and mapping of both existing conditions and environmental constraints. Other natural and cultural features (e.g. corridors, linkages, hedgerows, swales, meadow-feeding areas, etc.) that may contribute to functions of the designated natural area's features and functions, both onsite and related to the immediate adjacent lands will be listed and described.

   The site description will include an assessment of surficial soils, topography, surface drainage patterns, flora, fauna, fish habitat and natural features using available information from background resources and field work. Information will be presented using summary text descriptions, photos, tables, figures, and appendices.

4. Identification of Constraints and Opportunities

   Based on the findings of the background review and field inventories, a constraint analysis will be undertaken to identify areas of the subject property that are environmentally constrained and require protection. This analysis will include consideration of setbacks and buffers that are most appropriate to ensure the long-term function of environmental features. The analysis will be used to establish a preliminary limit of development to inform development design and servicing. Additionally, the EIS will identify opportunities for enhancement of the natural area and its ecological functions that can be implemented to improve the ecological integrity of the valleylands

5. Description of the Proposed Development

   This section will describe all components of the proposed development, including tree preservation, grading, servicing, stormwater management (i.e. LID), design and landscaping.

6. Evaluation of the Effects on the Environment

Based on the findings of the Scoped EIS, we will describe the sensitivity of the features and functions, and describe the anticipated impacts of the development of these features and functions in terms of potential direct, indirect, and cumulative effects both during construction and upon occupancy. This evaluation of potential effects will conform to Appendix A of CVC's EIS Guidelines. A figure detailing all features, constraints, buffers and setbacks that are recommended and/or required will also be included in the EIS. This includes the delineation of habitat of endangered and threatened species.

7. Description of Mitigation Measures

For this section we will prepare recommendations for development on the property, including any best management practices to protect and enhance the natural heritage features and functions, and appropriate mitigation to prevent or minimize any anticipated impacts (e.g. buffers/setbacks, restrictions on timing of works, and the rehabilitation of disturbed areas).

8. Policy Conformity

The proposed development will be reviewed in context of applicable federal, provincial, regional, municipal and conservation authority plans, policies and regulations with respect to natural heritage features. An opinion will be provided regarding compliance.

9. Recommendations

The concluding section will summarize our recommendations related to the appropriateness of the proposal in relation to applicable natural heritage policies and guidelines, as well as any recommendations related to appropriate mitigation and enhancement measures. Literature and sources cited (including experts contacted) will also be appended at the end of the Scoped EIS. This section include a summary statement regarding the impacts on significant natural heritage features or their ecological functions and describe how any negative impacts can be mitigated. Recommendations will also be provided for restoration and enhancement of the natural heritage system and associated ecological functions.

10. Appendices

These will include any relevant correspondence, and natural heritage data collected (including relevant data from background sources supplemented by site-specific field work).

Should you have any questions, please do not hesitate to contact the undersigned at (519) 826-0419 x30.

Prepared by:
Beacon Environmental

Shelley Gorenc, M.Sc., P.Geo.
Senior Fluvial Geomorphologist

Reviewed by:
Beacon Environmental

Ken Ursic
Senior Ecologist

cc: Maricris Marinas, CVC (mmarinas@creditvalleyca.ca)
Dorothy DiBerto, CVC (DDiBerto@creditvalleyca.ca)
Alvaro DiBlasio, Landowner (alvaro@diblasiocorp.com)
Jim Levac, Glen Schnarr & Associates Inc. (jiml@gsai.ca)

Appendix B

MNRF Correspondence

Minutes

4 June 2014

Project	Di Blasio Estates - Phase 2 West Rothschild Trail	From	Shelley Gorenc, M.Sc., P.Geo.
Subject	MNR ESA Permitting	Tel	905-814-4387
Date (Time): Location:	May 21, 2014 (1-2 pm) On Site	Job No	28/21135/ [Previously 12225]
Attendees	Emily Funnell (MNR) Alvaro Di Blasio (Di Blasio Estates) Orjan Carlson (Urban Ecosystems) Imran Khan (GHD) Shelley Gorenc (GHD)	Copy	All attendees

Minutes

1. Introductions

2. Site Plan

OC – Provided an overview of preliminary engineering details that have been prepared for the site.

EF – Questioned whether the preliminary site plan was different than the previous GHD submission to MNR.

SG – Indicated that the site plan had been revised:

- Access road into additional lots had been shifted north to provide additional buffer to top of slope and valley and has been shortened to reduce extension of road into open space area;
- Permeable pavers have been incorporated into access road as an LID feature;
- Development limit has not changed but minor revisions to lot limits have been made (subdivision of lots 9 and 10; narrowing of lot 1 to optimize open space area);
- Designated open space lot remains as previously discussed, but now includes a proposed infiltration basin to provide additional water quality benefits;

GHD Inc.
6705 Millcreek Drive Unit 1 Mississauga ON L5N 5M4 Canada
T 1 905 213 7121 **F** 1 905 890 8499 **E** mississauga@ghd.com **W** www.ghd.com

- Site plan does not require any formal stormwater release to Fletcher's Creek or tributary – all stormwater requirements can be addressed through LIDs and rear lot conveyance; and
- Changes to the site plan have further reduced encroachment into mapped Redside Dace regulated habitat limit; formerly 142 m^2 of encroachment – now 90 m^2 (refer to enclosed **Attachment A**).

EF – Requested clarification on how stormwater requirements are serviced through existing subdivision.

AD – Indicated that stormwater is currently split between an existing outfall to Fletcher's Creek tributary and a storm sewer system – servicing has not yet been assumed by the City.

3. Vegetation Removal Timing

EF – Indicated that MNR's remaining concern regarding the site was related to the timing of vegetation removal in vicinity of lots 8-11 (refer to **Attachment A**), where the regulated habitat limit is being driven by the limit of vegetation. Inquired whether the disturbance of this area pre-dates the 2007 up-listing of Redside Dace?

AD – Indicated that the vegetation removal pre-dates 2007.

SG – Noted the date associated with aerial imagery provided through the previous MNR submission was 2007 (Google Earth), but noted that formal confirmation of the disturbance timeline would be provided to MNR. Please refer to **Attachment B**, which indicates that vegetation removal occurred sometime between 2005 and 2006.

EF – Indicated that the development plan could likely be dealt with through a Letter of Advice (LOA), but that additional details regarding stormwater management, erosion and sediment control, confirmation that groundwater recharge/discharge is not an issue on site and water balance (geotechnical) details would be required.

4. Site Walk

ALL – Completed site walk of development limit to evaluate existing conditions.

EF – Was generally in agreement with the location of the infiltration basin – noted MNR's preference for large mature trees along the edge of the development limit to be retained.

EF – Inquired whether the City or CVC have been consulted for the Phase 2 development plan.

SG – Indicated that consultation with the City and CVC had been put on hold until preliminary engineering details could be developed, and agreement in principle with MNR regarding the ESA permitting process and timelines could be achieved.

5. Timeline

IK – Discussed overall timing for next steps and approvals. Ideally, looking towards issuance of an LOA by end of year, with construction to follow in 2015.

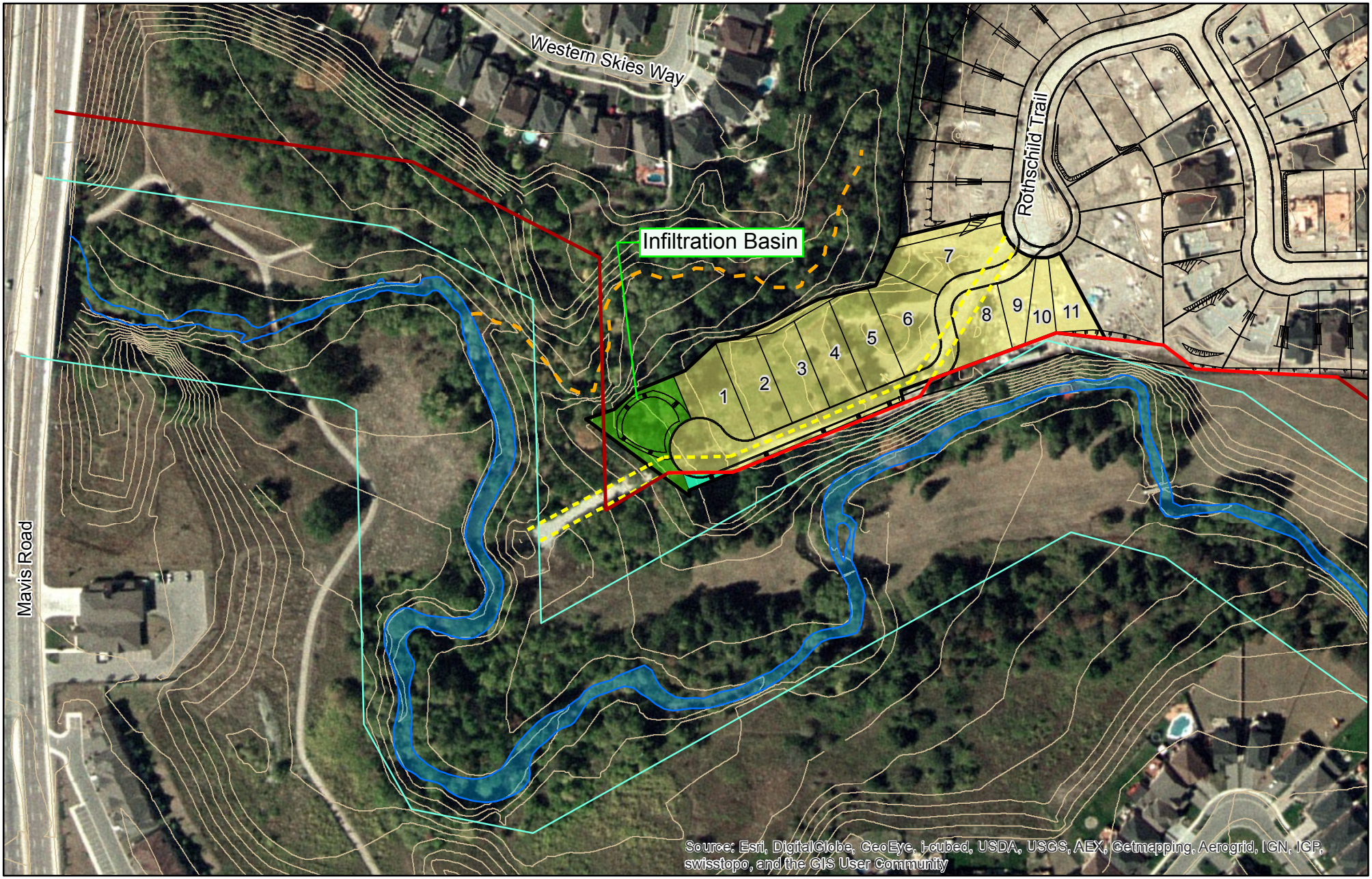
EF – Indicated that this timeline was likely achievable. Once the relevant background studies are completed, it is anticipated that a technical memo could be submitted to MNR and that the review process would be more expedient for an LOA than the formal ESA permitting process.

IK – Indicated that meeting minutes, a revised constraint map with updated site plan, and formal record of

vegetation disturbance pre-2007 would be submitted to MNR for review. If MNR is in agreement, AD will move forward with additional work and other agency approvals.

Note: The above is the writer's interpretation of the meeting minutes. Any errors or omissions should be reported to Shelley Gorenc immediately.

Shelley Gorenc, M.Sc., P.Geo.
Fluvial Geomorphologist



Legend

- 1 m Contour
- Existing Sanitary Sewer Easement
- Ravine tributary (Contributing to RSD habitat)
- Redside Dace (RSD) Regulated Habitat (30 m Riparian Area from Meander Belt Width)
- Redside Dace (RSD) Regulated Habitat (Limit of Disturbed Area)
- Area of Permanent Habitat Loss (90 m^2)
- Designated Open Space
- Limit of Development
- Meander Belt Width (80 m)
- Property Limit
- Watercourse

Meander Belt Width, Area of Permanent Habitat Loss, Designated Open Space, Limit of Development, and Redside Dace Regulated Habitat: GHD, 2014: 1 m Contour, Ravine Tributary, and Watercourse: Dougan & Associates, 2008; Imagery: ESRI World Imagery, 2007; Existing Sanitary Sewer Easement, Development Fabric, and Property Limit: Glenn Schnarr & Associates, 2014.

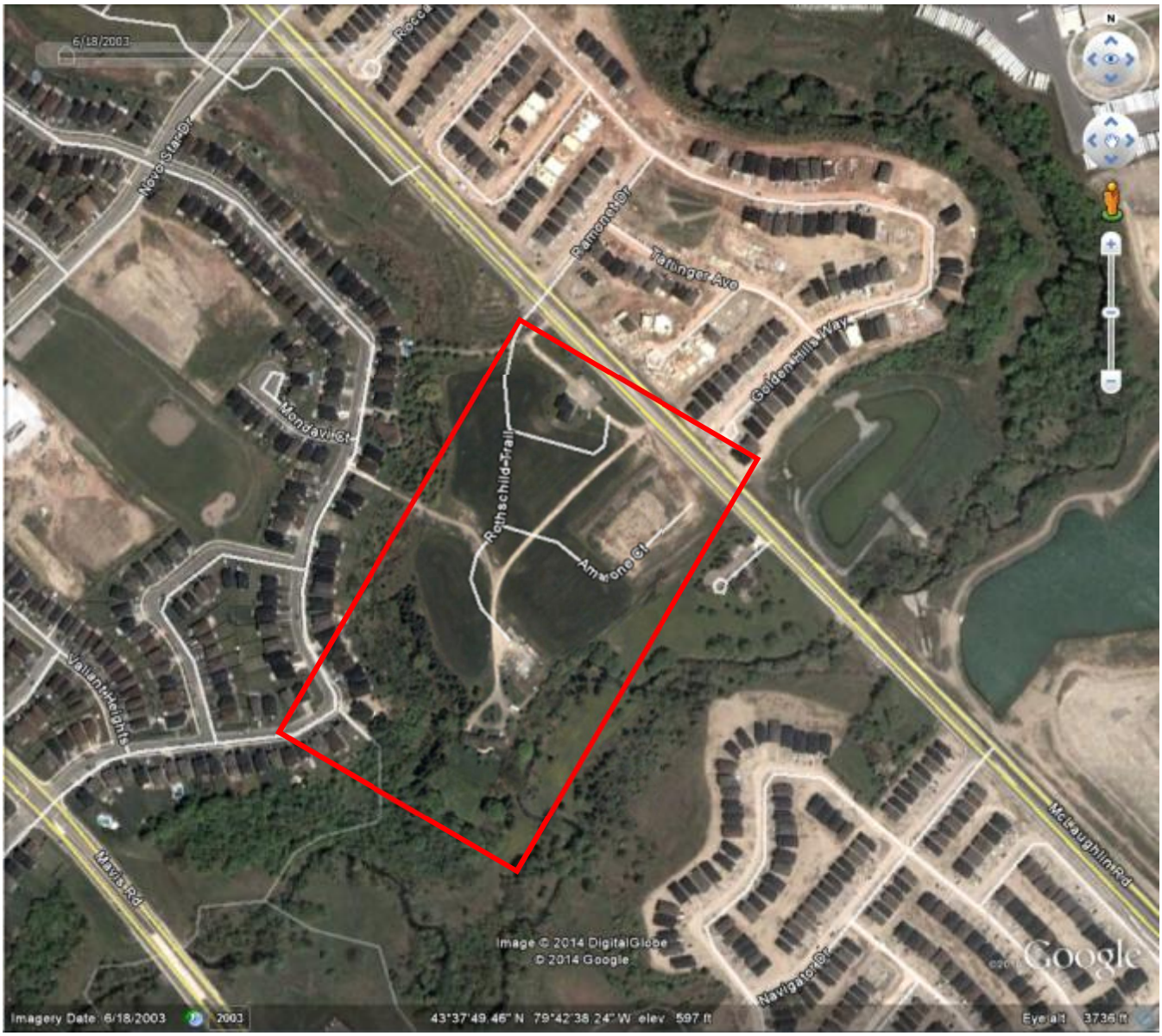
Fletcher's Creek
DiBlasio Property
Redside Dace Regulated Habitat Limit

DRAFT

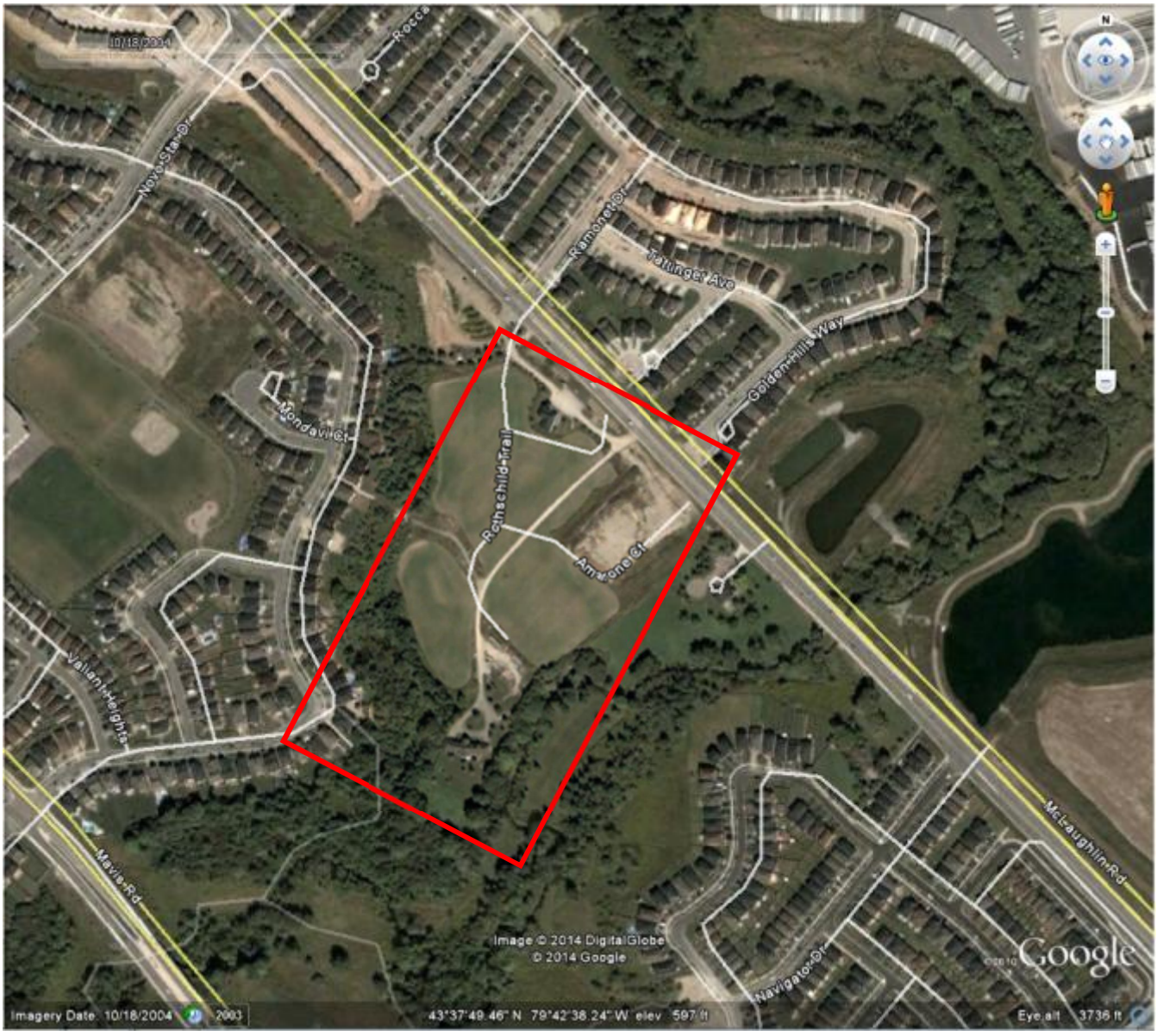
0 10 20
Metres

ATTACHMENT A	
DATE: MAY 2014	
PROJECT: 12225.450	
DRAWN BY: S.G., R.G.	

GHD

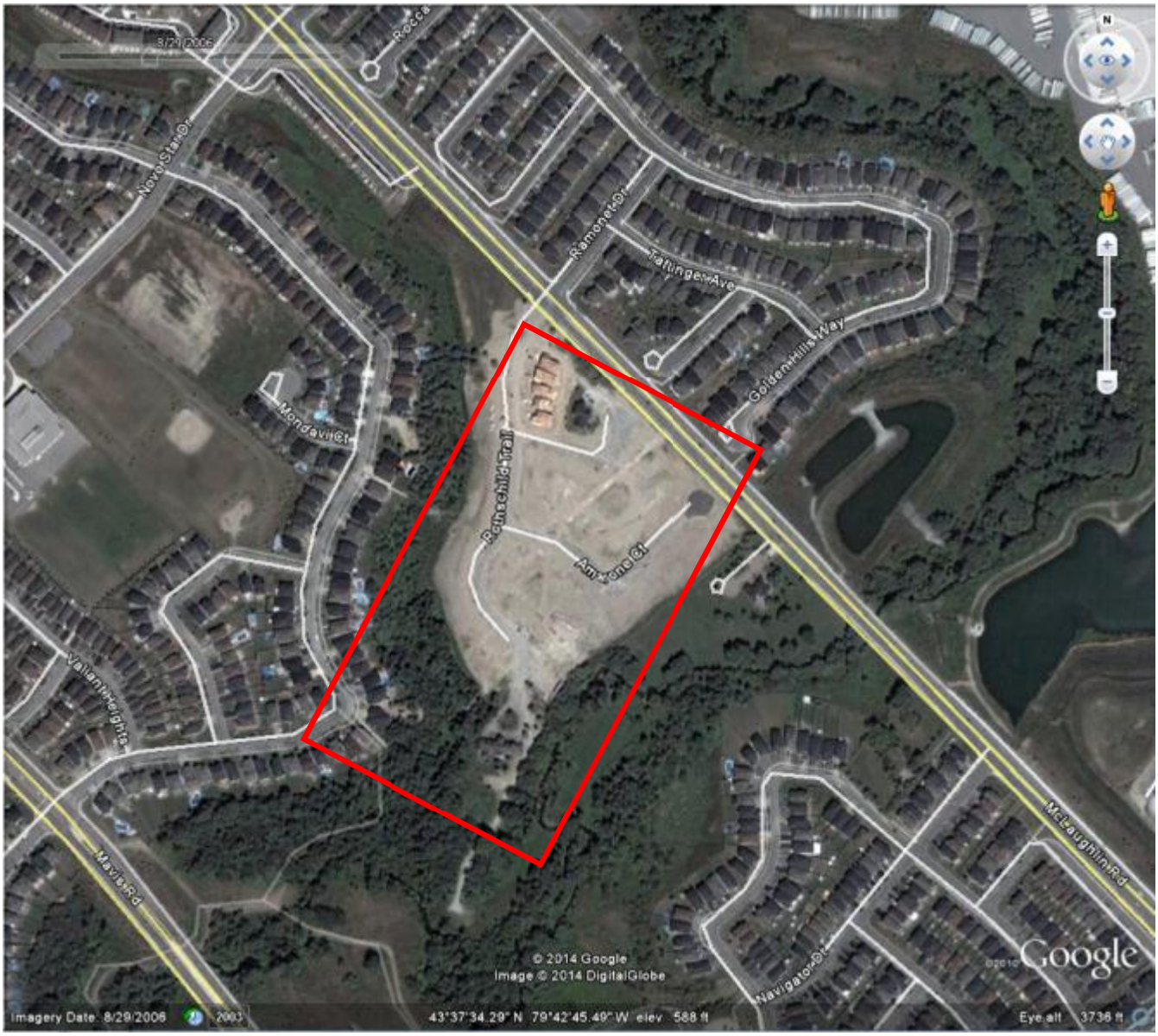


Year: 2003 Location: Mississauga, Ontario Easting: Northing:	Aerial ID: N/A Scale: N/A Source: Google Earth Pro ®

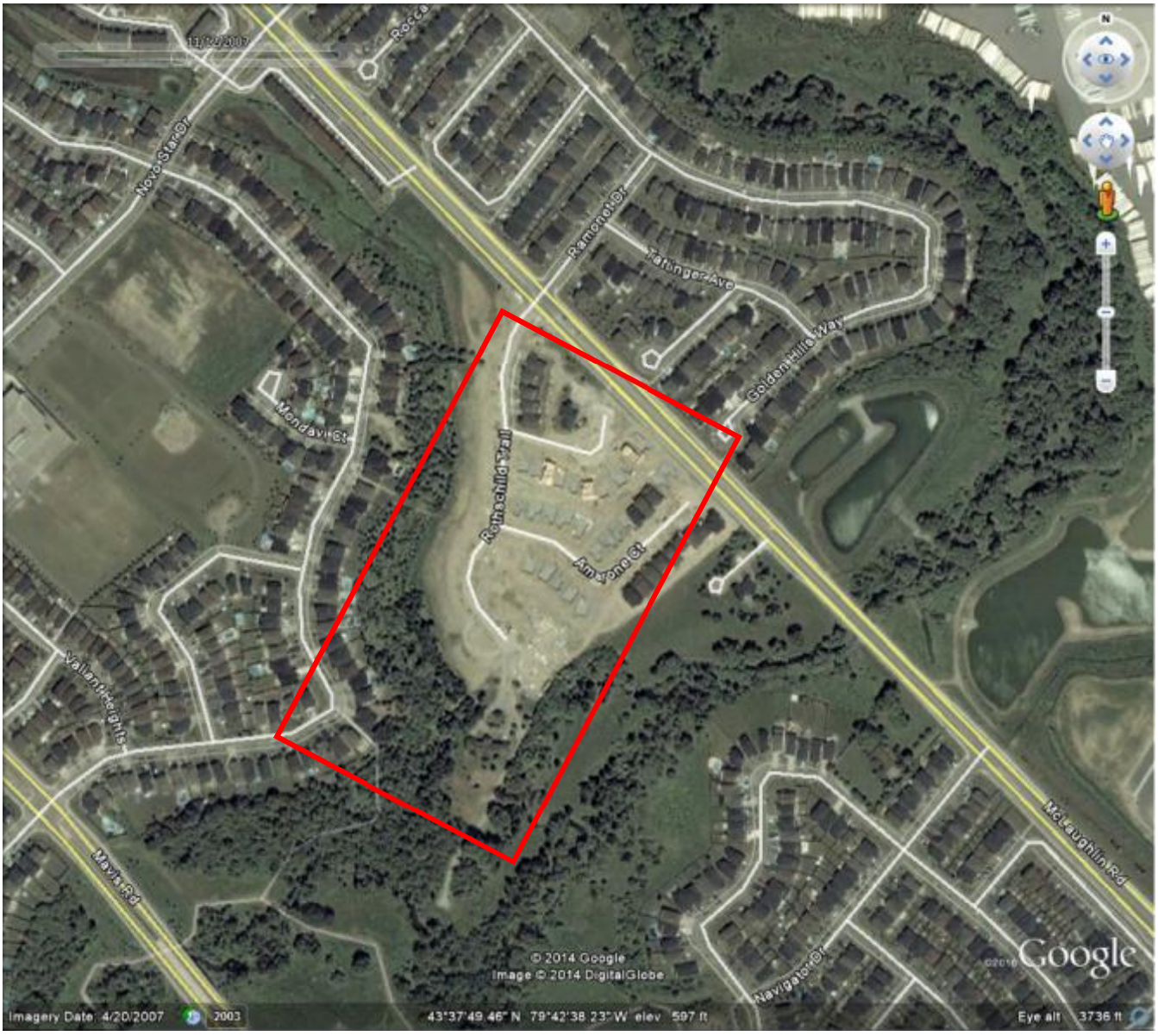


Year: 2004 Location: Mississauga, Ontario Easting: Northing:	Aerial ID: Scale: Source:

Year: 2005 Location: Mississauga, Ontario Easting: Northing:	Aerial ID: N/A Scale: N/A Source: Google Earth Pro ®



Year: 2006 Location: Mississauga, Ontario Easting: Northing:	Aerial ID: N/A Scale: N/A Source: Google Earth Pro ®



Year: 2007

Location: Mississauga, Ontario

Easting:
Northing:

Aerial ID: N/A

Scale: N/A

Source: Google Earth Pro ®

Year: 2009 Location: Mississauga, Ontario Easting: Northing:	Aerial ID: N/A Scale: N/A Source: Google Earth Pro ®

Ministry of
Natural Resources
and Forestry
Aurora District Office
50 Bloomington Road
Aurora, Ontario L4G 0L8

Ministère des
Richesses naturelles
et des Forets

Telephone: (905) 713-7400
Facsimile: (905) 713-7361

Ontario

April 26, 2017

Maureen Attard
Beacon Environmental
373 Woolwich Street
Guelph, ON N1H 3W4
519-826-0419 ext. 24
mattard@beaconenviro.com

Re: 6620 Rothschild Trail, Mississauga

Dear Maureen Attard,

In your email of February 13, 2017 you requested information regarding the above location. Apologies for the delay.

Species at risk recorded in the vicinity include Butternut (endangered) and Redside Dace (endangered, occupied habitat in Fletchers Creek). There is potential for endangered bats (i.e., Eastern Small-footed Myotis, Little Brown Myotis, Northern Myotis, Tri-colored Bat) in cavities.

Absence of information provided by MNRF for a given geographic area, or lack of current information for a given area or element, does not categorically mean the absence of sensitive species or features. Many areas in Ontario have never been surveyed and new plant and animal species records are still being discovered for many localities. Appropriate inventory work is needed depending on the undertakings proposed. Approval from MNRF may be required if work you are proposing could cause harm to any species that receive protection under the *Endangered Species Act 2007*.

Species at risk information is highly sensitive and is not intended for any person or project unrelated to this undertaking. Please do not include any specific sensitive information in reports that will be available for public record. As you complete your fieldwork in these areas, please report all information related to any species at risk to our office. This will assist with updating our database and facilitate early consultation regarding your project.

If you have any questions or comments, please do not hesitate to contact ESA.aurora@ontario.ca or Bohdan.Kowalyk@Ontario.ca.

Sincerely,

B. Kowalyk

Bohdan Kowalyk, R.P.F.
Technical Specialist, Aurora District, Ontario Ministry of Natural Resources and Forestry

Appendix C

Soils Investigation

Soil Engineers Ltd.
CONSULTING ENGINEERS
GEOTECHNICAL • ENVIRONMENTAL • HYDROGEOLOGICAL • BUILDING SCIENCE
100 NUGGET AVENUE, TORONTO, ONTARIO M1S 3A7 • TEL: (416) 754-8515 • FAX: (416) 754-8516

BARRIE	MISSISSAUGA	OSHAWA	NEWMARKET	GRAVENHURST	PETERBOROUGH	HAMILTON
TEL: (705) 721-7863	TEL: (905) 542-7605	TEL: (905) 440-2040	TEL: (905) 853-0647	TEL: (705) 684-4242	TEL: (905) 440-2040	TEL: (905) 777-7956
FAX: (705) 721-7864	FAX: (905) 542-2769	FAX: (905) 725-1315	FAX: (416) 754-8516	FAX: (705) 684-8522	FAX: (905) 725-1315	FAX: (905) 542-2769

A REPORT TO
DIBLASIO HOMES

A SOIL INVESTIGATION FOR PROPOSED RESIDENTIAL DEVELOPMENT

DIBLASIO ESTATE
6620 ROTHSCHILD TRAIL

CITY OF MISSISSAUGA

Reference No. 1406-S151

AUGUST 2014

DISTRIBUTION

2 Copies - Urban Ecosystems Limited
1 Copy - DiBlasio Homes
1 Copy - Soil Engineers Ltd. (Mississauga)
1 Copy - Soil Engineers Ltd. (Toronto)

TABLE OF CONTENTS

1.0 INTRODUCTION 1

2.0 SITE AND PROJECT DESCRIPTION 2

3.0 FIELD WORK 3

4.0 SUBSURFACE CONDITIONS 4

4.1 Topsoil Fill 4
4.2 Earth Fill 5
4.3 Silty Sand Till 6
4.4 Silt 7
4.5 Sand and Gravel 9
4.6 Silty Clay Till 10
4.7 Shale 12
4.8 Compaction Characteristics of the Revealed Soils 13

5.0 GROUNDWATER CONDITIONS 16

6.0 DISCUSSION AND RECOMMENDATIONS 18

6.1 Foundations 20
6.2 Engineered Fill 23
6.3 Garages, Driveways and Landscaping 25
6.4 Underground Services 26
6.5 Trench Backfilling 26
6.6 Pavement Design 29
6.7 Infiltration Basin 30
6.8 Soil Corrosivity 31
6.9 Soil Parameters 31
6.10 Excavation 32

7.0 LIMITATIONS OF REPORT 35

TABLES

Table 1 - Estimated Water Content for Compaction 13
Table 2 - Groundwater Levels 16
Table 3 - Founding Levels 21
Table 4 - Pavement Design 29
Table 5 - Soil Parameters 32
Table 6 - Classification of Soils for Excavation 32

DIAGRAM

Diagram 1 - Frost Protection Measures (Foundations) 22

ENCLOSURES

Borehole Logs ..... Figures 1 to 7
Grain Size Distribution Graphs ..... Figures 8 to 10
Borehole Location Plan and Subsurface Profile..... Drawing No. 1

1.0 INTRODUCTION

In accordance with written authorization dated June 23, 2014, by Mr. Alvaro DiBlasio of DiBlasio Homes, a soil investigation was carried out at 6620 Rothschild Trail, City of Mississauga, for a proposed Residential Development.

The purpose of the investigation was to reveal the subsurface conditions and determine the engineering properties of the disclosed soils for the design and construction of the proposed project.

The geotechnical findings and resulting recommendations are presented in this Report.

2.0 SITE AND PROJECT DESCRIPTION

The City of Mississauga is situated on Halton-Peel till plain where drift beds onto a shale bedrock at shallow to moderate depths. In places, the drift has been partly eroded by Peel Ponding (glacial lake) and filled with lacustrine sand, silt, clay and reworked tills.

The subject property is located at the end of Rothschild Trail, near Fletchers Creek, in the City of Mississauga. It is irregular in shape and has an area of approximately 9,200 sq. m. The property is currently occupied by a residential house.

It is understood that the subject property will be developed for residential use with an infiltration basin to the southwest of the site. Details of the development including the proposed grade, number of basements, number of storeys, etc., were not provided at the time that this report was prepared.

3.0 **FIELD WORK**

The field work, consisting of 7 boreholes to depths ranging from 4.7 to 5.3 m, was performed on July 25, 2014, at the locations shown on the Borehole Location Plan and Subsurface Profile, Drawing No. 1.

The boreholes were advanced at intervals to the sampling depths by a track-mounted, continuous-flight power-auger machine equipped for soil sampling. Standard Penetration Tests, using the procedures described on the enclosed "List of Abbreviations and Terms", were performed at the sampling depths. The test results are recorded as the Standard Penetration Resistance (or 'N' values) of the subsoil. The relative density of the granular strata and the consistency of the cohesive strata are inferred from the 'N' values. Split-spoon samples were recovered for soil classification and laboratory testing.

The field work was supervised and the findings were recorded by a Geotechnical Technician.

The elevation at each of the borehole locations was provided by the client.

4.0 SUBSURFACE CONDITIONS

Detailed descriptions of the encountered subsurface conditions are presented on the Borehole Logs, comprising Figures 1 to 7, inclusive. The revealed stratigraphy is plotted on the subsurface profile on Drawing No. 1, and the engineering properties of the disclosed soils are discussed herein.

Beneath a veneer of topsoil fill in some locations, overlying a layer of earth fill, the site is generally underlain by a stratum of silty sand till; strata and lenses of silty clay till, sand and gravel, and silt were found on and/or below the silty sand till at various depths and locations. Shale bedrock was found in Boreholes 4 and 5 at a depth of 4.6± m from the prevailing ground surface. Refusal to augering occurred at depths ranging from 4.9 to 5.3± m at Boreholes 1, 2 and 3, which indicates that boulders and/or bedrock occurred at these depths.

4.1 **Topsoil Fill** (Boreholes 2 to 6, inclusive)

The existing ground surface was covered with a grass lawn and a minor topsoil fill layer. The revealed topsoil thickness varies between 2.5 cm and 7.5 cm.

The topsoil fill is dark brown and permeated with roots. This infers that it contains appreciable amounts of roots and humus. These materials are unstable and compressible under loads; therefore, the topsoil fill is considered to be void of engineering value but can be used for general landscaping purposes.

A fertility analysis should be carried out to assess the suitability of the topsoil fill for use as a planting soil or sodding medium.

Due to its humus content, the topsoil fill will generate an offensive odour under anaerobic conditions and may produce volatile gases; therefore, it must not be buried within the building envelope, or deeper than 1.2 m below the finished grade, as it may have an adverse impact on the environmental well-being of the development.

4.2 **Earth Fill** (All Boreholes)

A layer of earth fill was encountered in all borehole locations; in Boreholes 2 to 6, inclusive, the fill lies beneath the topsoil till. It extended to depths ranging from 0.2± to 2.4± m from the prevailing ground surface.

In Boreholes 1, 2 and 7, the fill consisted of sand and gravel with traces to some concrete or brick fragments. Traces of rootlets were also observed in the fill. In Boreholes 3, 4, 5, 6 and 7, the fill consisted of sandy silt with some clay and traces of gravel and rootlets.

The obtained 'N' values range from 6 to 27, with a median of 10 blows per 30 cm of penetration, showing the fill is loose to compact, generally being compact.

The natural water content of the samples ranges from 5% to 20%, with a median of 12%, showing the fill is in a moist to wet, generally very moist condition.

One must be aware that the samples retrieved from boreholes 10 cm in diameter may not be truly representative of the geotechnical and environmental quality of the fill, and do not indicate whether the topsoil beneath the earth fill was completely stripped. This should be further assessed by laboratory testing and/or test pits.

4.3 **Silty Sand Till** (All Boreholes)

The silty sand till was encountered below the earth fill in all boreholes, except Borehole 7, where it was found below a silt deposit. It consists of a random mixture of soil particle sizes ranging from clay to gravel, with the sand being the predominant fraction. The material is heterogeneous, showing that it is a glacial till. It extends to depths ranging from 3.4 to 4.6 m from prevailing ground surface. In places, the upper 0.5± m of the till has been weathered.

A tactile examination of the soil samples showed that the till contains occasional seams of fine sand. It is slightly cemented and varies in cohesiveness from appreciable to slight, revealing that the till contains traces to some clay and gravel.

Hard resistance was encountered during augering showing that the till is permeated with occasional cobbles and boulders.

The relative density of the till, as inferred from the 'N' values ranging from 8 to 90, with a median of 28, is loose to very dense, being generally compact. The loose to marginally compact till occurred in the weathered zone of the till stratum.

The natural water content of the samples ranges from 8% to 22%, with a median of 14%, showing that the till is generally in a moist to saturated, generally very moist condition.

Grain size analyses were performed on 2 representative samples; the gradations are plotted on Figure 8.

Based on the field and laboratory findings, the deduced soil engineering properties pertaining to the project are listed below:

- High frost susceptibility and medium to low water erodibility.
- Moderate permeability, with an estimated coefficient of permeability of 10^{-4} to 10^{-5} cm/sec, and runoff coefficients of:

Slope	
0% - 2%	0.07 to 0.11
2% - 6%	0.12 to 0.16
6% +	0.18 to 0.23

- A frictional soil, its shear strength is primarily derived from internal friction and is augmented by cementation. Therefore, its strength is primarily soil density dependent.
- The till will slough slowly if submerged in an unconfined state or from an open-face cut under seepage conditions, particularly in the zone where the saturated sand layers are prevalent. The sides will be stable with a relatively steep slope when excavated in a moist condition.
- A poor flexible pavement-supportive material, with an estimated California Bearing Ratio (CBR) value of 7%.
- Moderately low corrosivity to buried metal, with an estimated electrical resistivity of 5000 ohm·cm.

4.4 **Silt** (Boreholes 6 and 7)

A silt deposit was encountered beneath the silty sand till in Borehole 6 and extended to the maximum investigated depth of 5.0 m from grade; it was encountered below the earth fill in Borehole 7 and extended to 2.7 m below grade. The upper layer of the silt in Borehole 7 has been weathered.

The relative density of the silt, as inferred from the 'N' values of 3, 22 and 52, is very loose to very dense. The low 'N' value was due to weathering.

The natural water content values of the samples are 22%, 28% and 32%, showing that the silt is in a wet and water-bearing condition. The wet samples displayed appreciate dilatancy where shaken by hand.

A grain size analysis was performed on a representative sample of the silt. The result is plotted on Figure 9.

Accordingly, the engineering properties are listed below:

- Highly frost susceptible, with high soil-adfreezing potential.
- Highly water erodible; it is susceptible to migration through small openings under seepage pressure.
- Moderate permeability, with an estimated coefficient of permeability of 10^{-5} cm/sec, and runoff coefficients of:

Slope	
0% - 2%	0.11
2% - 6%	0.16
6% +	0.23

- The soil has a high capillarity and water retention capacity.
- A frictional soil, its shear strength is density dependent. Due to its dilatancy, the strength of the wet silt is susceptible to impact disturbance; i.e., the disturbance will induce a build-up of pore pressure within the soil mantle, resulting in soil dilation and a reduction in shear strength.
- It will be subject to sliding in steep cuts. When excavated, the silt will run with seepage and the bottom will boil under a piezometric head of 0.3 m.
- A poor pavement-supportive material, with an estimated CBR value of 5%.
- Moderate corrosivity to buried metal, with an estimated electrical resistivity of 4500 ohm·cm.

4.5 **Sand and Gravel** (Borehole 7)

A sand and gravel layer was encountered below the silty sand till deposit, which extended to the maximum investigation depth of 4.7 m below grade.

Sample examinations showed that the sand is non-cohesive and generally in a wet condition. The latter is confirmed by the determined water content of the sample, which was found to be 8%, indicating that it is water bearing.

The obtained 'N' value is 50 blows per 15 cm, indicating that the relative density of the sand is very dense.

Accordingly, the engineering properties are listed below:

- Low frost susceptibility and low soil-adfreezing potential.
- Pervious, with an estimated coefficient of permeability of 10^{-2} to 10^{-3} cm/sec, and runoff coefficients of:

Slope	
0% - 2%	0.04
2% - 6%	0.09
6% +	0.13

- The soil has a high capillarity and water retention capacity.
- A frictional soil, its shear strength is dependent on its internal friction angle and soil density.
- In steep cuts, the sand will be stable in a damp to moist condition, but will slough if it is in a wet condition, run with seepage and boil with a piezometric head of about 0.4 m.
- A fair pavement-supportive material, with an estimated CBR value of 20%.

- Low corrosivity to buried metal, with an estimated electrical resistivity of 6500 ohm·cm.

4.6 **Silty Clay Till** (Boreholes 1 to 3, inclusive)

The silty clay till was encountered below the silty sand till at a depth of 4.6 m from grade. It is reddish-brown in colour and contains clay with low plasticity, seams of fine sand and a trace of gravel. Pieces of shale were also observed near the termination depths of the boreholes which ranged between 4.9 m and 5.3 m, where auger and sample refusal was encountered.

The till appears to be a shale-clay reversion.

The obtained 'N' values are all over 50 blows per 15 cm, indicating that the consistency of the clay till is hard.

The Atterberg Limits of 1 representative sample and the moisture content of all the samples were determined. The results are plotted on the Borehole Logs and summarized below:

Liquid Limit	20%
Plastic Limit	14%
Natural Water Content	6% and 11%

The above results show that the till is a cohesive material with low plasticity. The natural water content lies below its plastic limit, confirming the consistency of the till determined by the 'N' values.

A grain size analysis was performed on 1 representative sample of the silty clay till. The result is plotted on Figure 10.

Based on the above findings, the following engineering properties are deduced:

- High frost susceptibility and low soil-adfreezing potential.
- Low water erodibility.
- The clay is virtually impervious. The estimated coefficient of permeability is 10^{-7} cm/sec, with runoff coefficients of:

Slope	
0% - 2%	0.15
2% - 6%	0.20
6% +	0.28

- A cohesive-frictional soil, its shear strength is derived from consistency and augmented by the internal friction of the silt. Its shear strength is moisture dependent.
- In excavations, the till will be stable in a relatively steep cut for a short duration; however, as water seepage saturates the sand or silt layers, the sides will slough and sheet collapse may occur without warning.
- A very poor material to support flexible pavement, with an estimated CBR value of 3% or less.
- Moderately high corrosivity to buried metal, with an estimated electrical resistivity of 3500 ohm·cm.

4.7 **Shale** (Boreholes 4 and 5)

A layer of shale was encountered beneath the silty sand till at Boreholes 4 and 5 at 4.6 m below grade and extended to the auger and sample refusal depth of 4.7 m below grade.

In Boreholes 1, 2 and 3, refusal to augering occurred at depths ranging from 4.9± to 5.3± m from the prevailing ground surface. This refusal indicates that boulders and/or shale bedrock occurred at these depths; however, this can be verified by test pits prior to or during the project construction.

Shale is a laminated, sedimentary, moderately soft rock composed predominantly of clay material. The bedrock at this site is reddish-brown to grey in colour, showing it is a Dundas and/or Queenston Formation which consists of about 20% hard, limy and sandy layers.

The upper layers of the shale are often fissured as a result of the weathering process and/or overstressing by glaciation. The weathered condition often extends to about 2.0 or + m below the surface of the bedrock. Infiltrated precipitation and groundwater from the overburden soils will often permeate the fissures in the rock and, in places, will be under subterranean artesian pressure. However, because the shale is a clay rock, it is considered to be a material of low permeability and a poor aquifer, and the groundwater yield from the rock will be limited.

The shale is susceptible to disintegration and swelling upon exposure to air and water, with subsequent reversion to a clay soil, but the laminated limy and sandy layers would remain as rock slabs.

The weathered rock can be excavated with considerable effort by a heavy-duty backhoe equipped with a rock-ripper; however, excavation will become

progressively more difficult with depth into the sound shale. Efficient removal of the sound shale may require the aid of blasting or pneumatic hammering.

When excavating the sound shale, slight lateral displacement of the excavation walls is often experienced. This is due to the release of residual stress stored in the bedrock mantle and the swelling characteristic of the rock.

The excavated spoil will contain a large amount of hard limy and sandy rock slabs, rendering it virtually impossible to obtain uniform compaction. Therefore, unless the spoil is sorted, it is considered unsuitable for engineering applications.

4.8 Compaction Characteristics of the Revealed Soils

The obtainable degree of compaction is primarily dependent on the soil moisture and, to a lesser extent, on the type of compactor used and the effort applied. As a general guide, the typical water content values of the revealed soils for Standard Proctor compaction are presented in Table 1.

Table 1 - Estimated Water Content for Compaction

Soil Type	Determined Natural Water Content (%)	Water Content (%) for Standard Proctor Compaction	
		100% (optimum)	Range for 95% or +
Sandy Silt Fill	5 to 20	10	5 to 13
Silty Sand Till	8 to 22	10	5 to 13
Silt	22, 28 and 32	10	5 to 13
Sand and Gravel	8	8	5 to 12
Silty Clay Till	6 and 11	14	10 to 19

Based on the above findings, the majority of the in situ soils are generally not suitable for a 95% or + Standard Proctor compaction. Some of the sandy silt fill, silty sand till and silt are excessively wet and will require prior aeration. This should be carried out during the dry, warm weather by spreading them thinly on the ground. The silty clay till is generally too dry and will require the constant addition of water for structural construction.

The tills should be compacted using a heavy-weight, kneading-type roller while the sand and silt can be compacted by a smooth roller with or without vibration, depending on the water content of the soils being compacted. The lifts for compaction should be limited to 20 cm, or to a suitable thickness as assessed by test strips performed by the equipment which will be used at the time of construction.

When compacting the clay, clay till and cemented sandy silt till on the dry side of the optimum, the compactive energy will frequently bridge over the chunks in the soils and be transmitted laterally into the soil mantle. Therefore, the lifts of these soils must be limited to 20 cm or less (before compaction). It is difficult to monitor the lifts of backfill placed in deep trenches; therefore, it is preferable that the compaction of backfill at depths over 1.0 m below the road subgrade be carried out on the wet side of the optimum. This would allow a wider latitude of lift thickness.

If the compaction of the soils is carried out with the water content within the range for 95% Standard Proctor dry density but on the wet side of the optimum, the surface of the compacted soil mantle will roll under the dynamic compactive load. This is unsuitable for road construction since each component of the pavement structure is to be placed under dynamic conditions which will induce the rolling action of the subgrade surface and cause structural failure of the new pavement. The foundations or bedding of the sewer and slab-on-grade will be placed on a subgrade which will not be subjected to impact loads. Therefore, the structurally compacted soil mantle

with the water content on the wet side or dry side of the optimum will provide an adequate subgrade for the construction.

One should be aware that, with considerable effort, a 90%± Standard Proctor compaction of the wet silt is achievable. Further densification is prevented by the pore pressure induced by the compactive effort; however, large random voids will have been expelled and, with time, the pore pressure will dissipate and the percentage of compaction will increase. There are many cases on record where, after a few months of rest, the density of the compacted soil mantle has increased to over 95% of its maximum Standard Proctor dry density.

The presence of boulders in the tills will prevent transmission of the compactive energy into the underlying material to be compacted. If an appreciable amount of boulders over 15 cm in size is mixed with the material, it must either be sorted or must not be used for structural backfill and/or construction of engineered fill.

5.0 GROUNDWATER CONDITIONS

The boreholes were checked for the presence of groundwater or the occurrence of cave-in upon their completion of the field work. The data are plotted on the Borehole Logs and listed in Table 2.

Table 2 - Groundwater Levels

BH No.	Borehole Depth (m)	Soil Colour Changes Brown to Grey	Seepage Encountered During Augering		Measured Groundwater on Completion	
		Depth (m)	Depth (m)	Amount	Depth (m)	El. (m)
1	5.3	5.3+	-	-	Dry	-
2	4.9	4.9+	-	-	Dry	-
3	5.0	5.0+	-	-	Dry	-
4	4.7	0.8	-	-	Dry	-
5	4.7	4.6	-	-	Dry	-
6	5.0	4.6	4.5	Small	Dry	-
7	4.7	4.7+	1.5	Small	4.6	174.1

Groundwater was not observed upon completion in the majority of the boreholes. Signs of wetness were observed within the silt in Boreholes 6 and 7 at depths of 4.5 m and 1.5 m below grade, respectively. Groundwater was detected in Borehole 7 at depth of 4.6± m in the sand and gravel layer.

The native soil colour changes from brown to grey in Boreholes 4, 5 and 6 at depths ranging from 0.8± to 4.6± m from the prevailing ground surface. The brown colour indicates that the soils have oxidized. The groundwater will fluctuate with the seasons.

The groundwater yield from the silt and sand and gravel deposits and embedded sand and silt layers may be appreciable; however, it is expected to be spent with time if allowed to drain continuously.

The yield of groundwater from the shale bedrock, if encountered, may be appreciable initially, but will drain readily upon release through excavation.

The groundwater yield in the tills will be slow in rate and limited in quantity.

6.0 DISCUSSION AND RECOMMENDATIONS

The investigation disclosed that beneath a veneer of topsoil fill in some locations, overlying a layer of earth fill, the site is generally underlain by strata of loose to very dense, generally compact silty sand till, very loose to very dense, generally compact silt, very dense sand and gravel, and hard silty clay till overlying shale bedrock. The upper portion of the silt and silty sand till, in places, has been weathered.

Groundwater was encountered within the depth of investigation only in Borehole 7 in the sand and gravel deposit. Perched water derived from infiltrated precipitation may occur at shallower depths in the wet seasons.

The groundwater yield from the tills, due to their low permeability, will be slow and limited in quantity. The silt, and sand and gravel deposits, are often water bearing, and the yield from these deposits and from the bedrock, if encountered, may be appreciable initially and is expected to decrease or become spent with time if allowed to drain continuously.

As noted previously, details regarding the proposed residential development were not provided prior to the completion of the report; hence, all recommendations are made based on the existing conditions of the site, and deeper boreholes may be required when the draft plan of the development has been finalized.

The geotechnical findings which warrant special consideration are presented below:

1. The thickness of the revealed topsoil fill ranged from 2.5 to 7.5 cm. However, topsoil fill thicker than that disclosed by the boreholes may occur in the low-lying depressions or highly vegetated areas.

2. The topsoil fill should be stripped and removed for the project construction. The topsoil fill contains an appreciable amount of humus and will generate volatile gases under anaerobic conditions; therefore, it should not be buried within the building envelope or deeper than 1.2 m below the exterior finished grade of the development.
3. The fill is not suitable to support any structural loads. The earth fill must be subexcavated and sorted free of topsoil inclusions or deleterious materials to be reused as structural backfill and/or for construction of engineered fill on site. If it is impractical to sort the topsoil and deleterious materials from the fill, then it must be wasted and disposed of from the site.
4. The sound natural soils below the earth fill and weathered soils are suitable for normal spread and strip footing construction.
5. Where extended footings are required, or where earth fill is to be placed to raise the site, it is generally more economical to place engineered fill for normal footing, sewer and road construction.
6. A Class ‘B bedding, consisting of compacted 20-mm Crusher-Run Limestone, is recommended for the construction of the underground services.
7. Some of the revealed soils are highly frost susceptible, with high soil-adfreezing potential. Where these soils are used to backfill against foundation walls, special measures must be incorporated into the building construction to prevent serious damage due to soil adfreezing.
8. Perimeter subdrains and dampproofing of the foundation walls will be required for the building with a basement. The subdrains should be shielded by a fabric filter to prevent blockage by silt.
9. As noted, the tills contain shale debris and are likely to contain boulders. Extra effort and a properly equipped backhoe will be required for excavation. Boulders larger than 15 cm in size are not suitable for structural backfill and/or in the construction of engineered fill.

10. Water-bearing silt and sand and gravel were found in the area delineated by Boreholes 6 and 7; these deposits will run and boil when excavated and must be stabilized by vigorous pumping from closely spaced-well or, if necessary, by a well-point dewatering system prior to construction of the under services and/or foundations.
11. Services constructed in the thick water-bearing sand and silt deposits should consist of pipes with leak-proof joints or the joints should be wrapped with a waterproof membrane.
12. The shale bedrock occurs in places, and its excavation will be costly. Substantial savings can be realized by proper manipulation of the site grading which will minimize rock excavation.
13. Sewer construction may require rock excavation in places; in general, it can be carried out by a backhoe equipped with a rock-ripper, but where deep trenches are required, the use of a pneumatic hammer may be required to break up the sound rock mass prior to excavation.
14. Curb subdrains will be required by the City for road construction.

The recommendations appropriate for the project described in Section 2.0 are presented herein. One must be aware that the subsurface conditions may vary between boreholes. Should this become apparent during construction, a geotechnical engineer must be consulted to determine whether the following recommendations require revision.

6.1 **Foundations**

Based on the borehole findings, the footings should be placed below the topsoil fill, earth fill and weathered soils onto the sound natural soils. As a general guide, the recommended soil pressures for use in the design of normal strip and spread footings founded onto the sound natural soils, together with the corresponding founding levels, are presented in Table 3.

Table 3 - Founding Levels

Borehole No.	Recommended Maximum Allowable Soil Pressure (SLS)/ Factored Ultimate Soil Bearing Pressure (ULS) and Corresponding Founding Level	
	200 kPa (SLS) 320 kPa (ULS)	
	Depth (m)	El. (m)
1	1.2 or +	183.6 or -
2	1.2 or +	182.8 or -
3	1.2 or +	182.8 or -
4	2.7 or +	179.0 or -
5	1.2 or +	181.1 or -
6	1.2 or +	180.2 or -
7	2.5 or +	176.2 or -

Where earth fill is required to raise the site or where extended footings are required, it is generally more practical and economical to place engineered fill suitable for a Maximum Allowable Soil Pressure (SLS) of 150 kPa and a Factored Ultimate Soil Bearing Pressure (ULS) of 250 kPa for normal footing construction, depending on location. The requirements and procedures for engineered fill construction are discussed in Section 6.2.

The recommended soil pressure (SLS) incorporates a safety factor of 3. The total and differential settlements of the footings are estimated to be 25 mm and 15 mm, respectively.

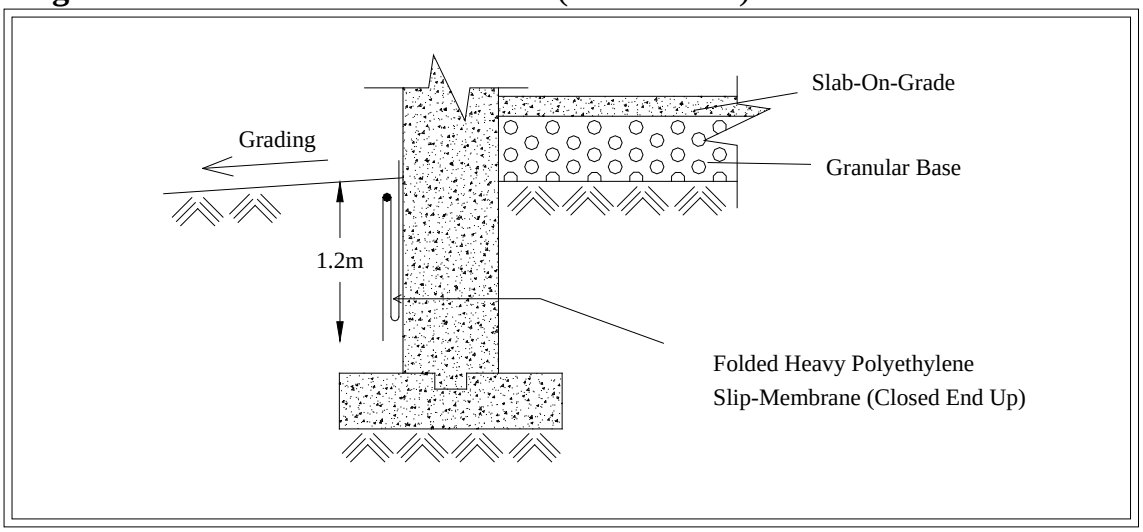
Footings exposed to weathering, and in unheated areas, should have at least 1.2 m of earth cover for protection against frost action.

Due to the presence of topsoil fill, earth fill and weathered soils, all of the footing subgrade should be inspected by a geotechnical engineer, or a geotechnical technician under the supervision of a geotechnical engineer, or a building inspector who has geotechnical background, to ensure that the revealed conditions are compatible with the foundation design requirements.

The footings must meet the requirements specified in the latest Ontario Building Code. As a guide, the structure should be designed to resist an earthquake force using Site Classification 'D' (stiff soil).

The in situ soils have moderately high to high soil-adfreezing potential. In order to alleviate the risk of frost damage, the foundation walls must be constructed of concrete and either the trench backfill will need to consist of non-frost-susceptible granular, or it should be shielded with a polyethylene slip-membrane between the concrete wall and the backfill. The recommended scheme is illustrated in Diagram 1.

Diagram 1 - Frost Protection Measures (Foundations)



6.2 **Engineered Fill**

Where earth fill is required to raise the site, or in areas where extended foundations will be required for house and services construction, it is generally economical to place engineered fill for normal footing, sewer and/or road construction

The engineering requirements for a certifiable fill for road construction, municipal services and footings designed with a 150 kPa Maximum Allowable Soil Pressure (SLS) are presented below:

1. All of the topsoil fill must be removed. The earth fill and weathered soils must be subexcavated, sorted free of topsoil inclusions and deleterious material, aerated and properly compacted to at least 98% of its maximum Standard Proctor dry density. The subgrade surface must be inspected and proof-rolled prior to any fill placement.
2. Inorganic soils must be used, and they must be uniformly compacted in lifts 20 cm thick to 98% or + of their maximum Standard Proctor dry density up to the proposed finished lot grade and/or road subgrade. The soil moisture must be properly controlled on the wet side of the optimum. If the building foundations are to be built soon after the fill placement, the densification process for the engineered fill must be increased to 100% of the maximum Standard Proctor compaction.
3. If imported fill is to be used, the hauler is responsible for its environmental quality and must provide a document to certify that it is free of hazardous contaminants.
4. If the engineered fill is to be left over the winter months, adequate earth cover, or equivalent, must be provided for protection against frost action.
5. The engineered fill must extend over the entire graded area; the engineered fill envelope and finished elevations must be clearly and accurately defined in the

field, and they must be precisely documented by qualified surveyors. Foundations partially on engineered fill must be reinforced by two 15-mm steel reinforcing bars in the footings and upper section of the foundation walls, or be designed by a structural engineer, to properly distribute the stress induced by the abrupt differential settlement (estimated to be 15± mm) between the natural soils and engineered fill.

6. The engineered fill must not be placed during the period from late November to early April, when freezing ambient temperatures occur either persistently or intermittently. This is to ensure that the fill is free of frozen soils, ice and snow.
7. Where the ground is wet due to subsurface water seepage, an appropriate subdrain scheme must be implemented prior to the fill placement, particularly if it is to be carried out on sloping ground.
8. Where the fill is to be placed on sloping ground steeper than 1 vertical: 3 horizontal, the face of the sloping ground must be flattened to 3 + so that it is suitable for safe operation of the compactor and the required compaction can be obtained.
9. The fill operation must be inspected on a full-time basis by a technician under the direction of a geotechnical engineer.
10. The footing and underground services subgrade must be inspected by the geotechnical consulting firm that inspected the engineered fill placement. This is to ensure that the integrity of the fill has not been compromised by interim construction, environmental degradation and/or disturbance by the excavation.
11. Any excavation carried out in the certified engineered fill must be reported to the geotechnical consultant who inspected the fill placement in order to document the locations of the excavation and/or to inspect reinstatement of the excavated areas to engineered fill status. If construction on the engineered fill does not commence within a period of 2 years from the date of

certification, the condition of the engineered fill must be assessed for re-certification.

12. Despite stringent control in the placement of the engineered fill, variations in soil type and density may occur in the engineered fill. Therefore, the strip footings and the upper section of the foundation walls constructed on the engineered fill may require continuous reinforcement with steel bars, depending on the uniformity of the soils in the engineered fill and the thickness of the engineered fill underlying the foundations. Should the footings and/or walls require reinforcement, the required number and size of reinforcing bars must be assessed by considering the uniformity as well as the thickness of the engineered fill beneath the foundations. In sewer construction, the engineered fill is considered to have the same structural proficiency as a natural inorganic soil.

6.3 **Garages, Driveways and Landscaping**

Due to the moderate to high frost susceptibility of the underlying soils, heaving of the pavement is expected to occur during the cold weather.

The driveways at the entrances to the garages should be backfilled with non-frost-susceptible granular material, with a frost taper at a slope of 1 vertical:1 horizontal. The slab-on-grade in open areas should be designed to tolerate frost heave, and the grading around the slab-on-grade must be such that it directs runoff away from the surface.

Interlocking stone pavement and slab-on-grade to be constructed in areas susceptible to ground movement must be constructed on a free-draining granular base at least 1.2 m thick, with proper drainage, which will prevent water from ponding in the granular base.

6.4 Underground Services

The subgrade for the underground services should consist of properly compacted inorganic earth fill or sound natural soils. A Class 'B' bedding is recommended for the design of the underground services construction. The bedding material should consist of compacted 20-mm Crusher-Run Limestone, or equivalent. Lean concrete and thickening of the Crusher-Run Limestone bedding may be used for subgrade stabilization. In areas where extensive dewatering is required, a Class 'A' concrete bedding may be necessary.

Where water-bearing sand and silt occur, the sewer joints should be leak-proof or wrapped with a waterproof membrane to prevent subgrade migration through leakage at faulty pipe joints. The necessity for implementing these measures can best be determined during sewer construction.

In order to prevent pipe floatation when the sewer trench is deluged with water, a soil cover with a thickness equal to the diameter of the pipe should be in place at all times after completion of the pipe installation.

Openings to subdrains and catch basins should be shielded by a fabric filter to prevent blockage by silting.

6.5 Trench Backfilling

The backfill in the trenches should be compacted to at least 95% of its maximum Standard Proctor dry density and increased to 98% below the floor slab. In the zone within 1.0 m below the road subgrade, the material should be compacted with the water content 2% to 3% drier than the optimum; within 0.6 m from the subgrade, the

compaction should be increased to 98% of the respective maximum Standard Proctor dry density to provide the required stiffness for pavement construction.

The in situ inorganic soils are suitable for use as trench fill; however, the water content of some of the occurring soils, as determined, is generally too wet for a 95% or + Standard Proctor compaction. The soils can be aerated by proper stockpiling prior to structural compaction. Furthermore, some of the silty clay till is too dry and may require the constant addition of water prior to backfilling.

In normal construction practice, the problem areas of road settlement largely occur adjacent to foundation walls, columns, manholes, catch basins and services crossings. In areas which are inaccessible to a heavy compactor, sand backfill should be used. Unless compaction of the backfill is carefully performed, settlement will occur. Often, the interface of the native soils and sand backfill will have to be flooded for a period of several days.

The narrow trenches for services crossings should be cut at 1 vertical:2 horizontal so that the backfill in the trenches can be effectively compacted. Otherwise, soil arching in the trenches will prevent the achievement of proper compaction. In this case, imported sand fill which can be appropriately compacted by using a smaller vibratory compactor must be used. The areas at the interface of the native soil and the sand backfill should preferably be flooded for at least 1 day.

One must be aware of possible consequences during trench backfilling and exercise caution as described below:

- When construction is carried out in freezing winter weather, allowance should be made for these following conditions. Despite stringent backfill monitoring, frozen soil layers may inadvertently be mixed with the structural trench

backfill. Should the in situ soils have a water content on the dry side of the optimum, it would be impossible to wet the soils due to the freezing condition, rendering difficulties in obtaining uniform and proper compaction. Furthermore, the freezing condition will prevent flooding of the backfill when it is required, such as when the trench box is removed. The above will invariably cause backfill settlement that may become evident within 1 to several years, depending on the depth of the trench which has been backfilled.

- In areas where the underground services construction is carried out during winter months, prolonged exposure of the trench walls will result in frost heave within the soil mantle of the walls. This may result in some settlement as the frost recedes, and repair costs will be incurred prior to final surfacing of the new pavement.
- To backfill a deep trench, one must be aware that future settlement is to be expected, unless the side of the cut is flattened to at least 1 vertical: 1.5+ horizontal, and the lifts of the fill and its moisture content are stringently controlled; i.e., lifts should be no more than 20 cm (or less if the backfilling conditions dictate) and uniformly compacted to achieve at least 95% of the maximum Standard Proctor dry density, with the moisture content on the wet side of the optimum.
- It is often difficult to achieve uniform compaction of the backfill in the lower vertical section of a trench which is an open cut or is stabilized by a trench box, particularly in the sector close to the trench walls or the sides of the box. These sectors must be backfilled with sand. In a trench stabilized by a trench box, the void left after the removal of the box will be filled by the backfill. It is necessary to backfill this sector with sand, and the compacted backfill must be flooded for 1 day, prior to the placement of the backfill above this sector, i.e., in the upper sloped trench section. This measure is necessary in order to prevent consolidation of inadvertent voids and loose backfill which will compromise the compaction of the backfill in the upper section. In areas

where groundwater movement is expected in the sand fill mantle, seepage collars should be provided.

6.6 Pavement Design

Permeable pavement will be used for the local road. Based on the borehole findings, the recommended pavement design is given in Table 4.

Table 4 - Pavement Design

Course	Thickness (mm)	OPS Specifications
Pavers Pedestrian and Driveway Vehicular Light Duty and Heavy Duty	60 80	Unit Pavers conforming to ASTM-C936
Bedding Sand	30	Clean Sand conforming to ASTM-C33
Granular Base Pedestrian and Driveway Vehicular Light Duty and Heavy Duty	150 200	OPSS Granular 'A' or equivalent
Granular Sub-base Pedestrian and Driveway Vehicular - Light Duty Vehicular - Heavy Duty	150 250 350	50-mm Crusher-Run Limestone or equivalent

The granular base and sub-base should be compacted to 100% of the maximum Standard Proctor dry density.

In order to provide a stable subgrade for pavement construction, it is imperative that the subgrade within the 1.0 m zone below the underside of the granular base be compacted to at least 98% of its maximum Standard Proctor dry density with the moisture content 2% to 3% drier than the optimum. This is to provide adequate stability for the pavement construction.

The following measures should be incorporated in the construction procedures and road design:

- If the parking lot construction does not immediately follow the trench backfilling, the subgrade should be properly crowned and smooth-rolled to allow interim precipitation to be properly drained.
- Areas adjacent to the roads should be properly graded to prevent ponding of large amounts of water. Otherwise, the water will seep into the subgrade mantle and induce a regression of the subgrade strength with costly consequences for the pavement construction.
- Prior to placement of the granular bases, the subgrade should be proof-rolled and any soft spots should be rectified.
- If the pavement is to be constructed during wet seasons, thickening of the granular sub-base may be required. The requirement for this can be determined at the time of the pavement construction.
- Fabric filter-encased curb subdrains will be required. They should be installed in wet areas at depths below the underside of the granular sub-base.

6.7 **Infiltration Basin**

An infiltration basin is a type of stormwater management facility constructed within highly permeable soils that provides temporary storage of stormwater runoff.

The proposed infiltration basin is located to the southwest of the subdivision, with an area of 708 m^2. The surface runoff is likely collected from the roof of the buildings, and the surrounding landscape and pavement area, and drains into the infiltration basin.

Based on the findings in Borehole 7, located at the proposed infiltration basin, it consisted of sandy silt fill, silt and silty sand till material to 4.6 m below grade with a layer of sand and gravel to the termination depth of 4.7 m below grade.

The sandy silt fill, silt and silty sand till generally have a moderate permeability while the sand and gravel have a high permeability. The recommended percolation time ('T') for the design of the infiltration basin is T = 45 min/cm for silt and silty sand till and 25 min/cm for the sandy silt fill.

The interior slope gradient of the proposed infiltration basin should be maintained to a minimum of 1 vertical:3 horizontal. Sediment and erosion control measure must be implemented during construction.

6.8 **Soil Corrosivity**

The subgrade of the water main and the backfill material will consist generally of sandy silt or silty sand till material. The silt has moderate corrosivity to ductile iron pipes and metal fittings; therefore, cathodic protection will be required. The precise size of the anodes can be calculated at the time of the sewer construction when the soils at the water main level are exposed and sufficient samples can be taken to analyze their corrosivity potential. To estimate the anode weight requirements, the electrical resistivity which has been determined for each of the disclosed soils can be used.

6.9 **Soil Parameters**

The recommended soil parameters for the project design are given in Table 5.

Table 5 - Soil Parameters

Unit Weight and Bulk Factor	**Unit Weight (kN/m^3)**	**Estimated Bulk Factor**	
	Bulk	**Loose**	**Compacted**
Earth Fill	20.0	1.20	1.00
Silt, Sand and Gravel	21.0	1.20	1.00
Silty Sand Till	22.5	1.33	1.03
Silty Clay Till	20.0	1.33	1.03
Lateral Earth Pressure Coefficients			
	Active K_a	**At Rest K_o**	**Passive K_p**
Earth Fill, Silt, Silty Sand Till, and Sand and Gravel	0.34	0.45	3.00
Silty Clay Till	0.40	0.55	2.50
Coefficients of Friction			
Between Concrete and Granular Base		0.50	
Between Concrete and Sound Natural Soils		0.40	

6.10 Excavation

Excavation should be carried out in accordance with Ontario Regulation 213/91. For excavation purposes, the types of soils are classified in Table 6.

Table 6 - Classification of Soils for Excavation

Material	**Type**
Sound Shale Bedrock	1
Silty Sand Till, weathered Shale Bedrock, Silty Clay Till	2
Earth Fill, dewatered Silt and Sand and Gravel	3
Water-bearing Silt, Sand and Gravel	4

In the tills which generally contain sand and silt deposits, the sides of excavations above groundwater may suffer localized sloughing or side collapse. Therefore, the sides must be sloped at 1 vertical:1 horizontal or + for stability.

At depths below the groundwater level, seepage in the till mantles during excavation is expected to be slow; in the shale, it may be slow to appreciable and can be controlled by pumping from sump wells.

Excavation into the hard or dense tills containing boulders or the weathered shale will require extra effort and the use of a heavy-duty backhoe equipped with a rock-ripper. If blasting of the bedrock is considered to expedite excavation, an expert should be consulted to determine the precautionary measures which should be taken to guard against damage to existing buildings and buried structures from the blasting shock waves.

Where the excavations are to be carried out in the water-bearing sand and gravel and silt, the possibility of flowing sides and bottom boiling dictates that the ground be predrained, either by pumping from closely spaced-wells or, if necessary, by the use of a well-point dewatering system. In order to provide a stable subgrade for services or foundation construction, the groundwater should be depressed to at least 0.5 m below the subgrade. Alternatively, the sides of the excavation can be sheeted. The sheeting should be driven into the underlying soils with low permeability to seal off the water infiltration.

As previously discussed, the groundwater yield from the sand and gravel and silt deposits is likely to be appreciable; however, this should be confirmed by test pumping at the time of construction.

Prospective contractors must be asked to assess the in situ subsurface conditions for soil cuts by digging test pits to at least 0.5 m below the sewer subgrade. These test pits should be allowed to remain open for a period of at least 4 hours to assess the trenching conditions.

7.0 LIMITATIONS OF REPORT

It should be noted that no chemical tests have been carried out to determine whether environmental contaminants are present in the soils. Therefore, this report deals only with the geotechnical aspects of the proposed project.

This report was prepared by Soil Engineers Ltd. for the account of DiBlasio Homes, and for review by their designated consultants and government agencies. The material in it reflects the judgement of Kin Fung Li, B.Eng., and Daniel Man, P.Eng., in light of the information available to it at the time of preparation. Any use which a Third Party makes of this report, or any reliance on decisions to be made based on it, are the responsibility of such Third Parties. Soil Engineers Ltd. accepts no responsibility for damages, if any, suffered by any Third Party as a result of decisions made or actions based on this report.

SOIL ENGINEERS LTD.

Kin Fung Li, B.Eng.

Daniel Man, P.Eng.

KFL/DM:dd

LIST OF ABBREVIATIONS AND DESCRIPTION OF TERMS

The abbreviations and terms commonly employed on the borehole logs and figures, and in the text of the report, are as follows:

SAMPLE TYPES

AS Auger sample
CS Chunk sample
DO Drive open (split spoon)
DS Denison type sample
FS Foil sample
RC Rock core (with size and percentage recovery)
ST Slotted tube
TO Thin-walled, open
TP Thin-walled, piston
WS Wash sample

PENETRATION RESISTANCE

Dynamic Cone Penetration Resistance:

A continuous profile showing the number of blows for each foot of penetration of a 2-inch diameter, 90° point cone driven by a 140-pound hammer falling 30 inches.

Plotted as '—●—'

Standard Penetration Resistance or 'N' Value:

The number of blows of a 140-pound hammer falling 30 inches required to advance a 2-inch O.D. drive open sampler one foot into undisturbed soil.

Plotted as '○'

WH Sampler advanced by static weight
PH Sampler advanced by hydraulic pressure
PM Sampler advanced by manual pressure
NP No penetration

SOIL DESCRIPTION

Cohesionless Soils:

'N' (blows/ft)	Relative Density
0 to 4	very loose
4 to 10	loose
10 to 30	compact
30 to 50	dense
over 50	very dense

Cohesive Soils:

Undrained Shear Strength (ksf)	'N' (blows/ft)	Consistency
less than 0.25	0 to 2	very soft
0.25 to 0.50	2 to 4	soft
0.50 to 1.0	4 to 8	firm
1.0 to 2.0	8 to 16	stiff
2.0 to 4.0	16 to 32	very stiff
over 4.0	over 32	hard

Method of Determination of Undrained Shear Strength of Cohesive Soils:

x 0.0 Field vane test in borehole; the number denotes the sensitivity to remoulding

△ Laboratory vane test

□ Compression test in laboratory

For a saturated cohesive soil, the undrained shear strength is taken as one half of the undrained compressive strength

METRIC CONVERSION FACTORS

1 ft = 0.3048 metres
1lb = 0.454 kg
1 inch = 25.4 mm
1ksf = 47.88 kPa

JOB NO: 1406-S151

LOG OF BOREHOLE NO: 1

FIGURE NO: 1

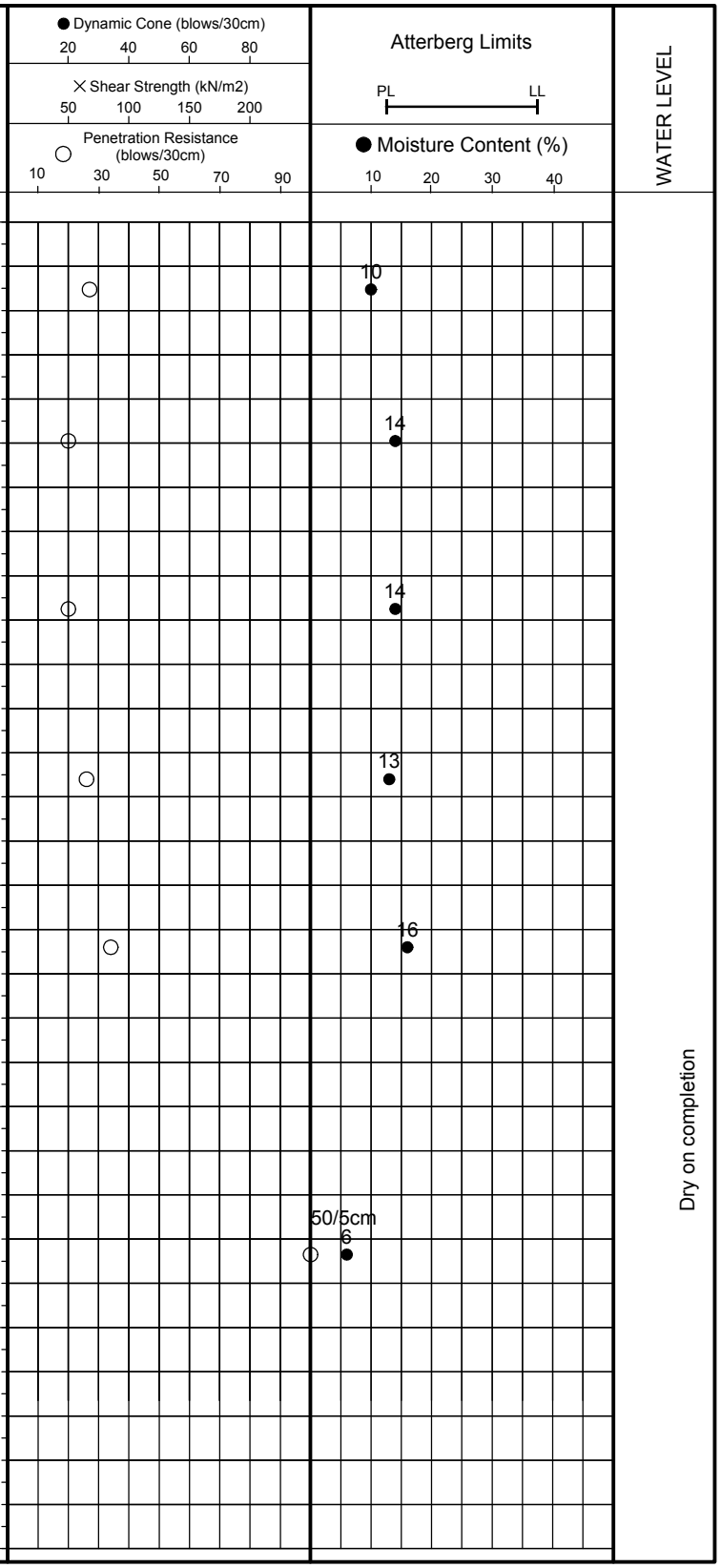
JOB DESCRIPTION: Proposed Residential Development

JOB LOCATION: 6620 Rothschild Trail, Mississauga, Ontario

METHOD OF BORING: Flight-Auger

DATE: July 25, 2014

Depth Elev. (m)	SOIL DESCRIPTION	SAMPLES Number	Type	N-Value
0.0	Ground Surface			
184.8	Brown, compact **SAND AND GRAVEL, Fill** trace of concrete fragments a layer of sandy silt at 0.45 m moist	1	DO	27
0.8				
184.0	Brown, compact to dense **SILTY SAND, Till** seams of fine sand some gravel and clay moist	2	DO	20
		3	DO	20
		4	DO	26
		5	DO	34
4.6				
180.2	Reddish brown, hard **SILTY CLAY, Till** seams of fine sand trace of gravel pieces of shale fragments moist	6	DO	50/5
5.3				
179.5	**REFUSAL TO AUGERING** **END OF BOREHOLE**			



Soil Engineers Ltd.

JOB NO: 1406-S151

LOG OF BOREHOLE NO: 2

FIGURE NO: 2

JOB DESCRIPTION: Proposed Residential Development

JOB LOCATION: 6620 Rothschild Trail, Mississauga, Ontario

METHOD OF BORING: Flight-Auger

DATE: July 25, 2014

Depth Elev. (m)	SOIL DESCRIPTION	SAMPLES Number	Type	N-Value	Depth Scale (m)	Dynamic Cone (blows/30cm) / Shear Strength (kN/m2) / Penetration Resistance (blows/30cm)	Atterberg Limits / Moisture Content (%)	WATER LEVEL
0.0	Ground Surface				0			
184.0	**TOPSOIL**							
0.2	Brown, compact							
183.8	**SAND AND GRAVEL, Fill** trace of concrete fragments trace of rootlets moist	1	DO	12			12	
	Brown, compact to dense	2	DO	23	1		13	
	SILTY SAND, Till seams of fine sand some gravel and clay moist	3	DO	21			13	
		4	DO	29	2		14	
		5	DO	42	3		13	
4.6					4			Dry on completion
179.4	Reddish brown, hard	6	DO	50/12.5			50/12.5cm 11	
4.9	**SILTY CLAY, Till**				5			
179.1	seams of fine sand trace of gravel pieces of shale fragments moist							
	REFUSAL TO AUGERING **END OF BOREHOLE**				6			

Soil Engineers Ltd.

JOB NO: 1406-S151

LOG OF BOREHOLE NO: 3

FIGURE NO: 3

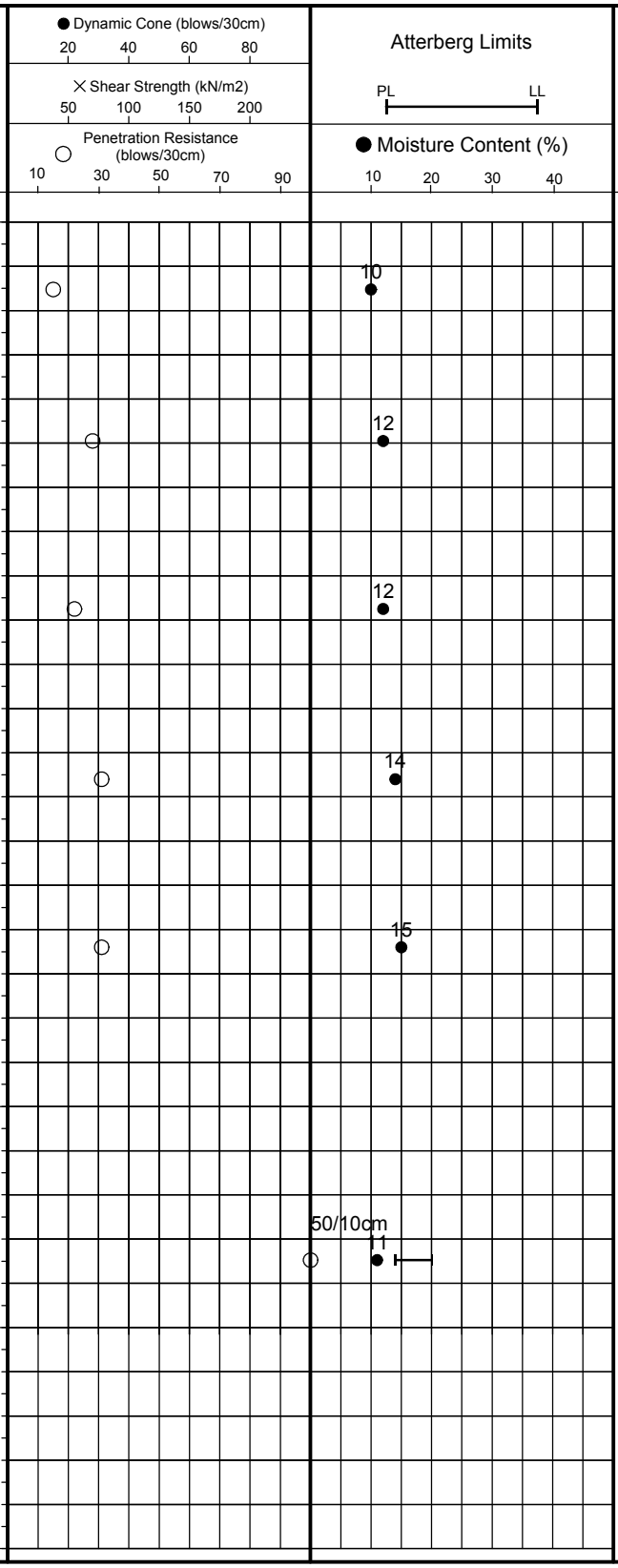
JOB DESCRIPTION: Proposed Residential Development

JOB LOCATION: 6620 Rothschild Trail, Mississauga, Ontario

METHOD OF BORING: Flight-Auger

DATE: July 25, 2014

Depth / Elev. (m)	SOIL DESCRIPTION	SAMPLES Number	Type	N-Value
0.0	Ground Surface			
184.0	**TOPSOIL**			
	Brown, compact **SANDY SILT, Fill** some clay and gravel trace of rootlets moist	1	DO	15
0.8 183.2	Brown, compact to dense **SILTY SAND, Till** seams of fine sand some gravel and clay moist	2	DO	28
		3	DO	22
		4	DO	31
		5	DO	31
4.6 179.4	Reddish brown, hard **SILTY CLAY, Till** seams of fine sand trace of gravel pieces of shale fragments moist	6	DO	50/10
5.0 179.0	**REFUSAL TO AUGERING** **END OF BOREHOLE**			



WATER LEVEL

Dry on completion

Soil Engineers Ltd.

JOB NO: 1406-S151

LOG OF BOREHOLE NO: 4

FIGURE NO: 4

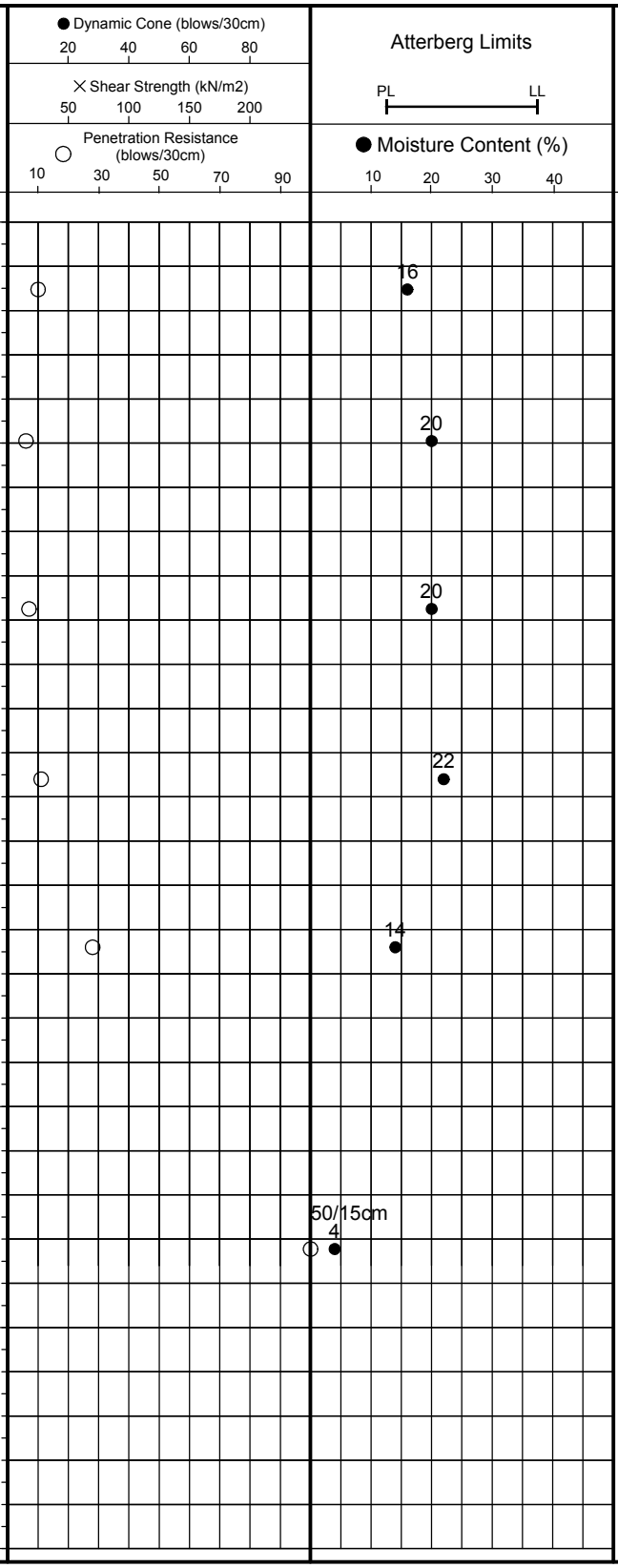
JOB DESCRIPTION: Proposed Residential Development

JOB LOCATION: 6620 Rothschild Trail, Mississauga, Ontario

METHOD OF BORING: Flight-Auger

DATE: July 25, 2014

Depth / Elev. (m)	SOIL DESCRIPTION	SAMPLES Number	Type	N-Value
0.0	Ground Surface			
181.7	**TOPSOIL**			
	Loose to compact **SANDY SILT, Fill** some clay trace of rootlets and topsoil trace of gravel moist brown / grey	1	DO	10
		2	DO	6
		3	DO	7
2.4				
179.4	Reddish brown, compact **SILTY SAND, Till** layer of silty fine sand at 3.5 m some gravel and clay moist	4	DO	11
		5	DO	28
4.6				
177.2	Reddish brown, hard	6	DO	50/15
4.7				
177.0	**SILTY CLAY, Till** seams of fine sand trace of gravel pieces of shale fragments moist			
	END OF BOREHOLE			



WATER LEVEL

Dry on completion

Soil Engineers Ltd.

JOB NO: 1406-S151

LOG OF BOREHOLE NO: 5

FIGURE NO: 5

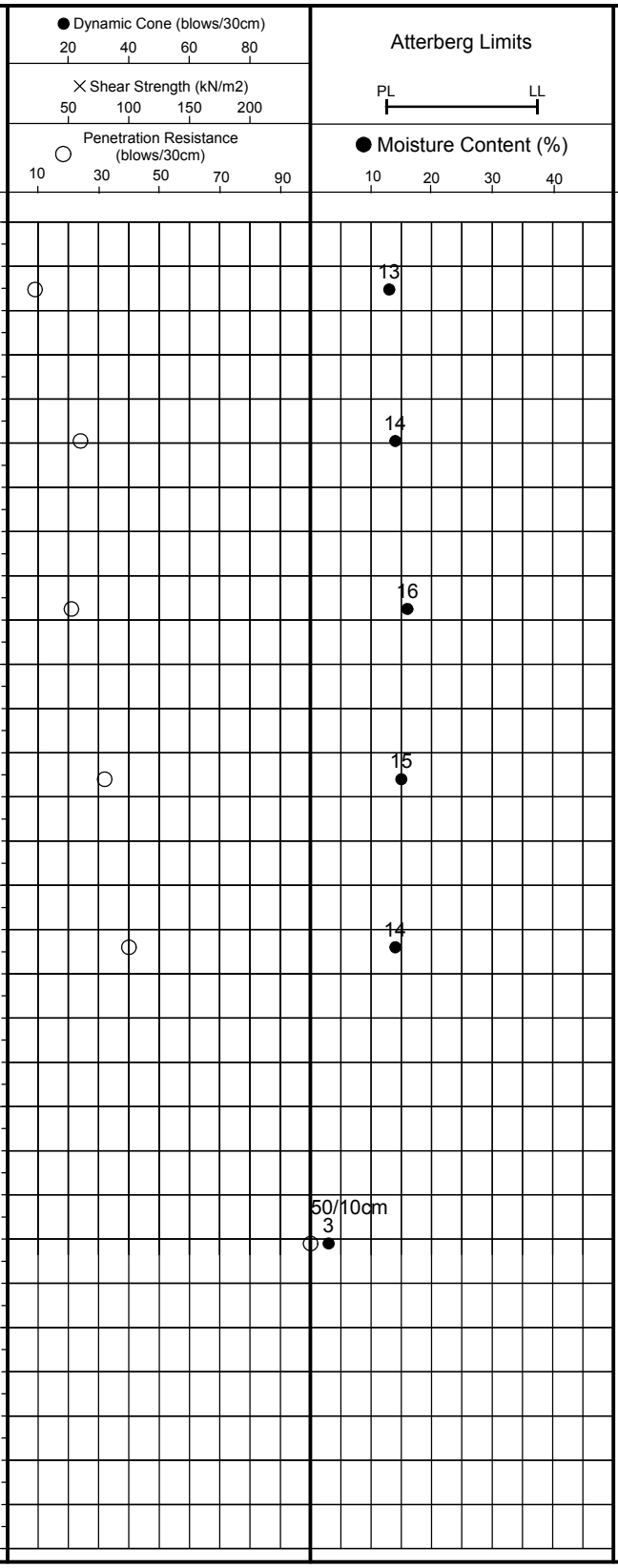
JOB DESCRIPTION: Proposed Residential Development

JOB LOCATION: 6620 Rothschild Trail, Mississauga, Ontario

METHOD OF BORING: Flight-Auger

DATE: July 25, 2014

Depth Elev. (m)	SOIL DESCRIPTION	SAMPLES Number	Type	N-Value	Depth Scale (m)
0.0	Ground Surface				0
182.3	**TOPSOIL**				
	Brown, loose	1	DO	9	
	SANDY SILT, Fill				
	a layer of sand and gravel at 0.05 m some gravel trace of rootlets moist				
0.8 181.6	Brown, compact to dense	2	DO	24	1
	SILTY SAND, Till				
	seams of fine sand some gravel and clay moist	3	DO	21	
		4	DO	32	2
		5	DO	40	3
4.6 177.8	Grey, hard	6	DO	50/10	4
4.7 177.6	**SHALE**				
	seams of fine sand moist				5
	END OF BOREHOLE				6



WATER LEVEL: Dry on completion

Soil Engineers Ltd.

JOB NO: 1406-S151

LOG OF BOREHOLE NO: 6

FIGURE NO: 6

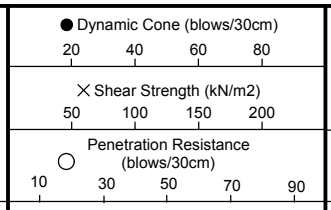
JOB DESCRIPTION: Proposed Residential Development

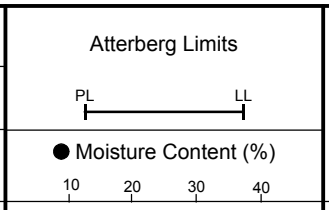
JOB LOCATION: 6620 Rothschild Trail, Mississauga, Ontario

METHOD OF BORING: Flight-Auger

DATE: July 25, 2014

Depth Elev. (m)	SOIL DESCRIPTION	SAMPLES Number	Type	N-Value	Depth Scale (m)
0.0	Ground Surface				0
181.4	**TOPSOIL**				
	Brown, loose				
0.3					
181.2	**SANDY SILT, Fill**	1	DO	8	
	trace of rootlets and gravel moist				
	Brown, compact to very dense				
	SILTY SAND, Till	2	DO	26	1
	seams of fine sand some gravel and clay moist				
		3	DO	31	
					2
		4	DO	48	
					3
3.4		5	DO	90	
178.1	Hard				
	SILT				4
	moist wet below 4.5 m				
	brown / grey	6	DO	52	
5.0					5
176.4	**END OF BOREHOLE**				6





WATER LEVEL

Dry on completion

Soil Engineers Ltd.

JOB NO: 1406-S151

LOG OF BOREHOLE NO: 7

FIGURE NO: 7

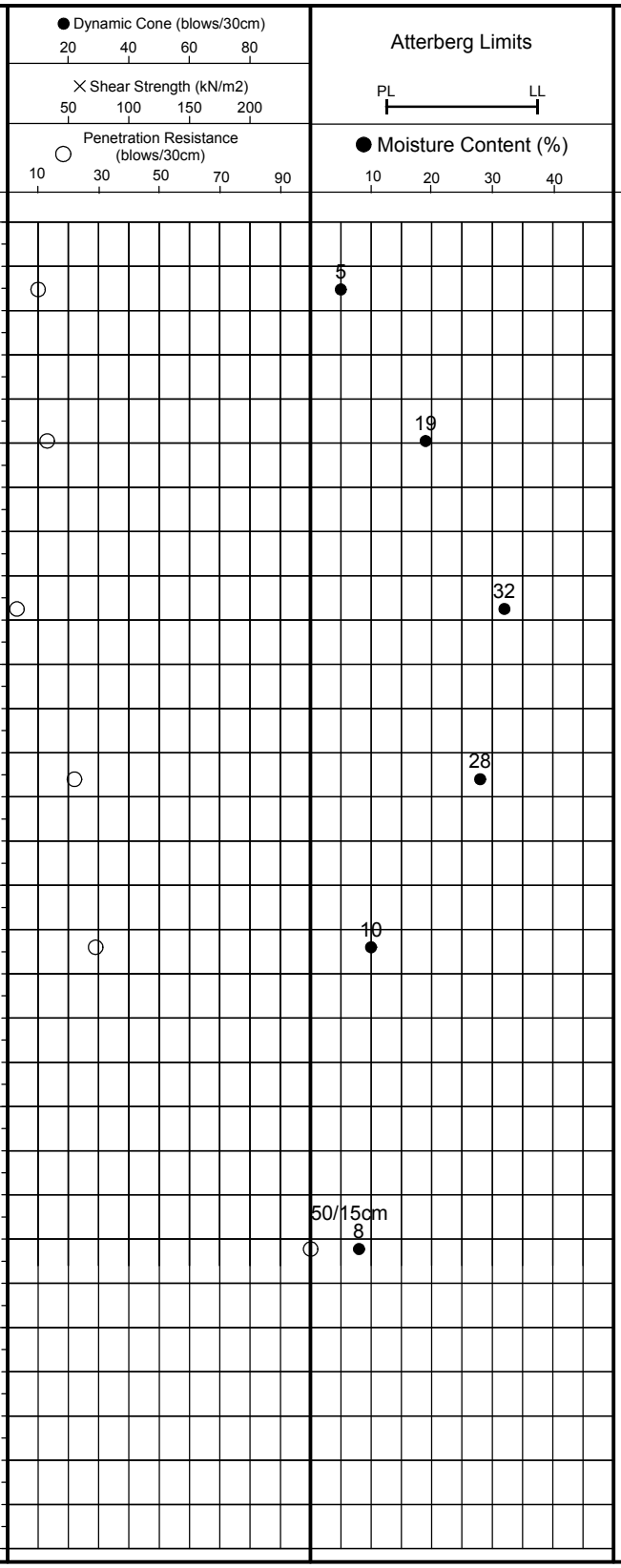
JOB DESCRIPTION: Proposed Residential Development

JOB LOCATION: 6620 Rothschild Trail, Mississauga, Ontario

METHOD OF BORING: Flight-Auger

DATE: July 25, 2014

Depth Elev. (m)	SOIL DESCRIPTION	SAMPLES Number	Type	N-Value
0.0	Ground Surface			
178.7	Brown, compact			
0.3	**SAND AND GRAVEL, FIll**	1	DO	10
178.4	some concrete and brick fragments moist			
	Brown, compact			
	SANDY SILT, FIll	2	DO	13
	some clay trace of brick fragments moist			
1.5				
177.2	Brown, loose to compact			
	SILT	3	DO	3
	wet			
		4	DO	22
2.7				
176.0	Brown, compact			
	SILTY SAND, Till			
	seams of fine sand some clay and gravel moist to wet	5	DO	29
4.6				
174.1	Brown, very dense	6	DO	50/15
4.7				
174.0	**SAND AND GRAVEL**			
	moist to wet			
	END OF BOREHOLE			



Soil Engineers Ltd.

Soil Engineers Ltd.

GRAIN SIZE DISTRIBUTION

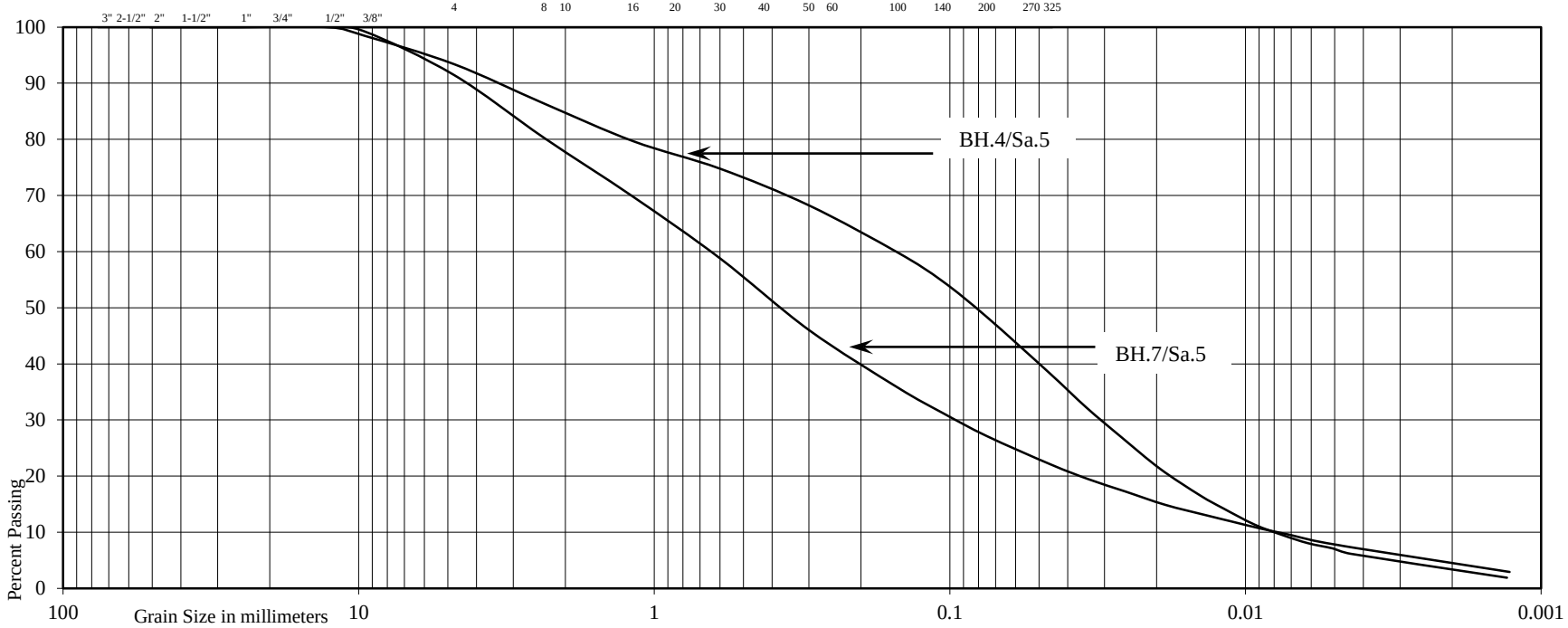
Reference No: 1406-S151

U.S. BUREAU OF SOILS CLASSIFICATION

GRAVEL		SAND				SILT	CLAY
COARSE	FINE	COARSE	MEDIUM	FINE	V. FINE		

UNIFIED SOIL CLASSIFICATION

GRAVEL		SAND			SILT & CLAY
COARSE	FINE	COARSE	MEDIUM	FINE	



Project:	Proposed Residential Development	
Location:	6620 Rothschild Trail, City of Mississauga	
Borehole No:	4	7
Sample No:	5	5
Depth (m):	3.3	3.3
Elevation (m):	178.4	175.4

BH./Sa.	4/5	7/5
Liquid Limit (%) =	-	-
Plastic Limit (%) =	-	-
Plasticity Index (%) =	-	-
Moisture Content (%) =	14	8
Estimated Permeability (cm./sec.) =	10^{-5}	10^{-4}

Classification of Sample [& Group Symbol]: SILTY SAND, Till
some silt

Figure: 8

Soil Engineers Ltd.

GRAIN SIZE DISTRIBUTION

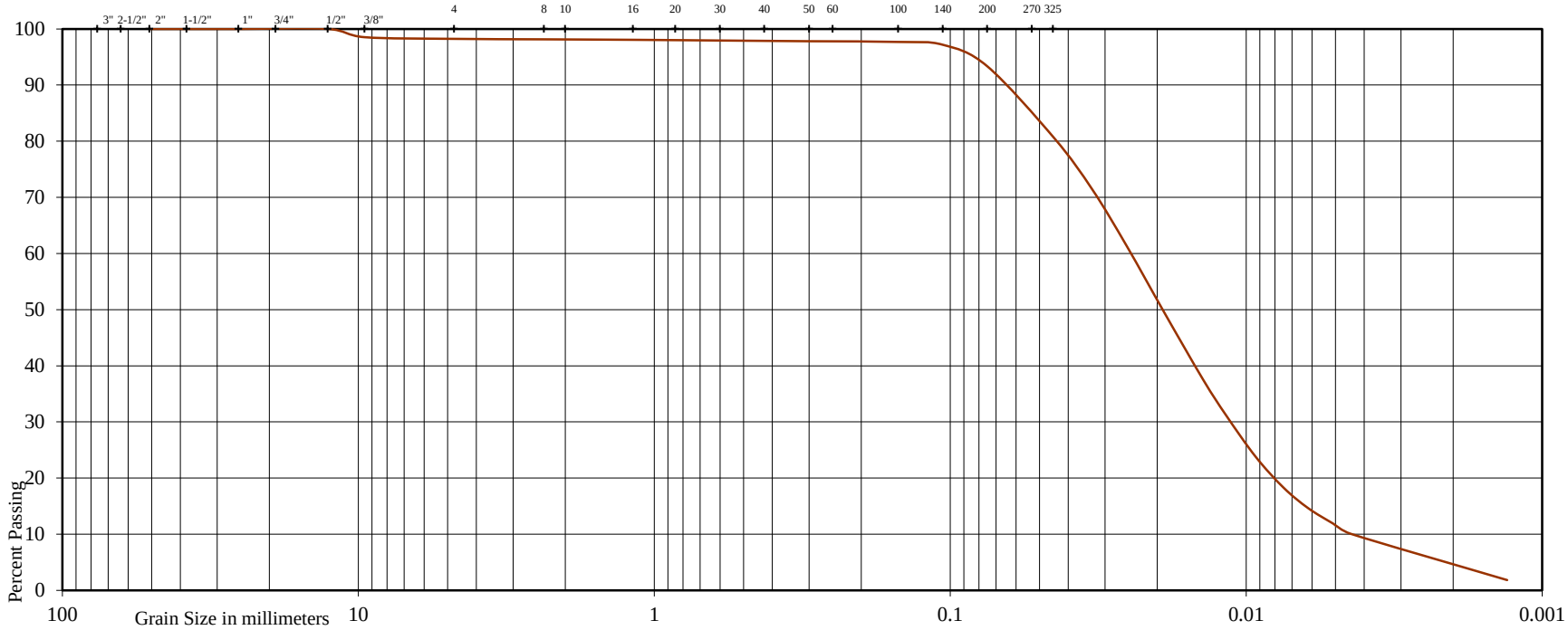
Reference No: 1406-S151

U.S. BUREAU OF SOILS CLASSIFICATION

GRAVEL		SAND				SILT	CLAY
COARSE	FINE	COARSE	MEDIUM	FINE	V. FINE		

UNIFIED SOIL CLASSIFICATION

GRAVEL		SAND			SILT & CLAY
COARSE	FINE	COARSE	MEDIUM	FINE	



Project: Proposed Residential Development

Location: 6620 Rothschild Trail, City of Mississauga

Borehole No: 6

Sample No: 6

Depth (m): 4.8

Elevation (m): 176.6

Liquid Limit (%) = -

Plastic Limit (%) = -

Plasticity Index (%) = -

Moisture Content (%) = 22

Estimated Permeability (cm./sec.) = 10^{-5}

Classification of Sample [& Group Symbol]: SILT

Figure: 9

Soil Engineers Ltd.

GRAIN SIZE DISTRIBUTION

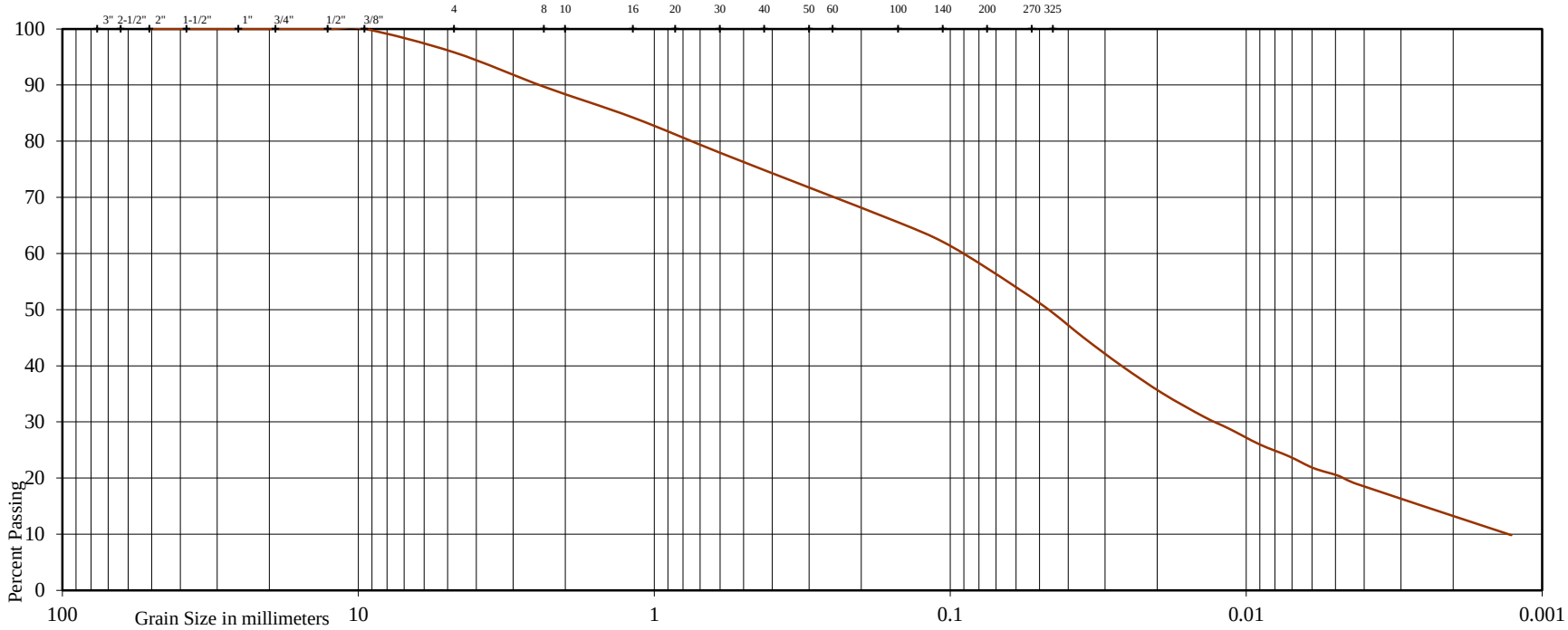
Reference No: 1406-S151

U.S. BUREAU OF SOILS CLASSIFICATION

GRAVEL		SAND				SILT	CLAY
COARSE	FINE	COARSE	MEDIUM	FINE	V. FINE		

UNIFIED SOIL CLASSIFICATION

GRAVEL		SAND			SILT & CLAY
COARSE	FINE	COARSE	MEDIUM	FINE	



Project: Proposed Residential Development

Location: 6620 Rothschild Trail, City of Mississauga

Borehole No: 3

Sample No: 6

Depth (m): 4.7

Elevation (m): 179.3

Liquid Limit (%) = 20

Plastic Limit (%) = 14

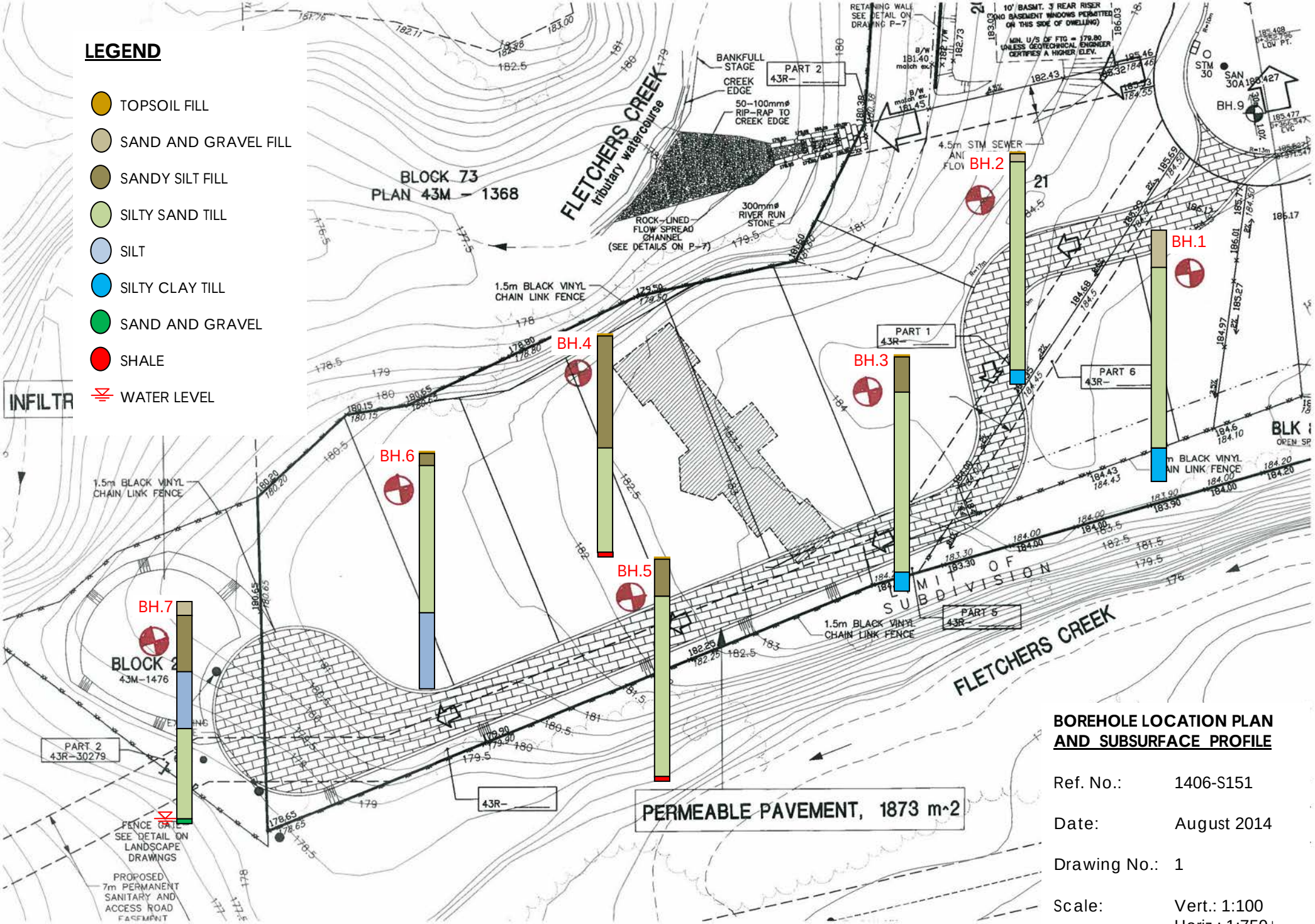
Plasticity Index (%) = 6

Moisture Content (%) = 11

Estimated Permeability (cm./sec.) = 10^{-7}

Classification of Sample [& Group Symbol]: SILTY CLAY, Till

Figure: 10



BOREHOLE LOCATION PLAN AND SUBSURFACE PROFILE

Ref. No.:	1406-S151
Date:	August 2014
Drawing No.:	1
Scale:	Vert.: 1:100 Horiz.: 1:750±

SOIL ENGINEERS LTD.

Appendix D

Plant List

Appendix D

Plant List

Family Name	Scientific Name	Common Name	S-Rank
Apiaceae	*Daucus carota*	Queen Anne's Lace	SNA
Asclepiadaceae	*Asclepias syriaca*	Common Milkweed	S5
Asteraceae	*Bidens frondosa*	Devil's Beggar's Ticks	S5
Asteraceae	*Cichorium intybus*	Chicory	SNA
Asteraceae	*Erigeron canadensis*	Fleabane	S5
Asteraceae	*Euthamia graminifolia*	Grass-leaved Goldenrod	S5
Asteraceae	*Solidago altissima var. altissima*	Tall Goldenrod	S5
Asteraceae	*Solidago flexicaulis*	Broad-leaved Goldenrod	S5
Asteraceae	*Symphyotrichum lanceolatum* ssp. *lanceolatum*	Panicled Aster	S5
Asteraceae	*Symphyotrichum lateriflorum* var. *lateriflorum*	Calico Aster	S5
Asteraceae	*Symphyotrichum novae-angliae*	New England Aster	S5
Asteraceae	*Tussilago farfara*	Colt's Foot	SNA
Balsaminaceae	*Impatiens capensis*	Spotted Jewel-weed	S5
Betulaceae	*Ostrya virginiana*	Eastern Hop-hornbeam	S5
Boraginaceae	*Hackelia virginiana*	Virginia Stickseed	S5
Brassicaceae	*Alliaria petiolata*	Garlic Mustard	SNA
Brassicaceae	*Hesperis matronalis*	Dame's Rocket	SNA
Caprifoliaceae	*Lonicera tatarica*	Tartarian Honeysuckle	SNA
Cyperaceae	*Carex rosea*	Rosy Sedge	S5
Dryopteridaceae	*Dryopteris carthusiana*	Spinulose Wood Fern	S5
Fabaceae	*Gleditsia triacanthos*	Honey Locust	S2
Fabaceae	*Lotus corniculatus*	Bird's-foot Trefoil	SNA
Fabaceae	*Medicago lupulina*	Black Medic	SNA
Fabaceae	*Trifolium repens*	White Clover	SNA
Fabaceae	*Vicia cracca*	Tufted Vetch	SNA
Fagaceae	*Fagus grandifolia*	American Beech	S5
Fagaceae	*Quercus macrocarpa*	Bur Oak	S5
Fagaceae	*Quercus rubra*	Northern Red Oak	S5
Juglandaceae	*Carya cordiformis*	Bitternut Hickory	S5
Juglandaceae	*Carya ovata* var. *ovata*	Shagbark Hickory	S5
Juglandaceae	*Juglans cinerea*	Butternut	S2?
Liliaceae	*Hemerocallis fulva*	Orange Daylily	SNA
Oleaceae	*Fraxinus americana*	White Ash	S5

Family Name	Scientific Name	Common Name	S-Rank
Oleaceae	*Fraxinus excelsior*	European Ash	SNA
Oleaceae	*Fraxinus pennsylvanica*	Green Ash	S5
Pinaceae	*Picea glauca*	White Spruce	S5
Pinaceae	*Picea pungens*	Colorado Spruce	SNA
Pinaceae	*Pinus strobus*	Eastern White Pine	S5
Plantaginaceae	*Plantago major*	Nipple-seed Plantain	SNA
Poaceae	*Bromus inermis* ssp. *inermis*	Smooth Brome	SNA
Poaceae	*Phalaris arundinacea*	Reed Canary Grass	S5
Poaceae	*Poa pratensis* ssp. *pratensis*	Kentucky Bluegrass	SNA
Rhamnaceae	*Rhamnus cathartica*	Buckthorn	SNA
Rosaceae	*Crataegus* sp.	Hawthorn Species	
Rosaceae	*Fragaria virginiana*	Wild Stawberry	S5
Rosaceae	*Geum* sp.	Avens Species	
Rosaceae	*Malus* sp.	Apple Species	
Rosaceae	*Prunus virginiana* var. *virginiana*	Choke Cherry	S5
Rosaceae	*Rosa multiflora*	Multi-flora Rose	SNA
Rosaceae	*Rubus idaeus* ssp. *strigosus*	Wild Red Raspberry	S5
Salicaceae	*Populus deltoides* ssp. *deltoides*	Eastern Cottonwood	S5
Salicaceae	*Populus tremuloides*	Quaking Aspen	S5
Salicaceae	*Salix* x *fragilis*	Crack Willow	SNA
Sapindaceae	*Acer negundo*	Manitoba Maple	S5
Sapindaceae	*Acer platanoides*	Norway Maple	SNA
Sapindaceae	*Acer saccharum* var. *saccharum*	Sugar Maple	S5
Solanaceae	*Solanum dulcamara*	Climbing Nightshade	SNA
Tiliaceae	*Tilia americana*	American Basswood	S5
Ulmaceae	*Ulmus americana*	American Elm	S5
Verbenaceae	*Verbena urticifolia*	White Vervain	S5
Violaceae	*Viola sororia*	Woolly Blue Violet	S5
Vitaceae	*Parthenocissus vitacea*	Thicket Creeper	S5
Vitaceae	*Vitis riparia*	Riverbank Grape	S5

Appendix E

Arborist Report

March 20, 2019 BEL 215194

Alvaro DiBlasio
President
DiBlasio Homes
6664 Rothschild Trail
Mississauga, ON L5W 0A6

Re: Arborist Report - 6620 Rothschild Trail, Mississauga, ON

Dear Mr. DiBlasio:

Beacon Environmental Limited (Beacon) was retained to prepare and Arborist Report and Tree Inventory and Preservation Plan (TIPP) in support of the proposed Site Plan for 6620 Rothchild Trail in the City of Mississauga (the subject property).

This report summarizes the findings of a tree inventory and assessment of trees located on and adjacent to the subject property and provides recommendations for tree removal or preservation based on the potential to integrate trees within and adjacent to the proposed development.

Methods

All trees measuring ≥10 cm diameter at breast height (DBH, measured 1.4 m above grade) within the proposed development areas, including a proposed stormwater outfall, were assessed by an International Society of Arboriculture (ISA) Certified Arborist on October 13, 2015 and January 21, 2019. Trees measuring ≥15 cm DBH located along the edge of the woodland adjacent to the subject property were also inventoried. Inventoried trees were marked with numbered aluminum forestry tags. In addition, the dripline of woodland trees surrounding the property was staked with Credit Valley Conservation (CVC) on May 26, 2015. All tagged trees and the staked woodland dripline were surveyed by an Ontario Land Surveyor (OLS).

Data was collected for each tagged tree, including the species, trunk diameter-at-breast-height (DBH), approximate crown diameter, and health and condition. The condition of individual trees was assessed in terms of overall health and structural integrity based on indicators such as live leaves and buds, dead wood, decay, structural defects, and presence of disease. Each tree was assigned a condition rating of good, fair, poor, or dead based on the following criteria:

- **Poor** – Severe dieback, significant lean, missing leader, major defects, significant decay and/or disease presence;
- **Fair** – Moderate dieback and/or lean, limb defects, multiple stems, moderate foliage damage from stress;

- **Good** – Healthy vigorous growth, minor visible defects or damage; and
- **Dead** – No live crown.

Findings

A total of 100 trees were inventoried on and adjacent to the subject property. A complete list of trees is provided in **Appendix A**. Tree locations are illustrated in **Figure 1**. Inventoried trees range in size from 10 to 100 cm DBH, with a median DBH of 26 cm. A summary of the species and size class distribution is provided in **Table 1**. Tree condition is summarized as follows:

- Good: 49;
- Fair-Good: 16;
- Fair: 16;
- Fair-Poor: 4;
- Poor: 8; and
- Dead: 7.

Table 1. Tree Species and Size Class Summary

Species	Common Name	DBH Range (cm)											Total
		10-14	15-19	20-29	30-39	40-49	50-59	60-69	70-79	80-89	90-99	100-109	
Acer negundo	Manitoba Maple	-	1	1	-	-	-	-	-	-	-	-	**2**
Acer platanoides	Norway Maple	-	-	3	3	-	-	-	-	-	-	-	**6**
Acer saccharum	Sugar Maple	-	1	-	-	-	1	2	2	-	-	1	**7**
Fraxinus americana	White Ash	-	-	2	2	1	-	-	-	-	-	-	**5**
Fraxinus excelsior	European Ash	1	-	-	-	-	-	-	-	-	-	-	**1**
Fraxinus pennsylvanica	Green Ash	2	-	2	-	-	-	-	-	-	-	-	**4**
Gleditsia triacanthos var inermis	Thornless Honey Locust	2	1	2	2	-	-	-	-	-	-	-	**7**
Malus sp	Apple	-	1	1	-	-	-	-	-	-	-	-	**2**
Picea glauca	White Spruce	3	6	12	7	4	-	-	-	-	-	-	**32**
Picea pungens	Colorado Blue Spruce	-	-	-	-	1	-	-	-	-	-	-	**1**
Pinus strobus	White Pine	-	5	3	2	-	-	-	-	-	-	-	**10**
Populus tremuloides	Trembling Aspen	-	8	-	-	-	-	-	-	-	-	-	**8**
Quercus macrocarpa	Bur Oak	2	3	-	-	-	-	-	-	-	-	-	**5**

Species	Common Name	DBH Range (cm)											Total
		10-14	15-19	20-29	30-39	40-49	50-59	60-69	70-79	80-89	90-99	100-109	
Quercus rubra	Red Oak	-	3	2	3	-	-	-	-	-	-	-	**8**
Ulmus americana	White Elm	-	1	1	-	-	-	-	-	-	-	-	**2**
	Total	**10**	**30**	**29**	**19**	**6**	**1**	**2**	**2**	**0**	**0**	**1**	**100**

Description of Proposed Redevelopment

The proposed development consists of a residential four (4) storey apartment building with access from Rothschild Trail. The existing building on the property will be demolished.

Impact Assessment and Recommendations

Tree Removals

A total of 20 trees ≥10 cm ranging in size from 12 to 35 cm DBH are recommended for removal from the tablelands of the subject property to accommodate the proposed development, of which 15 are in fair or good condition, four are in poor or fair-poor condition, and one is dead. Of the 20 trees proposed for removal, four are Ash species. The majority of trees to be removed are young to mid-aged planted ornamental trees including Thornless Honey Locust, White Spruce, and Norway Maple.

Trees on private property are subject to the City of Mississauga's Private Tree Protection Bylaw 0254-2012. As three or more trees having a DBH greater than 15 cm are proposed for removal as part of a Site Plan application in support of the development proposal, per City standards the applicant will be required to receive a Tree Removal Permission as part of the review of the planning application. The issuance of a Tree Removal Permission follows the same process and involves the same conditions and fee payments as the City's Tree Permit process, and will be applied as a condition of site plan approval prior to the granting of the Tree Removal Permission.

Tree Preservation

Of the trees inventoried, A total of 80 trees are identified for preservation (see **Figure 1** and **Appendix A**), all of which are located within the woodland along the edge of the proposed development.

Tree health and structural integrity can be compromised by grade changes, soil compaction, root cutting, and mechanical damage to trunks and branches resulting from the operation of construction equipment. As such, trees to be retained shall be protected through the establishment of a tree protection zone (TPZ). The minimum recommended TPZ's are based on the DBH of the tree as indicated in **Table 2** and illustrated on **Figure 1**.

Trees along the woodland edge will be protected by providing a 5 m buffer to the staked dripline, which exceeds the minimum tree protection zones. Tree protection hoarding consisting of 1.2 m orange plastic fencing framed with solid top and bottom rail, or 1.2 m plywood or an alternative approved by the City, will be installed along the edge of the buffer (see **Figure 1** for fence location and detail). Fencing should be installed before any construction or site alteration takes place and should not be removed until after construction is completed.

No grading, soil disturbance, or surface treatments shall occur within the TPZ and no equipment or materials shall be stored inside the TPZ.

Table 2. Minimum Tree Protection Zones

Trunk Diameter (cm)	Minimum TPZ (m)*
<10	1.2
10-29	1.8
30-40	2.4
41-50	3
51-60	3.6
61-70	4.2
71-80	4.8
81-90	5.4
91-100	6

* to be measured from the outside edge of the base of the tree

In addition to the establishment of the TPZ, the following specifications are recommended to ensure the health and survival of any retained trees:

- Before the beginning of work, the contractor and project arborist should meet on site to review work procedures, access routes, storage areas, and the TPZ or other tree protection measures;
- Some tree roots may extend beyond the tree protection zone. Any root damage occurring during construction should be cut cleanly with a hand saw or pruning shears;
- Any injury to a tree during construction should be evaluated by a qualified arborist; and
- Any pruning of trees for construction clearance shall be performed by a qualified arborist.

Tree Replacement/Compensation

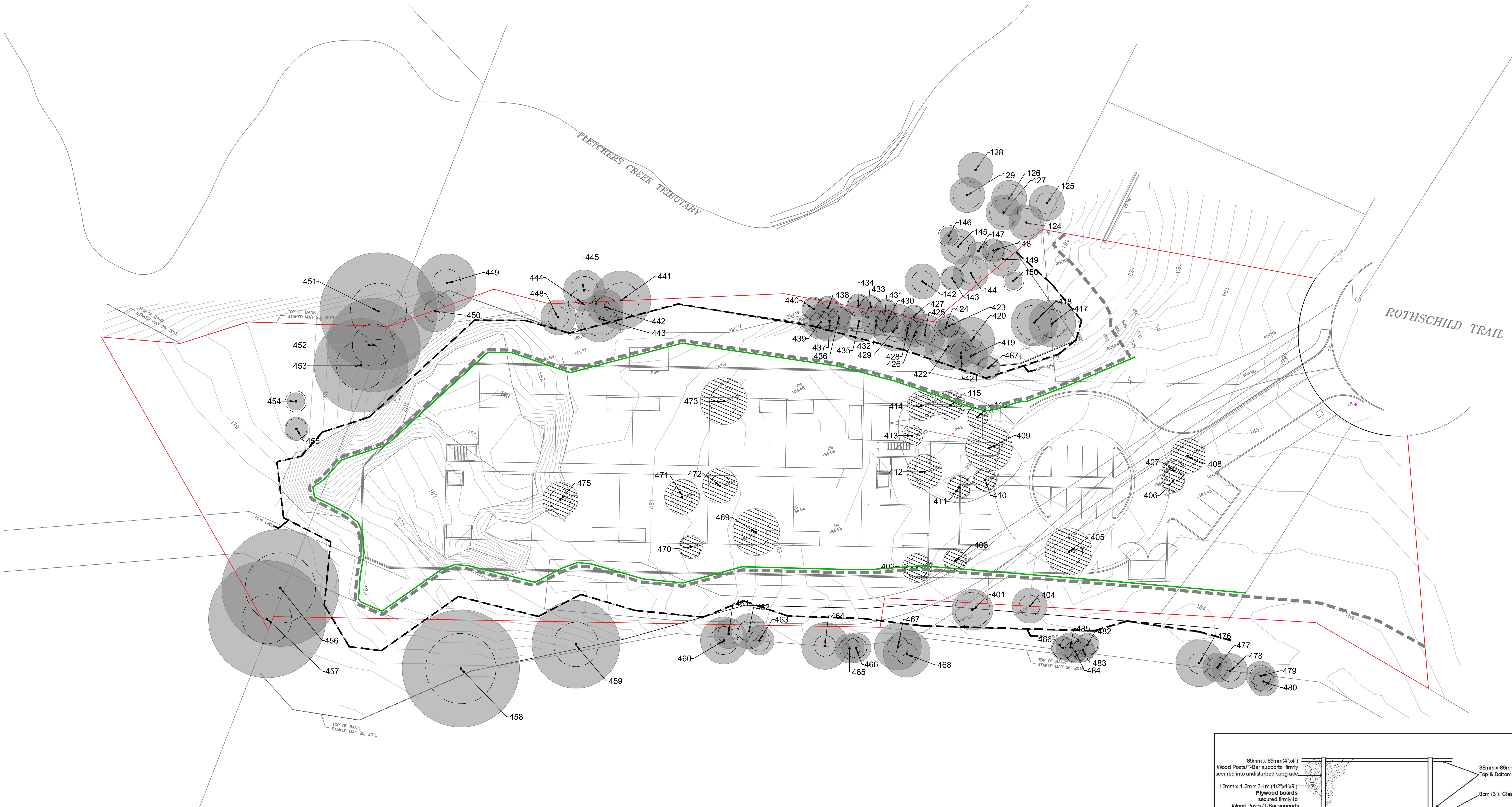
To compensate for the removal of 16 live trees (the City of Mississauga considers all Ash trees to be dead/dying), the woodland buffer along the north side of the proposed development will be planted with a variety of native trees. Trees removed from the subject property and adjacent lands will be replaced at a minimum ratio of 1:1 (one tree planted for each tree removed) and will be subject to an aftercare plan (e.g. watering) suitable for the site, species planted, and weather.

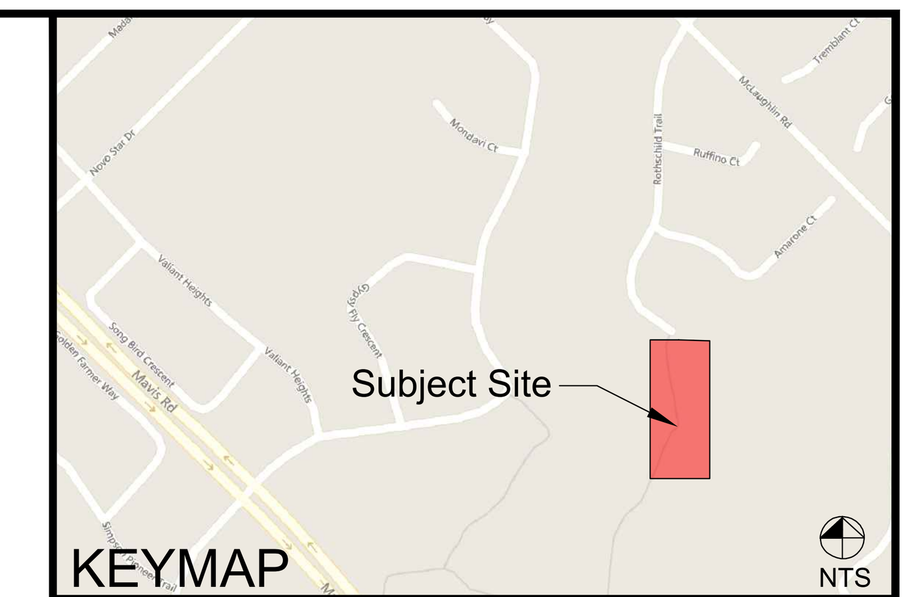
Report prepared by:
Beacon Environmental

Dan Westerhof, B.Sc., MES
Terrestrial Ecologist
Certified Arborist (ON-1536A)

Report reviewed by:
Beacon Environmental

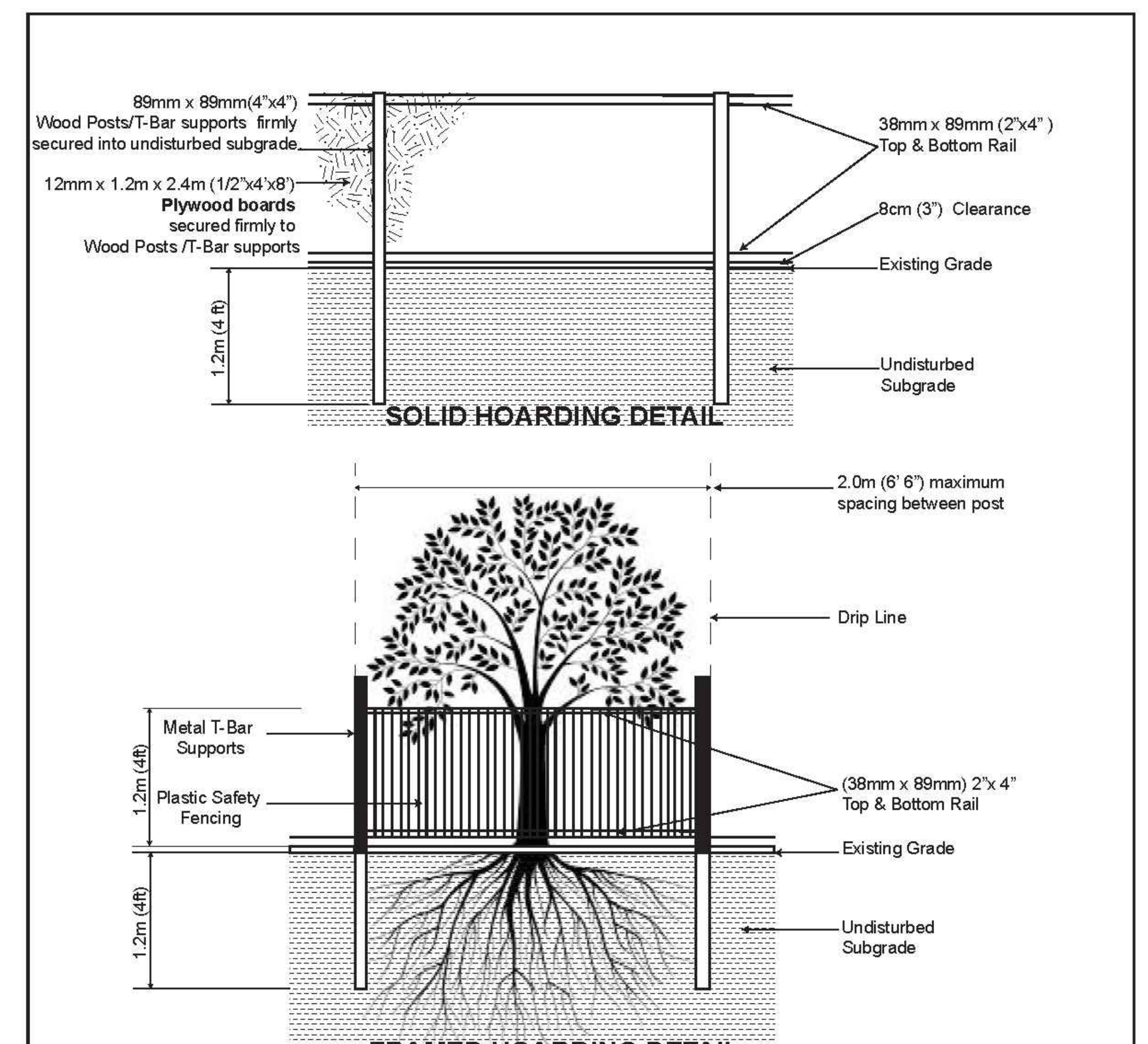
Ash Baron
Sr. Ecologist
Certified Arborist (ON-1821A)





LEGEND

- Tree for Preservation
- Tree for Removal
- 1678 Tree tag
- Tree Crown
- Minimum Tree Protection Zone
- Tree Location
- Property Boundary
- Limit of Development
- Dripline
- Proposed Tree Preservation Hoarding Location



NOTES:

1. Hoarding details to be determined following initial site inspection.
2. Private tree hoarding to be approved by Development & Design ; City tree hoarding to be approved by Community Services Dept.
3. Hoarding must be supplied, installed and maintained by the applicant throughout all phases of construction. **Inspection must be conducted by the Development and Design Division prior to removing any/all private hoarding.**
4. Do not allow water to collect and pond behind or within hoarding.
5. **T-bar supports are acceptable alternative to 4x4 posts. U-shaped metal supports will not be accepted.**
6. **Plywood** must be utilized for 'solid' hoarding. OSB/Chipboard will not be accepted for solid hoarding. Plywood sheets must be installed on "construction" side of frame.
7. Applicant is responsible to ensure utility locates are completed within city boulevard prior to installing framed hoarding.

TREE PRESERVATION HOARDING

SCALE : N.T.S DATE : June 2017

MISSISSAUGA

Notes: Scale shown is for an 36" x 24" page.
For illustrative purposes. Do not scale

Nº	REVISIONS	DATE:	BY:
6			
5			
4			
3			
2			
1	ISSUED	2019/3/07	DW

SCALE

1:350 (0 5 10 20)

NORTH ARROW

CERTIFIED ARBORIST ISA

DAN WESTERHOF
#ON-1536A

SEAL

BEACON ENVIRONMENTAL
GUELPH OFFICE
373 WOOLWICH ST,
GUELPH, ON N1H 3W4
T) 519.826.0419
519.826.9306
www.beaconenviro.com

CLIENT
DIBLASIO HOMES

PROJECT
BLOCK 21 VINTAGES SELECT

SHEET TITLE
TREE INVENTORY AND PRESERVATION PLAN

DESIGN BY:	--	PROJECT Nº:	215194
DRAWN BY:	NC/MB	FIGURE Nº:	1
CHECKED BY:	DW		
DATE:	08 March 2019		

Appendix A

Tree Inventory and Evaluation

Appendix A

Tree Inventory and Evaluation

124	*Picea glauca*	White Spruce	35	6	2.4	Good		Preserve
125	*Picea glauca*	White Spruce	26	6	1.8	Good		Preserve
126	*Picea glauca*	White Spruce	34	6	2.4	Good		Preserve
127	*Picea glauca*	White Spruce	30	6	2.4	Good		Preserve
128	*Picea glauca*	White Spruce	42	6	3	Good		Preserve
129	*Picea glauca*	White Spruce	35	6	2.4	Dead		Preserve
134	*Ulmus americana*	White Elm	24	4	1.8	Dead		Preserve
139	*Pinus strobus*	White Pine	30	2	2.4	Dead		Preserve
142	*Acer negundo*	Manitoba Maple	25	6	1.8	Fair	lean	Preserve
143	*Acer negundo*	Manitoba Maple	16	4	1.8	Fair	lean	Preserve
144	*Picea glauca*	White Spruce	27	6	1.8	Good		Preserve
145	*Picea glauca*	White Spruce	24	6	1.8	Good		Preserve
146	*Picea glauca*	White Spruce	14	3	1.8	Poor	uprooted, leaning	Preserve
147	*Picea glauca*	White Spruce	17	3	1.8	Good	crowded	Preserve
148	*Picea glauca*	White Spruce	23	4	1.8	Good	crowded	Preserve
149	*Picea glauca*	White Spruce	28	6	1.8	Good		Preserve
150	*Fraxinus pennsylvanica*	Green Ash	10	3	1.8	Fair		Preserve
401	*Picea pungens*	Colorado Blue Spruce	40	7	3	Good		Preserve
402	*Fraxinus pennsylvanica*	Green Ash	24	5	1.8	Poor	top broken off, lots of epicoromic branches, poor form	Remove
403	*Fraxinus pennsylvanica*	Green Ash	20	4	1.8	Poor	nearly dead	Remove
404	*Acer platanoides*	Norway Maple	24	6	1.8	Poor	large old open wound along lower trunk, branch dieback on one side	Preserve
405	*Gleditsia triacanthos* var. *inermis*	Thornless Honey Locust	35	8	2.4	Good		Remove
406	*Picea glauca*	White Spruce	20	4	1.8	Good		Remove
407	*Picea glauca*	White Spruce	16	4	1.8	Good		Remove
408	*Picea glauca*	White Spruce	22	6	1.8	Good		Remove
409	*Gleditsia triacanthos* var. *inermis*	Thornless Honey Locust	33	8	2.4	Good		Remove
410	*Gleditsia triacanthos* var. *inermis*	Thornless Honey Locust	14	4	1.8	Fair-Good	codominant leaders, flat top	Remove
411	*Fraxinus excelsior*	European Ash	12	4	1.8	Good		Remove
412	*Gleditsia triacanthos* var. *inermis*	Thornless Honey Locust	20	6	1.8	Good		Remove
413	*Malus* sp.	Apple	23	3	1.8	Fair-Poor	heavily pruned	Remove

414	*Gleditsia triacanthos* var. *inermis*	Thornless Honey Locust	20	5	1.8	Good		Remove
415	*Gleditsia triacanthos* var. *inermis*	Thornless Honey Locust	16	5	1.8	Good		Remove
416	*Gleditsia triacanthos* var. *inermis*	Thornless Honey Locust	12	3	1.8	Good		Remove
417	*Picea glauca*	White Spruce	39	8	2.4	Good		Preserve
418	*Picea glauca*	White Spruce	40	8	3	Good		Preserve
419	*Picea glauca*	White Spruce	21	6	1.8	Good		Preserve
420	*Pinus strobus*	White Pine	30	8	1.8	Good		Preserve
421	*Picea glauca*	White Spruce	17	5	1.8	Fair		Preserve
422	*Fraxinus americana*	White Ash	45	8	3	Fair	codominant leaders, large epicormic branches along trunk	Preserve
423	*Pinus strobus*	White Pine	15	4	1.8	Fair-Good		Preserve
424	*Pinus strobus*	White Pine	15	3	1.8	Fair		Preserve
425	*Picea glauca*	White Spruce	27	7	1.8	Good		Preserve
426	*Picea glauca*	White Spruce	14,11	5	1.8	Fair-Good		Preserve
427	*Pinus strobus*	White Pine	20	4	1.8	Good		Preserve
428	*Picea glauca*	White Spruce	19	5	1.8	Good		Preserve
429	*Fraxinus americana*	White Ash	31	8	2.4	Fair-Poor	three codominant leaders, one broken leader, branch dieback	Preserve
430	*Picea glauca*	White Spruce	18	4	1.8	Good		Preserve
431	*Pinus strobus*	White Pine	20	4	1.8	Good		Preserve
432	*Picea glauca*	White Spruce	13,11	5	1.8	Good		Preserve
433	*Pinus strobus*	White Pine	18	4	1.8	Poor	nearly dead	Preserve
434	*Pinus strobus*	White Pine	15	4	1.8	Good		Preserve
435	*Fraxinus americana*	White Ash	27	7	1.8	Fair-Poor	uneven crown, codominant leaders, large haning branch	Preserve
436	*Picea glauca*	White Spruce	17	4	1.8	Good		Preserve
437	*Picea glauca*	White Spruce	25	7	1.8	Good		Preserve
438	*Pinus strobus*	White Pine	17	4	1.8	Fair-Good		Preserve
439	*Picea glauca*	White Spruce	17	6	1.8	Fair	Uneven crown, crowded	Preserve
440	*Pinus strobus*	White Pine	20	4	1.8	Fair-Good	uneven crown	Preserve
441	*Picea glauca*	White Spruce	48	10	3	Good		Preserve
442	*Picea glauca*	White Spruce	24	6	1.8	Fair		Preserve
443	*Picea glauca*	White Spruce	42	8	3	Fair-Good		Preserve
444	*Picea glauca*	White Spruce	34	1	2.4	Dead		Preserve
445	*Picea glauca*	White Spruce	33	7	2.4	Good		Preserve
448	*Fraxinus americana*	White Ash	22	6	1.8	Dead		Preserve
449	*Quercus rubra*	Red Oak	37	10	2.4	Fair-Good	uneven crown	Preserve
450	*Fraxinus americana*	White Ash	30	7	1.8	Fair	codominant leaders, uneven crown	Preserve
451	*Acer saccharum*	Sugar Maple	70	20	4.8	Fair-Good	large branches borke off - gap in canopy	Preserve
452	*Acer saccharum*	Sugar Maple	50	16	3.6	Fair-Good	large open wound where branch broke off	Preserve
453	*Acer saccharum*	Sugar Maple	60	16	4.2	Fair-Good	uneven crown	Preserve

454	*Ulmus americana*	White Elm	17	3	1.8	Poor	covered in grape vine	Preserve
455	*Acer saccharum*	Sugar Maple	15	4	1.8	Good		Preserve
456	*Acer saccharum*	Sugar Maple	70,70	20	6	Fair-Poor	major damage to one trunk, massive open wound with extensive decay. Other trunk good with minor branch dieback	Preserve
457	*Acer saccharum*	Sugar Maple	65	20	4.2	Fair-Good	uneven crown	Preserve
458	*Acer saccharum*	Sugar Maple	100	20	6	Good		Preserve
459	*Quercus rubra*	Red Oak	50	15	3.6	Good	minor dieback, uneven crown	Preserve
460	*Quercus rubra*	Red Oak	36	8	2.4	Good		Preserve
461	*Quercus macrocarpa*	Bur Oak	18	5	1.8	Fair		Preserve
462	*Quercus macrocarpa*	Bur Oak	24	6	1.8	Good		Preserve
463	*Quercus rubra*	Red Oak	17	5	1.8	Good		Preserve
464	*Quercus macrocarpa*	Bur Oak	28	8	1.8	Good		Preserve
465	*Quercus macrocarpa*	Bur Oak	18	5	1.8	Fair-Good	uneven crown	Preserve
466	*Quercus rubra*	Red Oak	17	5	1.8	Fair-Good	uneven crown	Preserve
467	*Quercus macrocarpa*	Bur Oak	24	8	1.8	Good		Preserve
468	*Quercus rubra*	Red Oak	24	8	1.8	Fair-Good	uneven crown	Preserve
469	*Acer platanoides*	Norway Maple	32	8	2.4	Good		Remove
470	*Fraxinus pennsylvanica*	Green Ash	24	4	1.8	Dead		Remove
471	*Acer platanoides*	Norway Maple	24	6	1.8	Fair	frost crack	Remove
472	*Acer platanoides*	Norway Maple	30	6	1.8	Poor	large broken branch, poor form	Remove
473	*Acer platanoides*	Norway Maple	31	8	2.4	Fair-Good		Remove
475	*Acer platanoides*	Norway Maple	25	6	1.8	Fair	dieback on one side	Remove
476	*Quercus rubra*	Red Oak	23	8	1.8	Fair-Good	uneven crown	Preserve
477	*Quercus rubra*	Red Oak	15	5	1.8	Good		Preserve
478	*Populus tremuloides*	Trembling Aspen	14,15	6	1.8	Fair		Preserve
479	*Populus tremuloides*	Trembling Aspen	16	5	1.8	Good		Preserve
480	*Populus tremuloides*	Trembling Aspen	16	5	1.8	Good		Preserve
482	*Populus tremuloides*	Trembling Aspen	17	4	1.8	Fair	dead branch, uneven crown	Preserve
483	*Populus tremuloides*	Trembling Aspen	15	4	1.8	Fair		Preserve
484	*Populus tremuloides*	Trembling Aspen	17	4	1.8	Dead		Preserve
485	*Populus tremuloides*	Trembling Aspen	15	5	1.8	Good		Preserve
486	*Populus tremuloides*	Trembling Aspen	15	4	1.8	Poor	nearly dead	Preserve
487	*Malus* sp.	Apple	15	4	1.8	Fair		Preserve

Appendix F

Breeding Birds Data

Appendix F

Breeding Bird Habitat Assessment

Common Name	Scientific Name	Status					Species Recorded in OBBA Square 17PJ03[f]	Potential for Habitat on Subject Property[g]	Potential for Habitat within 120 m of Subject Property[g]
		National Species at Risk COSEWIC[a]	Species at Risk in Ontario [b]	Provincial breeding season SRANK[c]	TRCA Status[d]	Area-sensitive (OMNR)[e]			
Green Heron	*Butorides virescens*			S4	L4		x		L
Canada Goose	*Branta canadensis*			S5	L5		x		M
Wood Duck	*Aix sponsa*			S5	L4		x		
Mallard	*Anas platyrhynchos*			S5	L5		x		M
Gadwall	*Anas strepera*			S4	L4		x		
Hooded Merganser	*Lophodytes cucullatus*			S5	L3		x		
Common Merganser	*Mergus merganser*			S5	L3	A	x		
Turkey Vulture	*Cathartes aura*			S5	L4		x		
Northern Harrier	*Circus cyaneus*			S4	L3	A	x		
Sharp-shinned Hawk	*Accipiter striatus*			S5	L3	A	x		M
Cooper's Hawk	*Accipiter cooperi*			S4	L4	A	x		
Red-tailed Hawk	*Buteo jamaicensis*			S5	L5		x		L
American Kestrel	*Falco sparverius*			S4	L4		x		L
Ring-necked Pheasant	*Phasianus colchicus*			SE	L+		x		
Sora	*Porzana carolina*			S4	L3		x		
Killdeer	*Charadrius vociferus*			S5	L4		x	L	M
Spotted Sandpiper	*Actitis macularia*			S5	L4		x		M
American Woodcock	*Scolopax minor*			S4	L3		x		L
Rock Pigeon	*Columba livia*			SNA	L+		x	M	H
Black-billed Cuckoo	*Coccyzus erythropthalmus*			S5	L3		x		L
Yellow-billed Cuckoo	*Coccyzus americanus*			S4	L3		x		L
Great Horned Owl	*Bubo virginianus*			S4	L4		x		L
Eastern Screech-Owl	*Megascops asio*			S4	L4		x		M
Common Nighthawk	*Chordeiles minor*	THR	SC	S4	L3		x		
Chimney Swift	*Chaetura pelagica*	THR	THR	S4	L4		x		
Ruby-throated Hummingbird	*Archilochus colubris*			S5	L4		x	L	H
Belted Kingfisher	*Ceryle alcyon*			S4	L4		x		M
Yellow-bellied Sapsucker	*Sphyrapicus varius*			S5	L3	A	x		L
Downy Woodpecker	*Picoides pubescens*			S5	L5		x	H	H
Hairy Woodpecker	*Picoides villosus*			S5	L4	A	x		H
Northern Flicker	*Colaptes auratus*			S4	L4		x		H
Pileated Woodpecker	*Dryocopus pileatus*			S5	L3	A	x		M
Eastern Wood-Pewee	*Contopus virens*	SC	SC	S4	L4		x		H
Alder Flycatcher	*Empidonax alnorum*			S5	L3		x		M
Willow Flycatcher	*Empidonax traillii*			S5	L4		x		M
Least Flycatcher	*Empidonax minimus*			S4	L3	A	x		L
Eastern Phoebe	*Sayornis phoebe*			S5	L5		x	L	M

Common Name	Scientific Name	Status					Species Recorded in OBBA Square 17PJ03[f]	Potential for Habitat on Subject Property[g]	Potential for Habitat within 120 m of Subject Property[g]
		National Species at Risk COSEWIC[a]	Species at Risk in Ontario [b]	Provincial breeding season SRANK[c]	TRCA Status[d]	Area-sensitive (OMNR)[e]			
Great Crested Flycatcher	*Myiarchus crinitus*			S4	L4		x		L
Eastern Kingbird	*Tyrannus tyrannus*			S4	L4		x	L	H
Horned Lark	*Eremophila alpestris*			S5	L3		x		
Purple Martin	*Progne subis*			S4	L4		x		
Tree Swallow	*Tachycineta bicolor*			S4	L4		x		M
N. Rough-winged Swallow	*Stelgidopteryx serripennis*			S4	L4		x		
Bank Swallow	*Riparia riparia*	THR	THR	S4	L3		x		
Cliff Swallow	*Petrochelidon pyrrhonota*			S4	L5		x		
Barn Swallow	*Hirundo rustica*	THR	THR	S4	L4		x		M
Blue Jay	*Cyanocitta cristata*			S5	L5		x	H	H
American Crow	*Corvus brachyrhynchos*			S5	L5		x	H	H
Black-capped Chickadee	*Poecile atricapillus*			S5	L5		x	H	H
Red-breasted Nuthatch	*Sitta canadensis*			S5	L4	A	x		L
White-breasted Nuthatch	*Sitta carolinensis*			S5	L4	A	x	L	M
House Wren	*Troglodytes aedon*			S5	L5		x	M	M
Winter Wren	*Troglodytes hiemalis*			S5	L3	A	x		
Blue-gray Gnatcatcher	*Polioptila caerulea*			S4	L4	A	x		L
Veery	*Catharus fuscescens*			S4	L3	A	x		
Wood Thrush	*Hylocichla mustelina*	THR	SC	S4	L3		x		
American Robin	*Turdus migratorius*			S5	L5		x	H	H
Northern Mockingbird	*Mimus polyglottus*			S4	L5		x		L
Gray Catbird	*Dumetella carolinensis*			S4	L4		x	M	H
Brown Thrasher	*Toxostoma rufum*			S4	L3		x		H
Cedar Waxwing	*Bombycilla cedrorum*			S5	L5		x	H	H
European Starling	*Sturnus vulgaris*			SE	L+		x	H	H
Warbling Vireo	*Vireo gilvus*			S5	L5		x	M	H
Red-eyed Vireo	*Vireo olivaceus*			S5	L4		x	M	M
Yellow Warbler	*Setophaga petechia*			S5	L5		x	H	H
Chestnut-sided Warbler	*Setophaga pensylvanica*			S5	L3		x		L
American Redstart	*Setophaga ruticilla*			S5	L3	A	x	L	H
Mourning Warbler	*Geothlypis philadelphia*			S4	L3		x		M
Common Yellowthroat	*Geothlyphis trichas*			S5	L4		x	L	H
Northern Cardinal	*Cardinalis cardinalis*			S5	L5		x	H	H
Rose-breasted Grosbeak	*Pheucticus ludovicianus*			S4	L4		x	L	M
Indigo Bunting	*Passerina cyanea*			S4	L4		x		M
Chipping Sparrow	*Spizella passerina*			S5	L5		x	H	H
Field Sparrow	*Spizella pusilla*			S4	L4		x		
Vesper Sparrow	*Pooecetes gramineus*			S4	L3		x		
Savannah Sparrow	*Passerculus sandwichensis*			S4	L4	A	x		
Song Sparrow	*Melospiza melodia*			S5	L5		x	H	H
Swamp Sparrow	*Melospiza georgiana*			S5	L4		x		H
White-throated Sparrow	*Zonotrichia albicollis*			S5	L3		x		
Bobolink	*Dolichonyx oryzivorus*	THR	THR	S4	L2	A	x		
Red-winged Blackbird	*Agelaius phoeniceus*			S4	L5		x	H	H

Common Name	Scientific Name	Status					Species Recorded in OBBA Square 17PJ03[f]	Potential for Habitat on Subject Property[g]	Potential for Habitat within 120 m of Subject Property[g]
		National Species at Risk COSEWIC[a]	Species at Risk in Ontario [b]	Provincial breeding season SRANK[c]	TRCA Status[d]	Area-sensitive (OMNR)[e]			
Eastern Meadowlark	*Sturnella magna*	THR	THR	S4	L3	A	x		
Common Grackle	*Quiscalus quiscula*			S5	L5		x	H	H
Brown-headed Cowbird	*Molothrus ater*			S4	L5		x	H	H
Orchard Oriole	*Icterus spurius*			S4	L5		x		L
Baltimore Oriole	*Icterus galbula*			S4	L5		x		H
House Finch	*Haemorhous mexicanus*			SNA	L+		x	M	H
American Goldfinch	*Spinus tristis*			S5	L5		x	H	H
House Sparrow	*Passer domesticus*			SNA	L+		x	H	H

Key

a - COSEWIC = Committee on the Status of Endangered Wildlife in Canada: END = Endangered, THR = Threatened, SC = Special Concern

b - Species at Risk in Ontario List (as applies to ESA) as designated by COSSARO (Committee on the Status of Species at Risk in Ontario) END = Endangered, THR = Threatened, SC = Special Concern: END = Endangered, THR = Threatened, SC = Special Concern

c - SRANK (from Natural Heritage Information Centre) for breeding status if: S1 (Critically Imperiled), S2 (Imperiled),S3 (Vulnerable), S4 (Apparently Secure), S5 (Secure) SNA (Not applicable 'because the species is not a suitable target for conservation activities'; includes non-native species)

d - Toronto and Region Conservation Authority L rank (Dec 2010): L1 to L3 Regional species of concern from highest to lowest; L4 Urban concern; L5 Secure through region; L+ Non-native

e - Ontario Ministry of Natural Resources (OMNR). 2000. Significant Wildlife Habitat Technical Guide (Appendix G). 151 p plus appendices.

f Ontario Breeding Bird Atlas (OBBA): x – species recorded as breeding within OBBA

g - Likelihood species would be encountered on or within 120 m of the Subject Property: H – High M – Moderate L – Low

Appendix G

Mammals Data

Appendix G

Mammal Habitat Assessment

Common Name	Scientific Name	SRANK[a]	SARA Status[b]	SARO Stauts[c]	Potential for Habitat On Subject Property[d]	Potential for Habitat Within 120 m Of Subject Property[d]
Little Brown Myotis	*Myotis lucifugus*	S3	END	END	L	H
Northern Myotis	*Myotis septentrionalis*	S3	END	END	L	L
Silver-haired Bat	*Lasionycteris noctivagans*	S4			M	H
Tricolored Bat	*Perimyotis subflavus*	S3?	END	END	L	L
Big Brown Bat	*Eptesicus fuscus*	S4			M	H
Eastern Red Bat	*Lasiurus borealis*	S4			L	L
Hoary Bat	*Lasiurus cinereus*	S4			M	H
Eastern Cottontail	*Sylvilagus floridanus*	S5			H	H
European Hare	*Lepus europaeus*	SNA			M	H
Eastern Chipmunk	*Tamias striatus*	S5			H	H
Eastern Gray Squirrel	*Sciurus carolinensis*	S5			H	H
Red Squirrel	*Tamiasciurus hudsonicus*	S5			M	H
Beaver	*Castor canadensis*	S5				L
Deer Mouse	*Peromyscus maniculatus*	S5			H	H
White-footed Mouse	*Peromyscus leucopus*	S5			H	H
Meadow Vole	*Microtus pennsylvanicus*	S5			H	H
Muskrat	*Ondatra zibethicus*	S5				H
Coyote	*Canis latrans*	S5				H
Red Fox	*Vulpes vulpes*	S5				L
Northern Raccoon	*Procyon lotor*	S5			H	H
American Mink	*Neovison vison*	S4				L
Striped Skunk	*Mephitis mephitis*	S5			H	H

Key

a - SRANK (from Natural Heritage Information Centre) for breeding status if: S1 (Critically Imperiled), S2 (Imperiled),S3 (Vulnerable), S4 (Apparently Secure), S5 (Secure) SNA (Not applicable 'because the species is not a suitable target for conservation activities'; includes non-native species)

b - SARA (SARA) as designated by COSEWIC (Committee on the Status of Endangered Wildlife in Canada): END = Endangered, THR = Threatened, SC = Special Concern

c - Species at Risk in Ontario List (as applies to ESA) as designated by COSSARO (Committee on the Status of Species at Risk in Ontario)

END = Endangered, THR = Threatened, SC = Special Concern: END = Endangered, THR = Threatened, SC = Special Concern

d - Likelihood species would be encountered on or within 120 m of the Subject Property: H – High M – Moderate L – Low

Appendix H

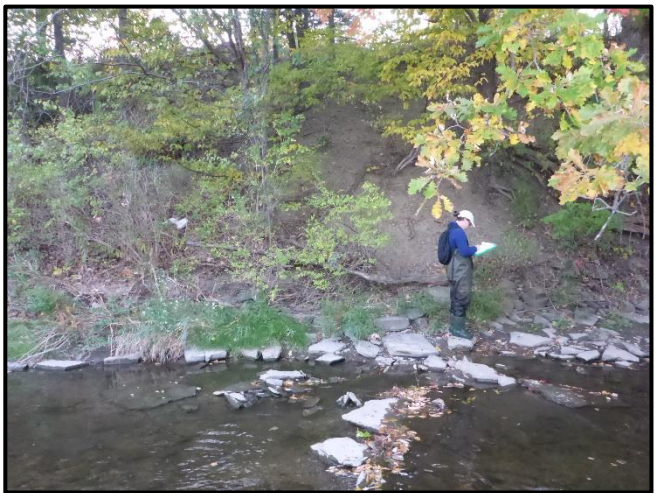
Photo Record

Reach FC-1

Photo 1 (Photo Location 1)
Downstream view of outflanked pedestrian crossing.

Reach FC-1

Photo 2 (Photo Location 2)
Downstream view of point bar formation (left bank) and valley wall contact upstream of subject property (right bank).



Reach FC-1

Photo 3 (Photo Location 3)
North-facing view of valley slope conditions at subject property.

Reach FC-1

Photo 4 (Photo Location 4)
Downstream view of general conditions along reach at subject property.

Reach FC-1

Photo 5 (Photo Location 5)
Upstream view of lateral bar formation.

Reach FC-1

Photo 6 (Photo Location 5)
Downstream view of bank erosion and undercutting along outer meander bend.

Reach FC-1

Photo 7 (Photo Location 6)
Evidence of basal scour (elevated tree roots) along outer bank.

Reach FC-1

Photo 8 (Photo Location 7)
Upstream view of general conditions along riffle section. Note: evidence of basal scour observed along bank (photo left).

Reach FC-1

Photo 9 (Photo Location 8)
Upstream view of general conditions. Note: wood debris within channel

Reach FC-1

Photo 10 (Photo Location 9)
Downstream view of point bar formation (left bank) and valley wall contact (right bank)

Reach FC-2

Photo 11 (Photo Location 10)
Upstream view general conditions from reach break (tributary confluence).

Reach FC-2

Photo 12 (Photo Location 10)
Downstream view of lateral bar formation (left bank) and valley wall contact (right bank).

Reach FC-2

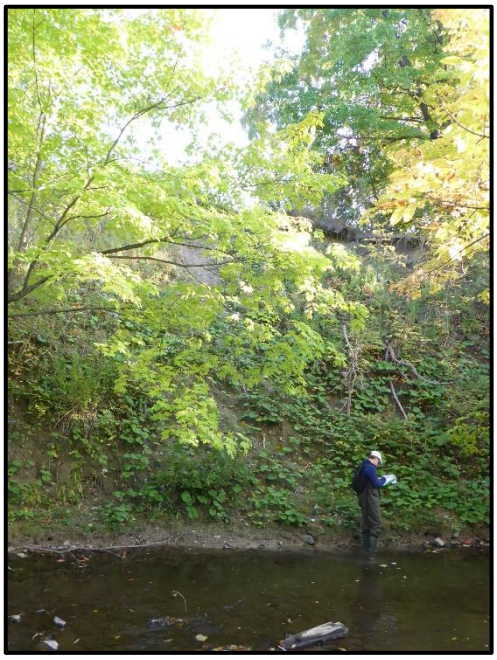
Photo 13 (Photo Location 11)
Upstream view of lateral bar with chute formation (photo right).

Reach FC-2

Photo 14 (Photo Location 12)
Downstream view of trail pedestrian crossing.

Reach FC-2

Photo 15 (Photo Location 13)
Upstream view of lateral bar formation.



Reach FC-2

Photo 16 (Photo Location 14)
Valley wall contact point.

Reach FC-2

Photo 17 (Photo Location 15)
Downstream view of Mavis Road crossing.

Reach FCT-1

Photo 18 (Photo Location 16)
Upstream view of tributary near confluence with Fletchers Creek.

Reach FCT-1

Photo 19
Upstream view of general conditions.

Reach FCT-1

Photo 20 (Photo Location 17)
Upstream view of tributary conditions adjacent to subject property. Note: channel is intermittently defined; presence of instream wood debris.

Reach FCT-1

Photo 21 (Photo Location 18)
Downstream view of general conditions.

Reach FCT-1

Photo 22 (Photo Location 19)
Downstream view of tributary near Amarone Court trail crossing.

Appendix I

Slope Stability Assessment

Soil Engineers Ltd.
CONSULTING ENGINEERS
GEOTECHNICAL • ENVIRONMENTAL • HYDROGEOLOGICAL • BUILDING SCIENCE
100 NUGGET AVENUE, TORONTO, ONTARIO M1S 3A7 • TEL: (416) 754-8515 • FAX: (416) 754-8516

BARRIE	MISSISSAUGA	OSHAWA	NEWMARKET	GRAVENHURST	PETERBOROUGH	HAMILTON
TEL: (705) 721-7863	TEL: (905) 542-7605	TEL: (905) 440-2040	TEL: (905) 853-0647	TEL: (705) 684-4242	TEL: (905) 440-2040	TEL: (905) 777-7956
FAX: (705) 721-7864	FAX: (905) 542-2769	FAX: (905) 725-1315	FAX: (416) 754-8516	FAX: (705) 684-8522	FAX: (905) 725-1315	FAX: (905) 542-2769

January 30, 2017

DiBlasio Homes
6620 Rothschild Trail
Mississauga, Ontario
L5W 0A6

Attention: Mr. Alvaro DiBlasio

Re: Slope Stability Assessment
Proposed Residential Development
6620 Rothschild Trail
City of Mississauga

Dear Sir:

As requested, we have carried out a slope stability assessment at the captioned site to determine the stability of the existing slopes along the east and west property boundaries.

Background

The subject property is located at the end of Rothschild Trail, near Fletchers Creek, in the City of Mississauga. It is irregular in shape and has an area of approximately 9,200 sq. m. The property is currently occupied by a residential house. Fletchers Creek flows along the east side of the property while a tributary of Fletchers Creek flows along the west side of the property. The slopes of concern are located along the east and west property boundaries.

Field Work

Based on the Soil Report dated August 2014 (Reference No. 1406-S151), seven (7) boreholes (Boreholes 1 to 7, inclusive) were advanced to depths of 4.7 to 5.3 m below the existing ground surface. The location of the boreholes are provided on Drawing No. 1.

The boreholes have revealed that beneath a veneer of topsoil fill in some locations, overlying a layer of earth fill, the site is generally underlain by a stratum of silty sand till; strata and lenses of silty clay till, sand and gravel, and silt were found embedded in and/or below the silty sand till at various depths and locations. Shale bedrock was found in Boreholes 4 and 5 at a depth of 4.6± m from the prevailing ground surface. Refusal to augering occurred at depths ranging from 4.9 to 5.3± m at Boreholes 1, 2 and 3, which indicates that boulders and/or bedrock occurred at these depths.

Groundwater was not observed upon completion in the majority of the boreholes. Signs of wetness were observed within the silt in Boreholes 6 and 7 at depths of 4.5 m and 1.5 m below grade, respectively. Groundwater was detected in Borehole 7 at a depth of 4.6± m in the sand and gravel layer.

Visual Inspection

The site inspection indicates that the slopes are well vegetated with shrubs and trees. Bare spots were observed occasionally along the slopes. No sign of sloughing and creep was evident along the slopes at the time of the inspection.

Fletchers Creek is located at the bottom of slope along the east side of the property. Active erosion along the edge of the creek is evident. The tributary at the west side of the property is at least 6 m away from the bottom of the slope and no erosion is evident along the tributary.

The overall height of the east slope is approximately 7± m, with a slope gradient of 1V:1.83± H while the west slope is approximately 3± m high with a slope gradient of 1V:2.4± H.

Modelling

The slope stability analysis was carried out at 2 cross sections (Cross Sections A-A and B-B). The surface profile was interpolated from the contours shown on the topographic maps

provided by the client in 2007 and 2014, and the subsurface soil information was derived from the borehole findings. The locations of the cross-sections are shown on Drawing No. 1. The existing slope details at the cross sections are presented on Drawing Nos. 2A, 2B and 3.

The analysis was carried out using force-moment-equilibrium criteria with the soil strength parameters shown in the following table. Where applicable, the groundwater levels measured in the boreholes were incorporated into the analysis as a phreatic surface.

Strength Parameters For Slope Stability Analysis			
Material Type	**Unit Weight (kN/m^3)**	**Effective Cohesion (kPa)**	**Effective Internal Friction Angle (degrees)**
Earth Fill	20.0	0	26
Silty Sand Till	22.5	3	35
Shale	Infinite Strength		

The results of the analyses are summarized in the table below:

Cross Section	**Existing Slope Gradient**	**Existing FOS**	**Remodeled Slope Gradient**	**Remodeled FOS**
A-A (Local)	1V:1.83H	1.344	1V:2.5H (Earth Fill) 1V:2H (Silty Sand Till) 1V:1.4H (Shale)	1.607
A-A (Global)		1.712		1.880
B-B	1V:2.4H	1.521	-	-

The factor of safety (FOS) for the existing slopes at the cross sections are generally above the Ontario Ministry of Natural Resources (OMNR) and Credit Valley Conservation Authority (CVC) requirement (FOS of 1.5), except Cross Section A-A (Local). The results of the analysis are presented on Drawing Nos. 2A, 2B and 3.

In accordance to the CVC toe erosion allowance requirement, the visual inspection along the creek and the borehole information, a toe erosion allowance of 5.0 m is considered adequate for shale with active erosion at the east slope near Fletchers Creek. Since the tributary along the west slope is located at least 6.0 m away from the bottom of slope, which exceeded the

recommended toe erosion allowance of 4.0 m for silty sand till, it was not necessary to incorporate a toe erosion allowance setback component for the west slope.

The slope at Cross Section A-A is remodeled and re-analyzed for its stability. The resulting FOS of the remodeled slope are 1.607 (Local) and 1.880 (Global), which meets the OMNR and CVC requirements. Therefore, the remodeled slope can be considered as geotechnically stable. The results of the analysis are presented on Drawing Nos. 4A and 4B.

The staked top of bank and the Long Term Stable Slope Line (LTSSL), as determined by incorporating the stability setback and toe erosion allowance, are shown on Drawing No. 1.

A development setback buffer for man-made and environmental degradation based on the CVC policy will be required. This is subject to the discretion of CVC.

In future development, should any alteration be carried out in the slope area, the slope should either be restored to its original or better than its original condition. For future site grading, all of the proposed slope should maintain a gradient of 1V:3H or flatter for stability. Any slope steeper than the mentioned gradient will require further stability analysis and it may require to be constructed as a reinforced earth slope.

In order to prevent disturbance of the existing stable slope and to enhance the stability of the bank for the proposed project, the following geotechnical constraints should be stipulated:

1. The prevailing vegetative cover must be maintained, since its extraction would deprive the bank of the rooting system that is reinforcement against soil erosion by weathering. If for any reason the vegetation cover is stripped, it must be reinstated to its original, or better than its original, protective condition.
2. The leafy topsoil cover on the bank face should not be disturbed, since this provides an insulation and screen against frost wedging and rainwash erosion.
3. Grading of the land adjacent to the bank must be such that concentrated runoff is not allowed to drain onto the bank face. Landscaping features which may cause runoff to

pond at the top of the bank, as well as saturation of the crown of the bank must not be permitted.

4. Where the construction is carried out near the top of the bank, stripping of topsoil or vegetation and dumping of loose fill over the bank must be prohibited.

In case of any removal of vegetation during the course of construction, restoration with selective native plantings, including deep rooting systems which would penetrate the original topsoil, shall be carried out after the development to ensure slope stability.

Provided that all the above recommendations are followed, the proposed development at the tableland should not have any adverse effect on the stability of the slope.

The above recommendations should be reviewed and are subject to the approval of CVC.

We trust the above satisfies your present requirements. Should you have any further queries, please feel free to contact this office.

Yours truly,

SOIL ENGINEERS LTD.

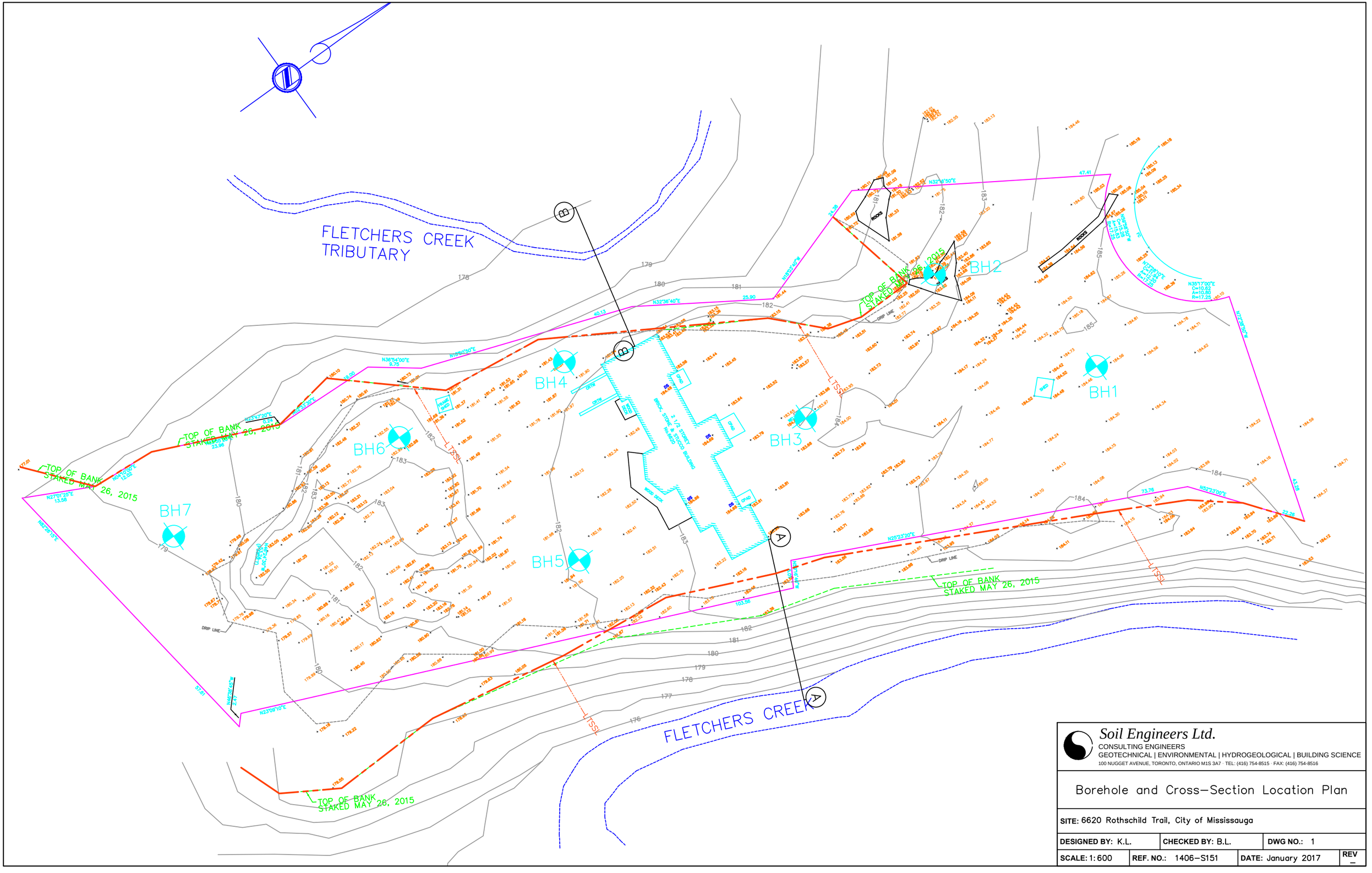
LICENSED PROFESSIONAL ENGINEER
Jan 30, 2017
B. P. Y. LEE
100104568
PROVINCE OF ONTARIO

Kin Fung Li, B.Eng.
KFL/BL:dd

Bernard Lee, P.Eng.

ENCLOSURES

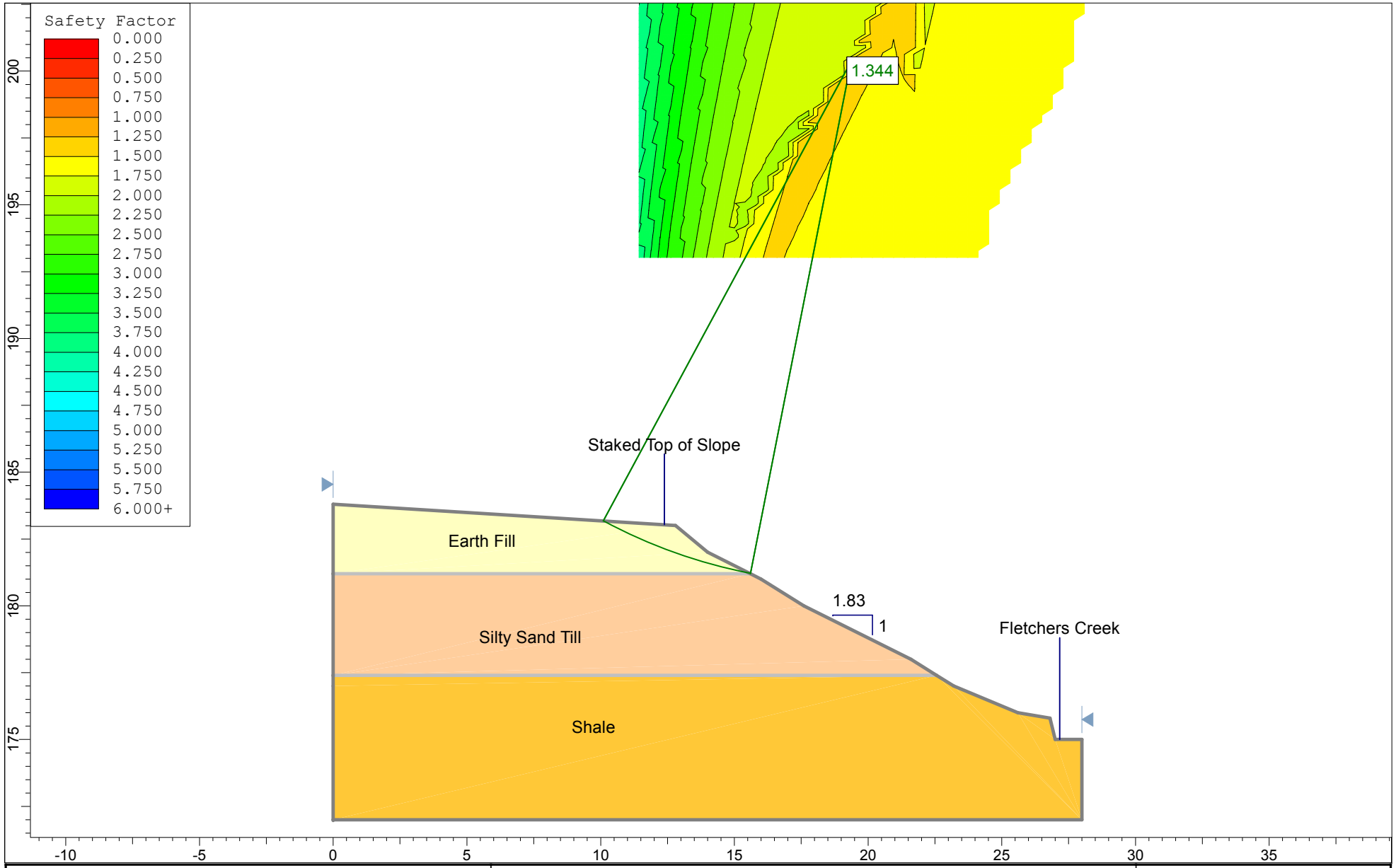
Borehole and Cross-Section Location Plan.....	Drawing No. 1
Cross-Sections A-A and B-B (Existing Condition)	Drawing Nos. 2A, 2B and 3
Cross-Section A-A (Geotechnically Stable Condition).....	Drawing Nos. 4A and 4B



Soil Engineers Ltd.
CONSULTING ENGINEERS
GEOTECHNICAL | ENVIRONMENTAL | HYDROGEOLOGICAL | BUILDING SCIENCE
100 NUGGET AVENUE, TORONTO, ONTARIO M1S 3A7 · TEL: (416) 754-8515 · FAX: (416) 754-8516

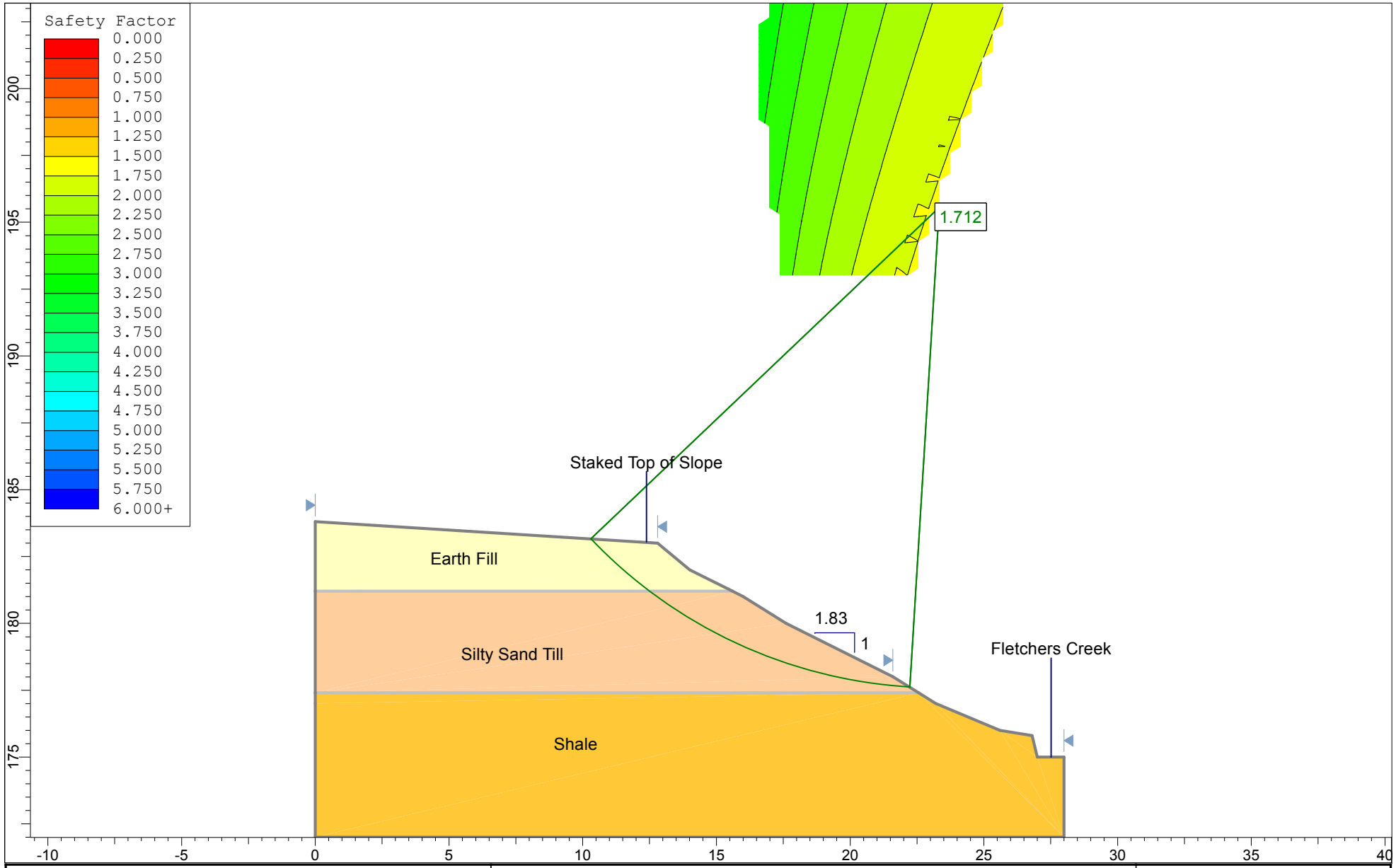
Borehole and Cross–Section Location Plan

SITE: 6620 Rothschild Trail, City of Mississauga			
DESIGNED BY: K.L.	**CHECKED BY:** B.L.	**DWG NO.:** 1	
SCALE: 1:600	**REF. NO.:** 1406–S151	**DATE:** January 2017	**REV** –



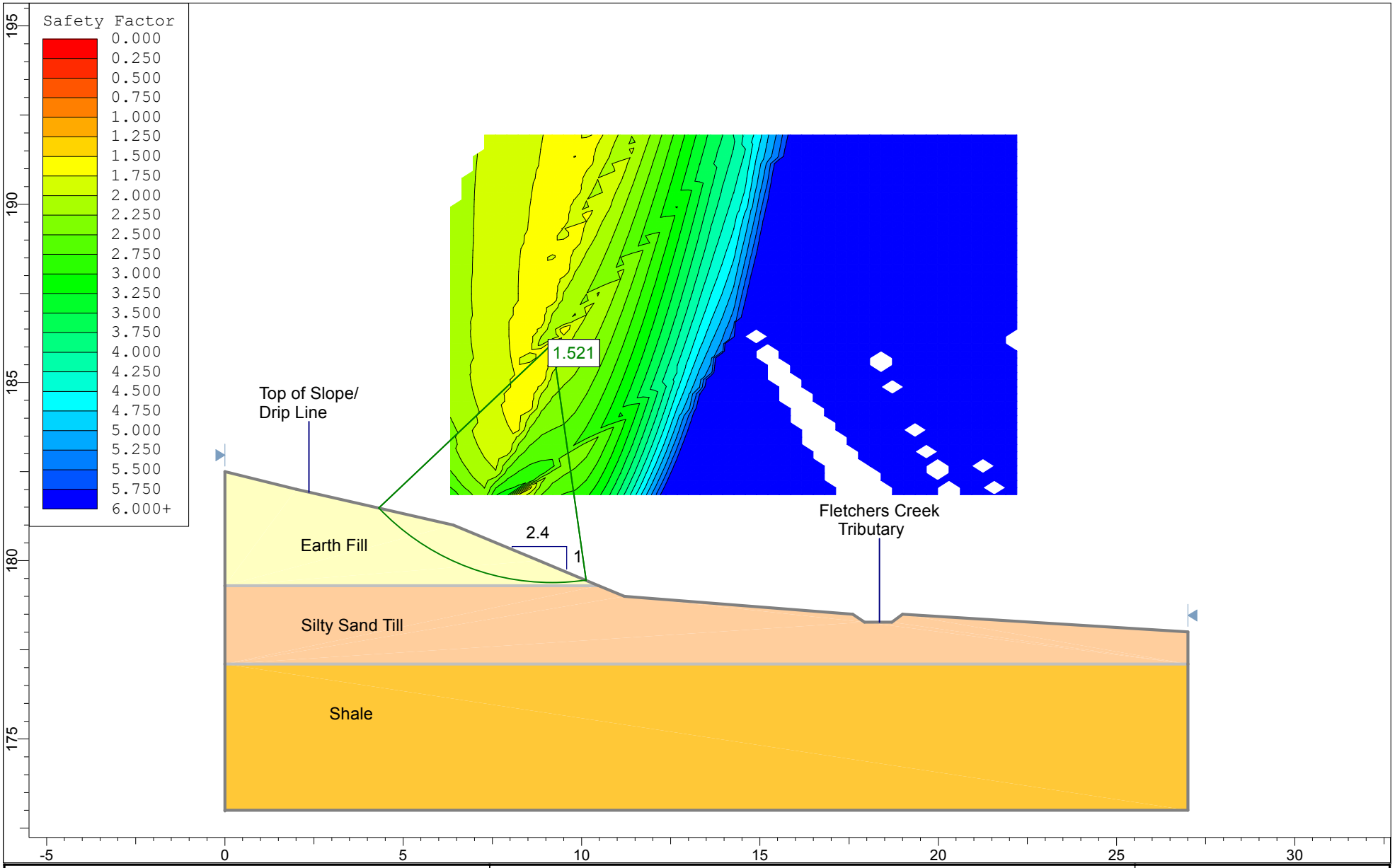
Soil Engineers Ltd.
CONSULTING ENGINEERS
GEOTECHNICAL | ENVIRONMENTAL | HYDROGEOLOGICAL | BUILDING SCIENCE
100 NUGGET AVENUE, TORONTO, ONTARIO M1S 3A7 · TEL: (416) 754-8515 · FAX: (416) 754-8516

Project Title: Slope Stability Assessment			Load Case: Cross-Section A-A (Local) (Existing Condition)
Location: 6620 Rothschild Trail, City of Missisauga			
Drawn By: K.L.	Checked By: B.L.	Scale: 1:200	Revision: -
Date: January 2017		Reference No.: 1406-S151	Drawing No.: 2A



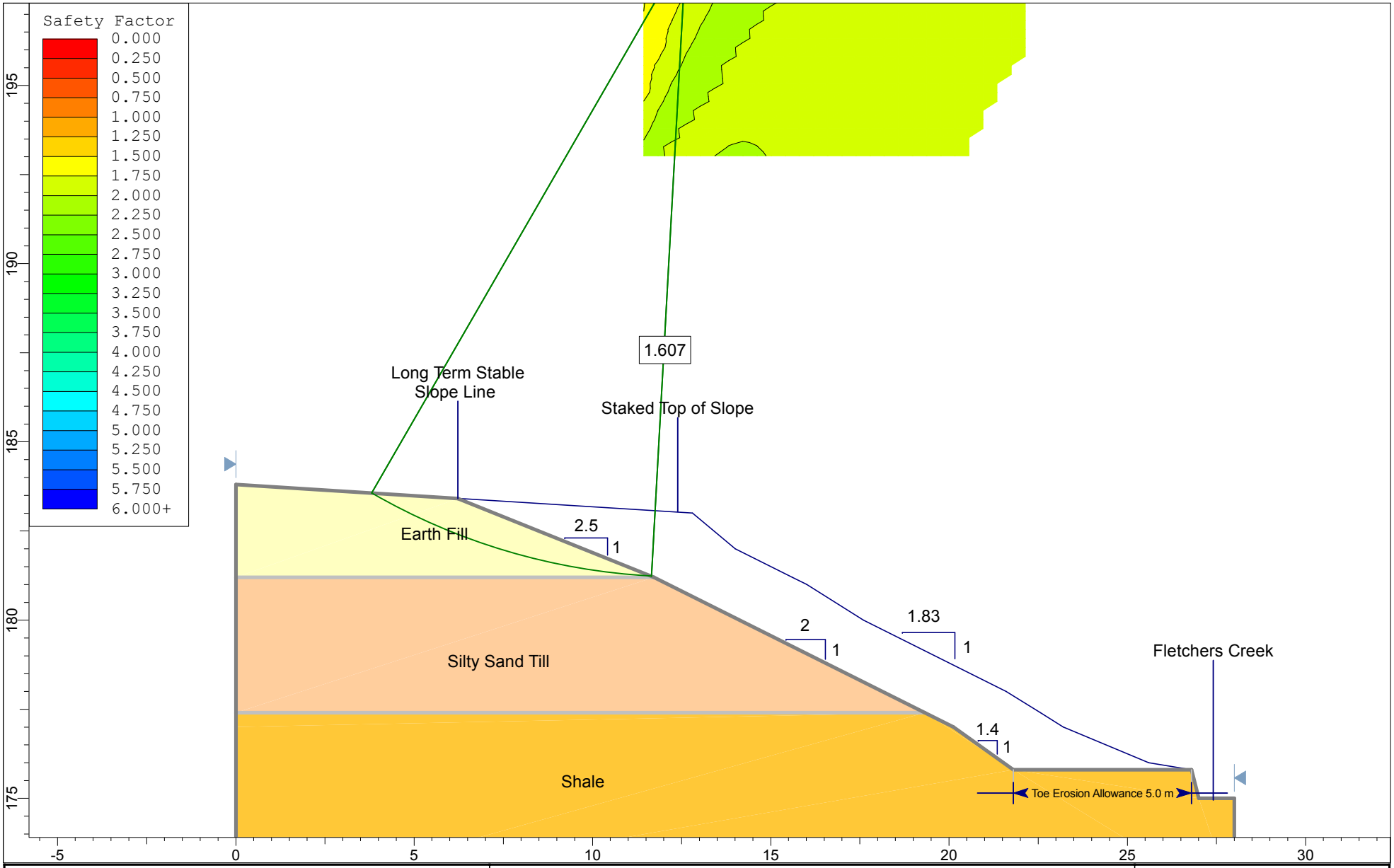
Soil Engineers Ltd.
CONSULTING ENGINEERS
GEOTECHNICAL | ENVIRONMENTAL | HYDROGEOLOGICAL | BUILDING SCIENCE
100 NUGGET AVENUE, TORONTO, ONTARIO M1S 3A7 · TEL: (416) 754-8515 · FAX: (416) 754-8516

Project Title: Slope Stability Assessment			Load Case: Cross-Section A-A (Global) (Existing Condition)
Location: 6620 Rothschild Trail, City of Missisauga			
Drawn By: K.L.	Checked By: B.L.	Scale: 1:200	Revision: -
Date: January 2017		Reference No.: 1406-S151	Drawing No.: 2B



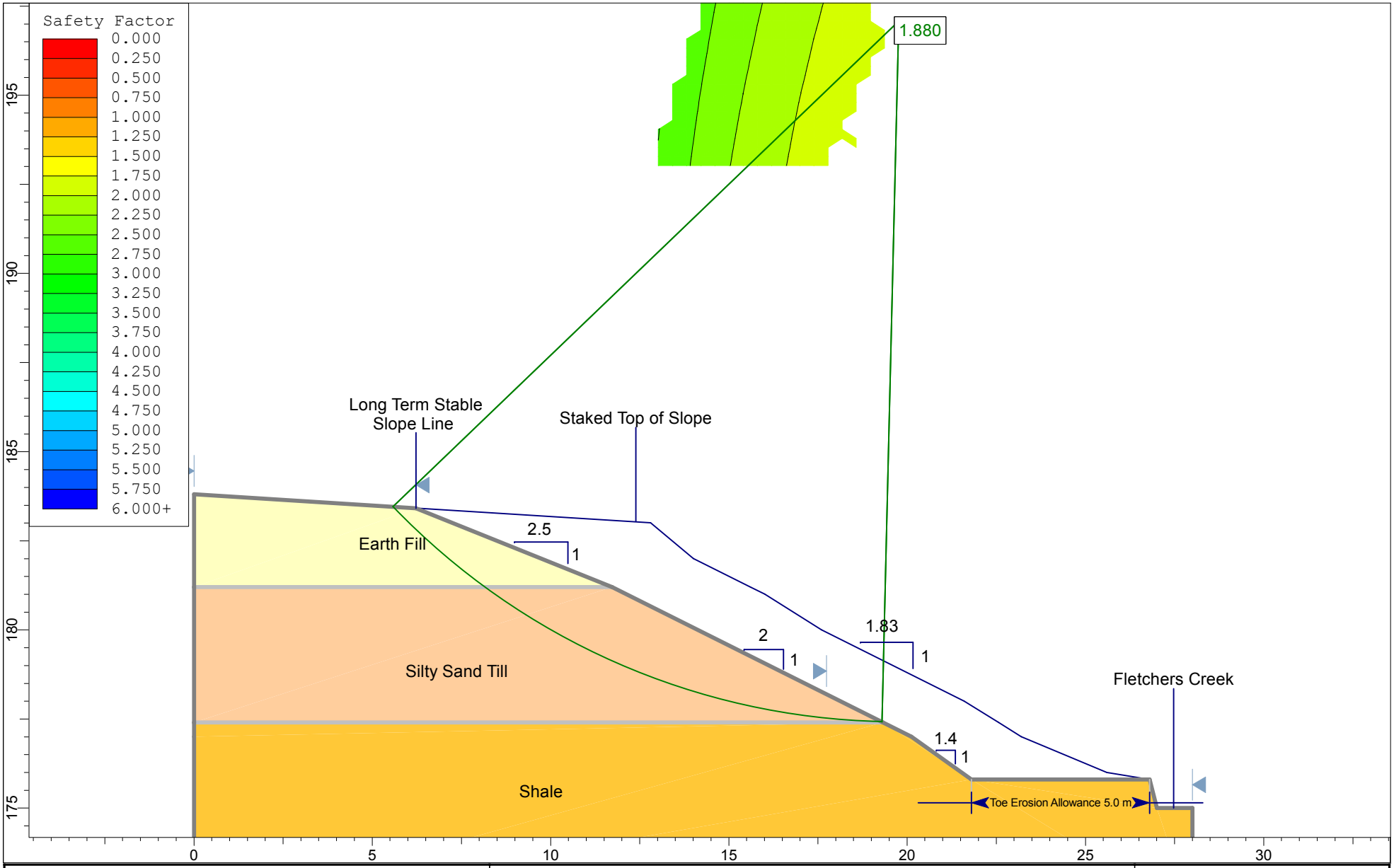
Soil Engineers Ltd.
CONSULTING ENGINEERS
GEOTECHNICAL | ENVIRONMENTAL | HYDROGEOLOGICAL | BUILDING SCIENCE
100 NUGGET AVENUE, TORONTO, ONTARIO M1S 3A7 · TEL: (416) 754-8515 · FAX: (416) 754-8516

Project Title: Slope Stability Assessment			Load Case: Cross-Section B-B
Location: 6620 Rothschild Trail, City of Missisauga			
Drawn By: K.L.	Checked By: B.L.	Scale: 1:150	Revision: -
Date: January 2017		Reference No.: 1406-S151	Drawing No.: 3



Soil Engineers Ltd.
CONSULTING ENGINEERS
GEOTECHNICAL | ENVIRONMENTAL | HYDROGEOLOGICAL | BUILDING SCIENCE
100 NUGGET AVENUE, TORONTO, ONTARIO M1S 3A7 · TEL: (416) 754-8515 · FAX: (416) 754-8516

Project Title: Slope Stability Assessment			Load Case: Cross-Section A-A (Local) (Geotechnically Stable Condition)
Location: 6620 Rothschild Trail, City of Missisauga			
Drawn By: K.L.	Checked By: B.L.	Scale: 1:150	Revision: -
Date: January 2017		Reference No.: 1406-S151	Drawing No.: 4A



Soil Engineers Ltd.
CONSULTING ENGINEERS
GEOTECHNICAL | ENVIRONMENTAL | HYDROGEOLOGICAL | BUILDING SCIENCE
100 NUGGET AVENUE, TORONTO, ONTARIO M1S 3A7 · TEL: (416) 754-8515 · FAX: (416) 754-8516

Project Title: Slope Stability Assessment			Load Case: Cross-Section A-A (Global) (Geotechnically Stable Condition)
Location: 6620 Rothschild Trail, City of Missisauga			
Drawn By: K.L.	Checked By: B.L.	Scale: 1:150	Revision: -
Date: January 2017		Reference No.: 1406-S151	Drawing No.: 4B

Appendix J

Functional Servicing Report

FUNCTIONAL SERVICING REPORT
PROPOSED RESIDENTIAL DEVELOPMENT
SIXTY SIX TWENTY
DI BLASIO HOMES
6620 ROTHSCHILD TRAIL
CITY OF MISSISSAUGA
REGIONAL MUNICIPALITY OF PEEL

Prepared By: SKIRA & ASSOCIATES LTD.
3464 Semenyk Court, Suite 100
Mississauga, Ontario
L5C 4P8

Telephone: (905) 275-5100
Fax: (905) 270-1936
Email: info@skiraconsult.ca

Our File No: 218-M14
Dated: July, 2018

EXECUTIVE SUMMARY

This Functional Servicing Report (FSR) has been prepared on behalf of Di Blasio Homes in support of a Re-Zoning application to facilitate a proposed infill residential development. This FSR presents a site servicing strategy for the proposed development that addresses the requirements of the applicable regulatory agencies and provides the basis for detailed servicing design. The servicing strategy for the proposed development is summarized as follows:

Transportation System

The proposed development will be efficiently serviced by Rothschild Trail, McLaughlin Road, Derry Road West and Courtneypark Drive West.

Water Servicing

The proposed development is to be serviced by a **200mm diameter** connection to the existing 200mm diameter PVC watermain located on the west side of Rothschild Trail. The water demand requirement for Maximum Day Demand plus Fire Flow is **8,019.78 L/min (133.663 l/s)**.

Sanitary Servicing

The proposed development is to be serviced by a new **200mm diameter** connection to the existing 250mm sanitary sewer located on an easement that traverses the property. The peak sanitary design flow of the proposed development is **2.21 l/s (0.00221 m^3/s)**.

Stormwater Servicing

Presently, the runoff from the site drains sheet flow in a northerly, westerly and southerly direction towards Fletcher's Creek and its tributary.

The proposed development will discharge the runoff into the existing Fletcher's Creek Tributary.

All foundation drains proposed for lower level parking including the ramp's storm trough will require sump pumps fitted with backwater valves and will be connected to on site storm sewer **(see Dwg. No. 218-M14)**.

The City of Mississauga and CVC standards identify the objectives for runoff from new development sites including water quantity, water quality and water balance.

Quantity

Quantity control will be provided for the proposed development as illustrated in Section 6.1.1 – Quantity Control, that is a sub-section of 6.1 – Stormwater Management.

Quality

Quality control was implemented for the site by providing an oil/grit separator **Type STC 300** manufactured by Stormceptor. The proposed unit is capable of treating **0.0141 m^3/s (1.41 l/s)** with **84%** TSS removal as illustrated in Section 6.1.2 – Quality Control.

Water Balance

A water balance of **23.03 m^3** is required and will be retained to be used for infiltration back into the ground as illustrated in Section 6.1.3 – Water Balance.

TABLE OF CONTENTS

		PAGE NO.
1.0	INTRODUCTION	1
2.0	STUDY AREA INFORMATION	2
3.0	TRANSPORTATION SYSTEM	3
4.0	WATER DISTRIBUTION SYSTEM	4
5.0	SANITARY DRAINAGE SYSTEM	5
6.0	STORM DRAINAGE SYSTEM	6
7.0	CONCULSIONS	13

LIST OF FIGURES

Figure/Drawing No.	1	-	KEY PLAN
	218-M14	-	SITE GRADING & SERVICING PLAN (back pocket)

APPENDICES

APPENDIX A	-	ORIFICE RESTRICTOR PLATE Computer Output
APPENDIX B	-	FIRE FLOW CALCULATIONS
APPENDIX C	-	STORMCEPTOR OIL/GRIT SEPARATOR Computer Output

1.0 INTRODUCTION

Skira & Associates Ltd. has been retained by Di Blasio Homes to investigate and prepare a Functional Servicing Report (FSR) to facilitate the proposed infill residential development. It is proposed to facilitate the construction of a residential four (4) storey apartment building.

The proposed development is located on Rothschild Trail in the City of Mississauga. **(See Figure No. 1)**.

It is intended that this FSR will assist in the assessment and review of the re-zoning application and later to guide the detailed design of the proposed redevelopment. The proposed design criteria is intended to meet the requirements of the City of Mississauga and any other relevant authorities.

2.0 STUDY AREA INFORMATION

The subject property is situated on Part of Lot 21 & 22, Registered Plan 43M-1710

The approximately 0.9287 hectare site is located on the end of Rothschild Trail. Presently, the area proposed for development is identified as 6620 Rothschild Trail. A 2 ½ storey brick, stone and stucco building is located on the property and is proposed for demolition. The subject site is bounded by Fletcher's Creek to the south and by a Fletcher's Creek Tributary to the north.

3.0 TRANSPORTATION SYSTEM

The site is in a good location being serviced by existing Rothschild Trail and McLaughlin Road running north-south. The existing nearby road system will provide a good access to Derry Road West and Courtneypark Drive West.

The proposed access to the site will be via a proposed 7.00m wide driveway connecting to Rothschild Trail.

4.0 WATER DISTRIBUTION SYSTEM

The proposed development is to be serviced by a **200mm diameter** connection to the existing 200mm diameter PVC watermain located on the west side of Rothschild Trail. The **200mm diameter** watermain connection will provide water supply for the fire protection and domestic usage **(see Dwg. No. 218-M14)**. The water demand requirement for Maximum Day Demand plus Fire Flow is **8,019.78 L/min (133.663 l/s)**.

Maximum Day Demand Calculation
Average Day Demand – 191 L/capita/day (0.00221 L/cap/s)

Unit Type	Population Density
2 Bedroom plus Den Apartment	2.1 persons/unit

Building	Building Data (units)	Population (persons)	Average Day Flow (l/s)	Peak Hour, AD x PH[1] (l/s)	Max. Day AD x MD[2] (l/s)
2 Bedroom	43	90.3	0.200	0.496	0.330
TOTAL:		**90.3**	**0.200**	**0.496**	**0.330**

[1] Peak Hour Factor, PH, is 2.48 for residential and 1.20 for commercial
[2] Max Day Factor, MD, is 1.65 for residential and 1.10 for commercial

Maximum Day Demand = **19.80 L/min (0.330 l/s)**

Fire Flow = **8,000 L/min (133.333 L/s)** – see calculation in **Appendix "B"**

Total Water Demand = (Max. Day Demand + Fire Flow)

0.330 + 133.333 = **133.663 L/s (8,019.78) L/min)**

5.0 SANITARY DRAINAGE SYSTEM

The proposed development is to be serviced by a new **200mm** diameter sanitary connection **(see Dwg. No. 218-M14)**. The new gravity connection will service the entire building and will discharge the sewage into the existing 250mm diameter sewer located on an easement that traverses the property.

5.1 Sanitary Flow Calculations

Types of units breakdown:

- Two bedrooms plus den - 43

Persons per unit:

- Two bedrooms plus den - 2.1 persons/unit

Population:

- 43 units x 2.1 = 90.3 Say **91**

Average Waste Water Flow = 450 l/cap/day

Average Daily Flow = 450 l/cap/day x 91 persons = 40,950 l/day

Average Flow = 40,950/24hr/3600s = **0.474l/s**

Peak Factor $= 1 + \frac{14}{4 + P^{0.5}}$

Where, P = population in thousands

$= 1 + \frac{14}{4 + 0.091^{0.5}}$

$= 1 + \frac{14}{4 + 0.302}$

$= 1 + \frac{14}{4.302}$

$= 1 + 3.254 =$ **4.254**

Infiltration Allowance (Sub-Area "B" = 0.7466 ha)

Infiltration = 0.26 l/s/ha

= 0.26 x 0.7466 ha = **0.194 l/s**

Design Flow = average flow x peaking factor + infiltration allowance

= 0.474 x 4.254 + 0.194

= **2.21 l/s (0.00221 m³/s)**

6.0 STORM DRAINAGE SYSTEM

The purpose of this section is to provide a suitable storm drainage solution for the proposed development area in order to comply with the City of Mississauga and CVC requirements.

Presently, the runoff from the site drains sheet flow in a northerly, westerly and southerly direction toward Fletcher's Creek and its tributary.

The proposed development will discharge the runoff into existing Fletcher's Creek Tributary.

All foundation drains proposed for lower level parking including the ramp's frough will require sump pumps fitted with lock water valves and will be connected to on sites storm sewer **(see Dwg. No. 218-M14)**.

6.1 STORMWATER MANAGEMENT

6.1.1 QUANTITY CONTROL

The on-site stormwater management plan that applies to the proposed development is as follows:

- The on-site stormwater management will ensure that the **100-year** storm event post-development flows will not exceed the pre-development release rates of the **2 year** storm event under the existing site conditions.
- Maximum required storage volumes for the site was arrived at using the Modified Rational Method.

6.1.1.1 Existing Site Conditions

Total Site Area = 0.9287 Ha

Total Roof Area = 0.0372 Ha

Paved/Concrete Area = 0.0640 Ha

Landscaped Area = 0.8275 Ha

Weighted C = 0.25 x 0.8275/0.9287 + 0.90 x 0.1012/0.9287

= 0.223 + 0.098

= **0.321**

Site Imperviousness = 0.1012 / 0.9287 = **10.9%**

The site runoff developed by a **2 year** storm event is as follows:

A	= 0.9287 Ha	Q = CIA / 360	
C	= 0.321		
T_c	= 15.00 min	Q_{2yr}	= 0.321 x 59.89 x 0.9287/360
I_{2yr}	= 59.89 mm/hr	Q_{2yr}	= **0.0496 m³/s**

6.1.1.2 Post-Development Conditions

Total Site Area	= 0.9287 Ha
Total Roof Area	= 0.1939 Ha
Total Paved/Concrete Area	= 0.1480 Ha
Total Landscaped Area	= 0.5868 Ha

Maximum allowable discharge from entire site shall be as follows:

$Q_{2yrallow}$ = **0.0496 m³/s**

The post-development drainage area was divided into **two (2) Sub-Areas ("A" and "B")** that reflect the applied stormwater management concept for the property.

Sub-Area "A" – 0.1821 Ha (West Part Undeveloped)

Site Area	= 0.1821 Ha
Landscaped Area	= 0.1821 Ha

The site runoff developed by a **2-year** storm event is as follows:

T_c	= 15.00 min	Q	= CIA/360
I_{2yr}	= 59.89 mm/hr	Q_{2yr}	= 0.25 x 59.89 x 0.1821 / 360 = **0.0076 m³/s**
C	= 0.25		

Sub-Area "B" – 0.7466 Ha (East Part Re-Development)

Site Area	= 0.7466 Ha
Roof Area	= 0.1939 Ha
Paved / Concrete Area	= 0.1480 Ha
Landscaped Area	= 0.4047 Ha

Weighted C = 0.25 x 0.4047 / 0.7466 + 0.90 x 0.3419 / 0.7466

= 0.136 + 0.412

= **0.548**

The maximum allowable discharge from this sub-area shall be as follows:

Q_{2yr} = 0.0496 – 0.0076 (Sub-Area "A") = **0.0420 m³/s (42.0 l/s)**

A portion of the site comprising of landscaping area along the south and north property lines will be allowed to drain uncontrolled towards Fletcher's Creek.

Uncontrolled Drainage Area

Site Area = 0.2860 Ha

Landscaped Area = 0.2860 Ha

A = 0.2860 Ha

C = 0.25

T_c = 15.00 min

I_{100yr} = 140.69 mm/hr

Q = CIA / 360

Q_{100yr} = 0.25 x 140.69 x 0.2860 / 360

Q_{100yr} = **0.0279 m³/s**

Controlled Drainage Area

Site Area = 0.4606 Ha

Roof Area = 0.1939 Ha

Paved/Concrete Area = 0.1480 Ha

Landscaped Area = 0.1187 Ha

Imperviousness = 0.3419 / 0.4606 = **74.2%**

The maximum allowable discharge from this area shall be as follows:

Q_{2yr} = 0.0420 – 0.0279 (uncontrolled 100-yr) = **0.0141 m³/s (14.1 l/s)**

The building roof will be provided with controlled roof drains that will limit the runoff discharge to **35.0 l/s/ha (0.035 m³/s/ha)** of roof area.

Controlled Roof Area = 0.1939 Ha

Controlled Roof Discharge will be as follows:

0.1939 Ha x 0.035 m³/s/Ha = **0.0068 m³/s (6.80 l/s)**

YEAR
STORM
100
CITY
Mississauga

C = 0.900
A (ha) = 0.19390
Allow. Discharge Qa (m3/s) = 0.006800
Safety Factor Sf = 0%

Max. Required Detention (m3) = ***73.90***

RAINFALL DURATION *Tc (min)*	**RAINFALL INTENSITY** *I (mm/hr)*	**TOTAL UNCONTROLLED RUNOFF** *Q=CIA/360 (m3/sec)*	**INFLOW VOLUME** Vi (m3)	**OUTFLOW VOLUME** Vo (m3)	**REQUIRED DETENTION VOLUME (m3)** *D=(Vi-Vo)*Sf*
15	140.69	0.0682	61.38	6.08	55.44
20	118.12	0.0573	68.71	8.08	60.78
25	102.41	0.0496	74.47	10.08	64.54
30	90.77	0.0440	79.21	12.09	67.29
35	81.77	0.0396	83.24	14.09	69.32
40	74.58	0.0362	86.77	16.10	70.84
45	68.68	0.0333	89.89	18.11	71.97
50	63.75	0.0309	92.71	20.11	72.78
55	59.56	0.0289	95.28	22.12	73.34
60	55.95	0.0271	97.64	24.13	73.70
65	52.81	0.0256	99.83	26.14	73.87
70	50.03	0.0243	101.87	28.15	**73.90**
75	47.58	0.0231	103.78	30.16	73.80
80	45.38	0.0220	105.58	32.17	73.59
85	43.39	0.0210	107.28	34.18	73.28
90	41.60	0.0202	108.90	36.19	72.88

Maximum Volume if detained temporarily on roof top represents water ponding depth of
73.90 m³ / 1939.0 m² = 0.038m (3.8cm)

The flat roof is to be equipped with Zurn Control – Flo Roof Drains

Maximum flow per 1 weir = 5.00 US GPM per 1 inch of head of water or
0.124 l/s per 1cm head of water

0.124 l/s/cm x 3.8cm = 0.471 l/s

Maximum discharge = 0.0068 m³/sec (6.8 l/s)

Number of weirs = 6.8 / 0.471 = 14.44 **say 15 weirs**

Number of roof drains: 3 drains with 5 weirs each

Controlled Roof Discharge = 15 x 0.471 = **7.1 l/s (0.0071 m³/s)**

Therefore, maximum allowable discharge from the remaining controlled area of the site (0.2667 ha) is as follows:

Q_{2yr} = 0.0141 – 0.0071 (controlled roof)

= **0.0070 m³/s (7.0 l/s)**

The runoff discharge from this area will be regulated by an orifice restrictor plate installed over the outlet pipe at the **CBMH-1** located just upstream the proposed oil/grit separator. The size of the orifice restrictor plate is **75mm diameter** with a **100 year** water ponding of **182.98 m**.

Orifice Restrictor Plate Discharge = **0.0141 m³/s (14.1 l/s) – See Appendix A**

Controlled Site Area = 0.2667 Ha

Paved/Concrete Area = 0.1480 Ha

Landscaped Area = 0.1187 Ha

Weighted C = 0.25 x 0.1187 / 0.2667 + 0.90 x 0.1480 / 0.2667

= 0.111 + 0.499

= 0.61

Imperviousness = 0.1480/0.2667 = **55.5%**

YEAR
STORM
100
CITY
Mississauga

C = **0.610**
A (ha) = **0.26670**
Allow. Discharge Qa (m3/s) = **0.007000**
Safety Factor Sf = **0%**

Max. Required Detention (m3) = ***66.39***

RAINFALL DURATION *Tc (min)*	**RAINFALL INTENSITY** *I (mm/hr)*	**TOTAL UNCONTROLLED RUNOFF** *Q=CIA/360 (m3/sec)*	**INFLOW VOLUME** Vi (m3)	**OUTFLOW VOLUME** Vo (m3)	**REQUIRED DETENTION VOLUME (m3)** *D=(Vi-Vo)*Sf*
15	140.69	0.0636	57.22	6.25	51.10
20	118.12	0.0534	64.06	8.31	55.89
25	102.41	0.0463	69.42	10.37	59.20
30	90.77	0.0410	73.84	12.43	61.57
35	81.77	0.0370	77.60	14.49	63.27
40	74.58	0.0337	80.89	16.55	64.50
45	68.68	0.0310	83.80	18.61	65.36
50	63.75	0.0288	86.43	20.67	65.92
55	59.56	0.0269	88.83	22.74	66.25
60	55.95	0.0253	91.03	24.80	**66.39**
65	52.81	0.0239	93.07	26.87	66.36
70	50.03	0.0226	94.97	28.93	66.20
75	47.58	0.0215	96.75	31.00	65.91
80	45.38	0.0205	98.43	33.07	65.52
85	43.39	0.0196	100.01	35.13	65.04
90	41.60	0.0188	101.52	37.20	64.48

Maximum storage required = **66.39 m³/s**

The required detention volumes will be provided inside the underground storm system and are as follows:

MANHOLE OR CATCHBASIN No.	MANHOLE OR CATCHBASIN TOP ELEVATION (m)	100YR PONDING ELEVATION (m)	100YR STORAGE AVAILABLE (m^3)	100YR STORAGE REQUIRED (m^3)
CBMH-1	183.75	182.98	1.75	
CB-2	184.15	182.98	0.25	
Cultec V8HD Chamber			67.40	
		TOTAL:	**69.40**	**66.39**

The total available storage volume of **69.40 m^3** satisfies the storage requirements.

The maximum allowable runoff release rate of **0.0141 m^3/s** will be achieved by the means of an orifice restrictor plate installed over the outlet pipe at the new **CBMH-1**. The size of the orifice restrictor plate is **75mm diameter. (See Dwg. No. 218-M14.)**

The orifice discharge rate was calculated by using FlowMaster computer program, developed by Haestad Methods Inc. (USA) and an output report is attached in **Appendix "A"**.

6.1.2 QUALITY CONTROL

Acceptable methods for stormwater treatment vary with size of the development, soil types and nature of proposed land use. All these must be balanced with the physical constrains imposed by the development site.

Taking in consideration of the size of the controlled drainage area of the site **(0.4606 ha)**, we have reviewed and selected the most suitable stormwater management practices (SWMP) to treat the stormwater runoff before it is released towards Fletcher's Creek.

Oil/Grit Separators (OGS)

Normally, these facilities operate based on the principle of sedimentation of the grit and phase separation of the oil. They are suitable for residential/institutional/commercial/industrial areas.

The stormwater runoff from the asphalt area will be intercepted and conveyed through the OGS prior to being discharged into the existing Fletcher's Creek Tributary.

The proposed oil/grit separator is **Type STC 300** manufactured by Stormceptor. The proposed unit is capable of treating **0.0141 m3/s (1.41 l/s)** with **84%** TSS removal.

Attached to this report is an output file created by Stormceptor software **(see attached Appendix "C")**.

The design principles for this type of separator (manhole type) are as follows: Low flows enter a lower chamber where sedimentation and oil separation can occur. High flows will bypass the low chamber, flowing through the upper chamber directly to the outlet pipe.

6.1.3 WATER BALANCE

The Credit Valley Conservation stormwater management plan contains a water balance target/criteria that requires the site to retain a **5mm** rainfall and allow it to evaporate, infiltrate back into the ground or re-use it for irrigation purposes.

The required volume is as follows:

Sub-Area "B" = 0.4606 hectares (landscaped area of uncontrolled drainage area is not included)

V_{5mm} = 4606.0 m² x 0.005m = **23.03 m³**

The Cultec Recharger V8HD System will provide means of storage and infiltration for area. The required infiltration volume will be stored within the stone base of the Cultec System.

Volume stored equals to:

12.61m x 5.49m x 0.40m = 27.69 m³
12.61m x 7.17m x 0.40m = 36.17 m³

Total = 63.86 m³

63.86 x 0.40 (porosity) = **25.54 m³**

Soil Engineers Ltd. has prepared in August 2014 a "Soil Investigation Report for 6620 Rothschild Trail". The native soil was found to be sandy silt, fill and silty sand, till.

The recommended percolation time (T) was T = 45 min/cm with percolation rate (P) of P = 0.0133m/hr (13.3mm/hr).

The expected time of percolation using area of contact and discharge rate was calculated using the following equation:

$t = V / P \times n \times A$

Where, t = time of percolation (hr)
V = volume to infiltrate (m³)
P = percolation rate (mm/hr)
n = porosity of storage media
A = area of contact (m²)

$$t = \frac{25.54}{0.0133 \times 0.40 \times 159.64}$$

= **30.07 hrs**

The report also found that no ground water was encountered at the depth of 5.0m below existing grade at the end of boreholes.

In addition to the Cultec Recharger System, the parking lot is designed to have Pervious Stable Surface to enhance water absorption levels on site by promoting infiltration.

The clear crushed stone below Eco-Priora or Ecolock by Unilock paving (A = 240.0 m²; depth = 0.45m) will provide the storage medium layer. Maximum volume provided is approximately **43.2m³**.

V = 240.0 x 0.45 x 0.40 (porosity) = **43.2m³**

The expected time of percolation using area of contact of 240.0m² is as follows:

$$t = \frac{43.2}{0.0133 \times 0.40 \times 240.0}$$

= **33.83 hrs**

7.0 CONCLUSIONS

Based on our investigation of available information, technical analysis and design calculations we found that the proposed development can be fully serviced to the existing services on Rothschild Trail, sanitary sewer on easement and storm discharge to Fletcher's Creek.

The findings and recommendations were prepared in accordance with accepted professional engineering practices and principles. Based on the above, the proposed development can be adequately serviced in accordance with the City of Mississauga and CVC standards.

The following summarizes the foregoing analysis:

Transportation System

The proposed development will be efficiently serviced by Rothschild Trail, McLaughlin Road, Derry Road West and Courtneypark Drive West.

Water Servicing

The proposed development is to be serviced by a **200mm diameter** connection to the existing 200mm diameter PVC watermain located on the west side of Rothschild Trail. The water demand requirement for Maximum Day Demand plus Fire Flow is **8,019.78 L/min (133.663 l/s)**.

Sanitary Servicing

The proposed development is to be serviced by a new **200mm diameter** connection to the existing 250mm sanitary sewer located on an easement that traverses the property. The peak sanitary design flow of the proposed development is **2.21 l/s (0.00221m³/s)**.

Stormwater Servicing

Presently, the runoff from the site drains sheet flow in a northerly, westerly and southerly direction towards Fletcher's Creek and its tributary.

The proposed development will discharge the runoff into the existing Fletcher's Creek Tributary.

All foundation drains proposed for lower level parking including the ramp's storm trough will require sump pumps fitted with backwater valves and will be connected to on site storm sewer **(see Dwg. No. 218-M14)**.

The City of Mississauga and CVC standards identify the objectives for runoff from new development sites including water quantity, water quality and water balance.

Quantity

Quantity control will be provided for the proposed development as illustrated in Section 6.1.1 – Quantity Control, that is a sub-section of 6.1 – Stormwater Management.

Quality

Quality control was implemented for the site by providing an oil/grit separator **Type STC 300** manufactured by Stormceptor. The proposed unit is capable of treating **0.0141 m³/s (1.41 l/s)** with **84%** TSS removal as illustrated in Section 6.1.2 – Quality Control.

Water Balance

A water balance of **23.03 m³** is required and will be retained to be used for infiltration back into the ground as illustrated in Section 6.1.3 – Water Balance.

We respectfully submit this report and we trust the information provided meets with your requirements. The report's recommendations will be implemented in detail design during engineering submission for the proposed residential development.

Yours truly,

SKIRA & ASSOCIATES LTD.

Bill Savilo, B. Sc.
Associate
BS:ak

Roman Kerkusz, P. Eng.

NOTE: Limitation of Report

This report was prepared by **Skira & Associates Ltd.** for **Di Blasio Homes** for review and approvals by government agencies only.

In light of the information available at the time of preparation of this report, any use by a **Third Party** of this report are solely the responsibility of such **Third Party** and **Skira & Associates Ltd.** accepts no responsibility for any damages, if any, suffered by the **Third Party.**

APPENDIX A

ORIFICE RESTRICTOR PLATE
Computer Output

75mm dia. ORIFICE RESTRICTOR PLATE
Worksheet for Circular Orifice

PROJECT DESCRIPTION	
WORKSHEET	Orifice - 1
TYPE	Circular Orifice
SOLVE FOR	Headwater Elevation

INPUT DATA	
DISCHARGE	0.0141 m^3/s
CENTROID ELEVATION	181.48 m
TAILWATER ELEVATION	181.54 m
DISCHARGE COEFFICIENT	0.60
DIAMETER	75 mm

RESULTS	
HEADWATER ELEVATION	82.98 m
HEADWATER HEIGHT ABOVE CENTROID	1.50 m
TAILWATER HEIGHT ABOVE CENTROID	0.06 m
FLOW AREA	0.0044 m^2
VELOCITY	3.19 m/s

SKIRA & ASSOCIATES LTD.
37 Brookside Road Waterbury, CT 06708 USA (203) 755-1668

APPENDIX B

FIRE FLOW CALCULATIONS

FIRE FLOW CALCULATION

An estimate of the required fire flow is determined by the following formula:

$F = 220C \sqrt{A}$

Where, F = the required fire flow in litres/minute

C = coefficient related to the type of construction

A = the total floor area in square metres

For this project:

C = 0.80 (for non-combustible construction)

A = 7,200 square metres

$F = 220 \times 0.80 \sqrt{7,200} = 15,000$ L/M (rounded off to nearest 1,000 L/M)

Reduction for fire hazard:

Non-combustible (25% reduction)

15,000 – 25% = 11,250 litres/minute

Reduction for complete automatic sprinkler protection:

30% reduction – sprinkler system conforming to NFPA

10% reduction – fully supervised system

Total of 40% reduction – 40% of 11,250 = 4,500 litres/minute

Percentage added for structures exposed within 45 metres

20.1 to 30m separation (10% increase)

10% of 11,250 = 1,125 litres/minute

11,250 – 4,500 + 1,125 = 8,000 litres/minute (rounded off to the nearest 1,000 L/M)

Estimated required Fire Flow is 8,000 litres/minute

APPENDIX C

STORMCEPTOR OIL/GRIT SEPARATOR
Computer Output

Stormceptor®

Stormceptor Design Summary

PCSWMM for Stormceptor

Project Information

Date	6/6/2018
Project Name	Sixty Six Twenty - Di Blasio Homes
Project Number	218-M14
Location	6620 Rothschilds Trail, Mississauga

Designer Information

Company	Skira & Associates Ltd.
Contact	Bill Savilo

Notes

N/A

Drainage Area

Total Area (ha)	0.4606
Imperviousness (%)	74.2

The Stormceptor System model STC 300 achieves the water quality objective removing 84% TSS for a Fine (organics, silts and sand) particle size distribution.

Rainfall

Name	TORONTO CENTRAL
State	ON
ID	100
Years of Records	1982 to 1999
Latitude	45°30'N
Longitude	90°30'W

Water Quality Objective

TSS Removal (%)	80

Upstream Storage

Storage (ha-m)	Discharge (L/s)
0.000	00.000
0.005	10.000
0.006	12.000
0.007	14.100

Stormceptor Sizing Summary

Stormceptor Model	TSS Removal %
STC 300	84
STC 750	90
STC 1000	89
STC 1500	89
STC 2000	92
STC 3000	92
STC 4000	94
STC 5000	94
STC 6000	95
STC 9000	97
STC 10000	96
STC 14000	97

Hanson

Stormceptor®

Particle Size Distribution

Removing silt particles from runoff ensures that the majority of the pollutants, such as hydrocarbons and heavy metals that adhere to fine particles, are not discharged into our natural water courses. The table below lists the particle size distribution used to define the annual TSS removal.

Fine (organics, silts and sand)

Particle Size µm	Distribution %	Specific Gravity	Settling Velocity m/s		Particle Size µm	Distribution %	Specific Gravity	Settling Velocity m/s
20	20	1.3	0.0004					
60	20	1.8	0.0016					
150	20	2.2	0.0108					
400	20	2.65	0.0647					
2000	20	2.65	0.2870					

Stormceptor Design Notes

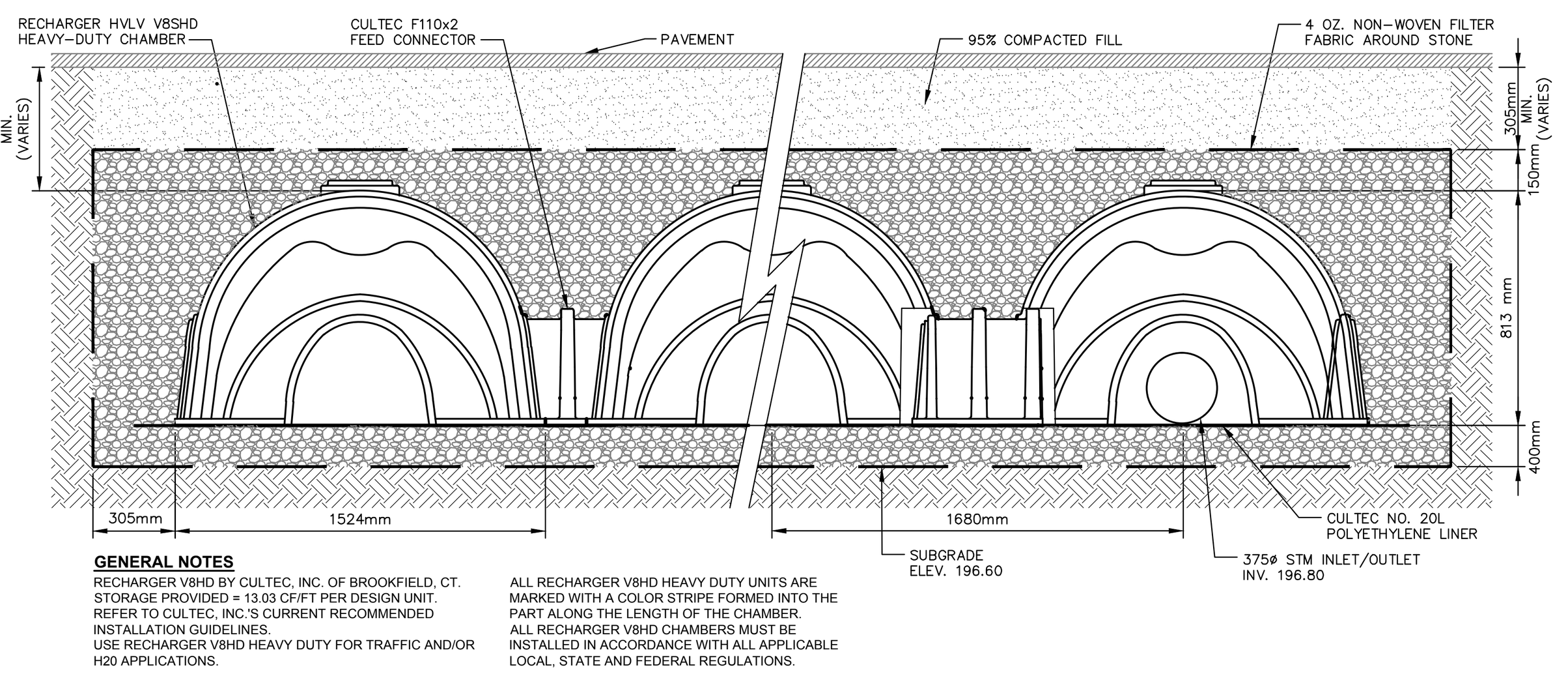
- Stormceptor performance estimates are based on simulations using PCSWMM for Stormceptor version 1.0
- Design estimates listed are only representative of specific project requirements based on total suspended solids (TSS) removal.
- Only the STC 300 is adaptable to function with a catch basin inlet and/or inline pipes.
- Only the Stormceptor models STC 750 to STC 6000 may accommodate multiple inlet pipes.
- Inlet and outlet invert elevation differences are as follows:

Inlet and Outlet Pipe Invert Elevations Differences

Inlet Pipe Configuration	STC 300	STC 750 to STC 6000	STC 9000 to STC 14000
Single inlet pipe	75 mm	25 mm	75 mm
Multiple inlet pipes	75 mm	75 mm	Only one inlet pipe.

- Design estimates are based on stable site conditions only, after construction is completed.
- Design estimates assume that the storm drain is not submerged during zero flows. For submerged applications, please contact your local Stormceptor representative.
- Design estimates may be modified for specific spills controls. Please contact your local Stormceptor representative for further assistance.
- For pricing inquiries or assistance, please contact Hanson Pipe & Precast, 1-888-888-3222.

Hanson



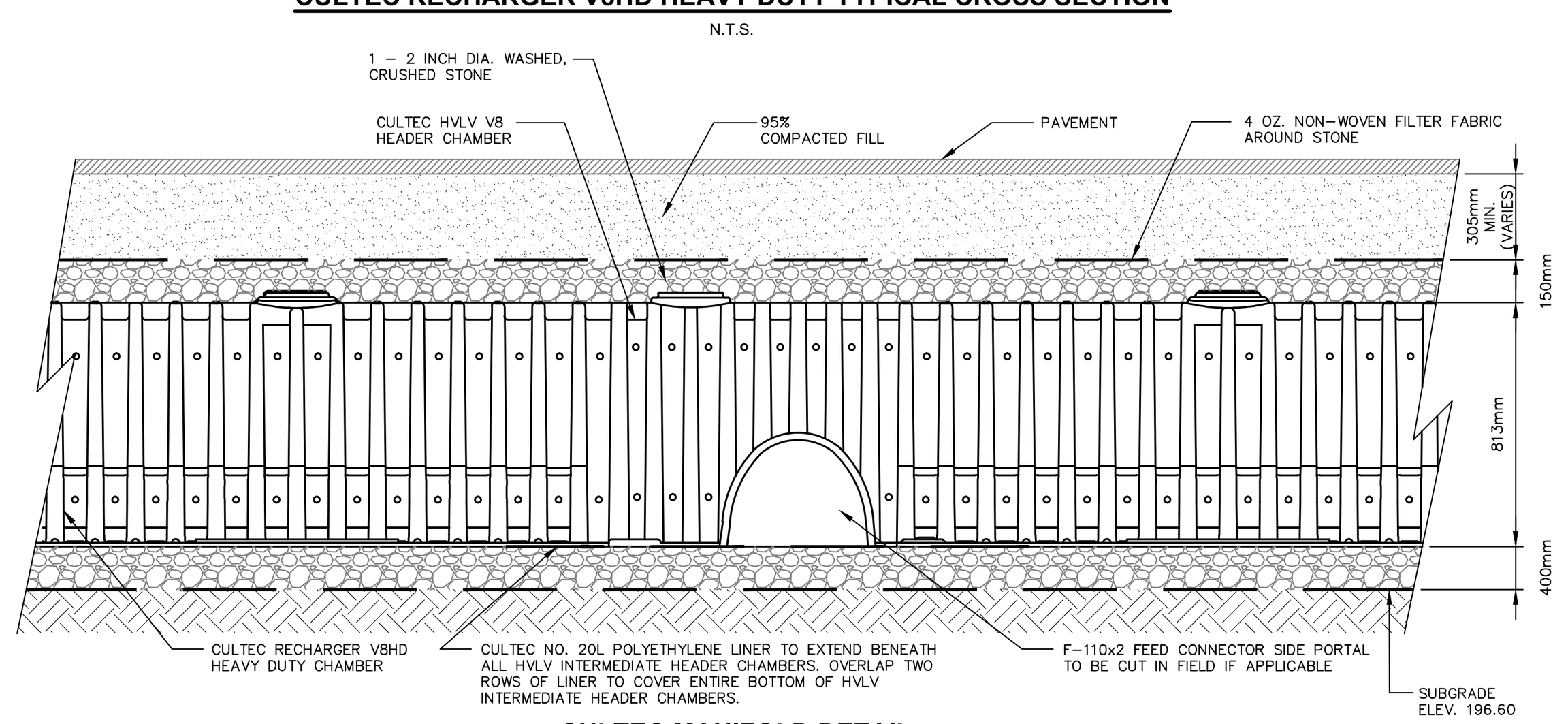
GENERAL NOTES

RECHARGER V8HD BY CULTEC, INC. OF BROOKFIELD, CT.
STORAGE PROVIDED = 13.03 CF/FT PER DESIGN UNIT.
REFER TO CULTEC, INC.'S CURRENT RECOMMENDED INSTALLATION GUIDELINES.
USE RECHARGER V8HD HEAVY DUTY FOR TRAFFIC AND/OR H20 APPLICATIONS.

ALL RECHARGER V8HD HEAVY DUTY UNITS ARE MARKED WITH A COLOR STRIPE FORMED INTO THE PART ALONG THE LENGTH OF THE CHAMBER.
ALL RECHARGER V8HD CHAMBERS MUST BE INSTALLED IN ACCORDANCE WITH ALL APPLICABLE LOCAL, STATE AND FEDERAL REGULATIONS.

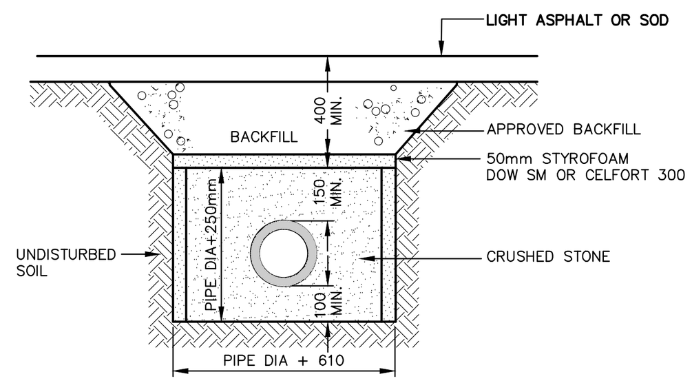
CULTEC RECHARGER V8HD HEAVY DUTY TYPICAL CROSS SECTION

N.T.S.



CULTEC MANIFOLD DETAIL

N.T.S.



PIPE INSULATION DETAIL FOR FROST PROTECTION

N.T.S.

STORMWATER MANAGEMENT - SUMMARY

SUB - AREA 'B'

CATCHBASIN NO.	CATCHBASIN TOP ELEV. (m)	PONDING ELEV. 100YR (m)	STORAGE AVAILABLE 100YR (m^3)	STORAGE REQUIRED 100YR (m^3)
CB MH 1	183.75	182.98	1.75	
CB 2	184.15	182.98	0.25	
CULTEC V8IHD CHAMBER			67.40	
		TOTAL:	69.40	66.39

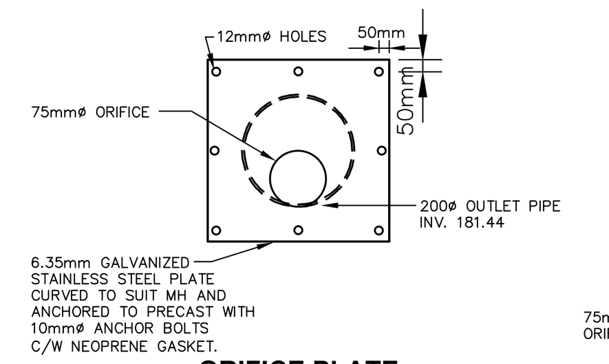
ALLOWABLE FLOW = 0.0496 m^3/s (2 yr)
TOTAL RELEASED FLOW = 0.0496 m^3/s (2 yr)
TOTAL UNCONTROLLED FLOW = 0.0355 m^3/s (100 yr)
TOTAL CONTROLLED FLOW = 0.0141 m^3/s (2 yr)

USE ZURN CONTROL - FLO ROOF DRAINS
MAXIMUM FLOW PER 1 WEIR = 0.124 L/s per cm OF HEAD OF WATER
OR 5.0 USGPM per inch OF HEAD OF WATER
MAXIMUM DISCHARGE FROM ROOF - 0.1939 Ha. x 0.035m^3/s/Ha = 0.0068m^3/s

NUMBER OF WEIRS = 6.8 L/s /0.471 L/s = 15
NUMBER OF ROOF DRAINS - 3 DRAINS WITH 5 WEIRS

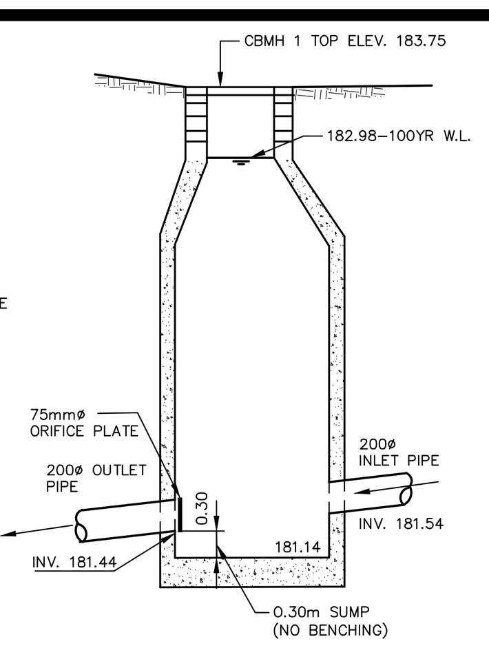
TOTAL ROOF DISCHARGE - 15x 0.471 L/sec = 7.1 L/sec
PONDING DEPTH = 3.8cm PONDING VOLUME = 73.90m^3(100YR)

ROOF DISCHARGE RATE TO BE CONTROLLED TO 35.0 L/sec/Ha OF ROOF AREA



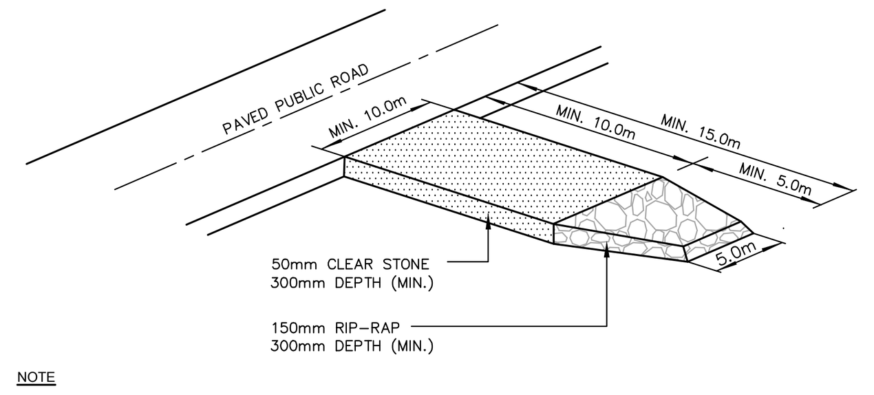
ORIFICE PLATE

N.T.S.



CONTROL MANHOLE - CBMH 1

N.T.S.

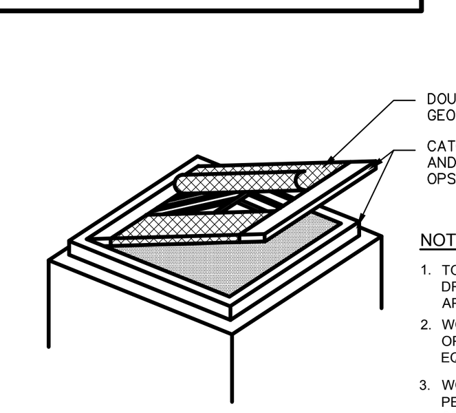


NOTE

1. GEOTEXTILE IS TO BE PLACED OVER THE ENTIRE AREA PRIOR TO STONE PLACEMENT.

CONSTRUCTION ACCESS AND MUDDING BAY DETAIL

(C.M.STD. 2970.010)

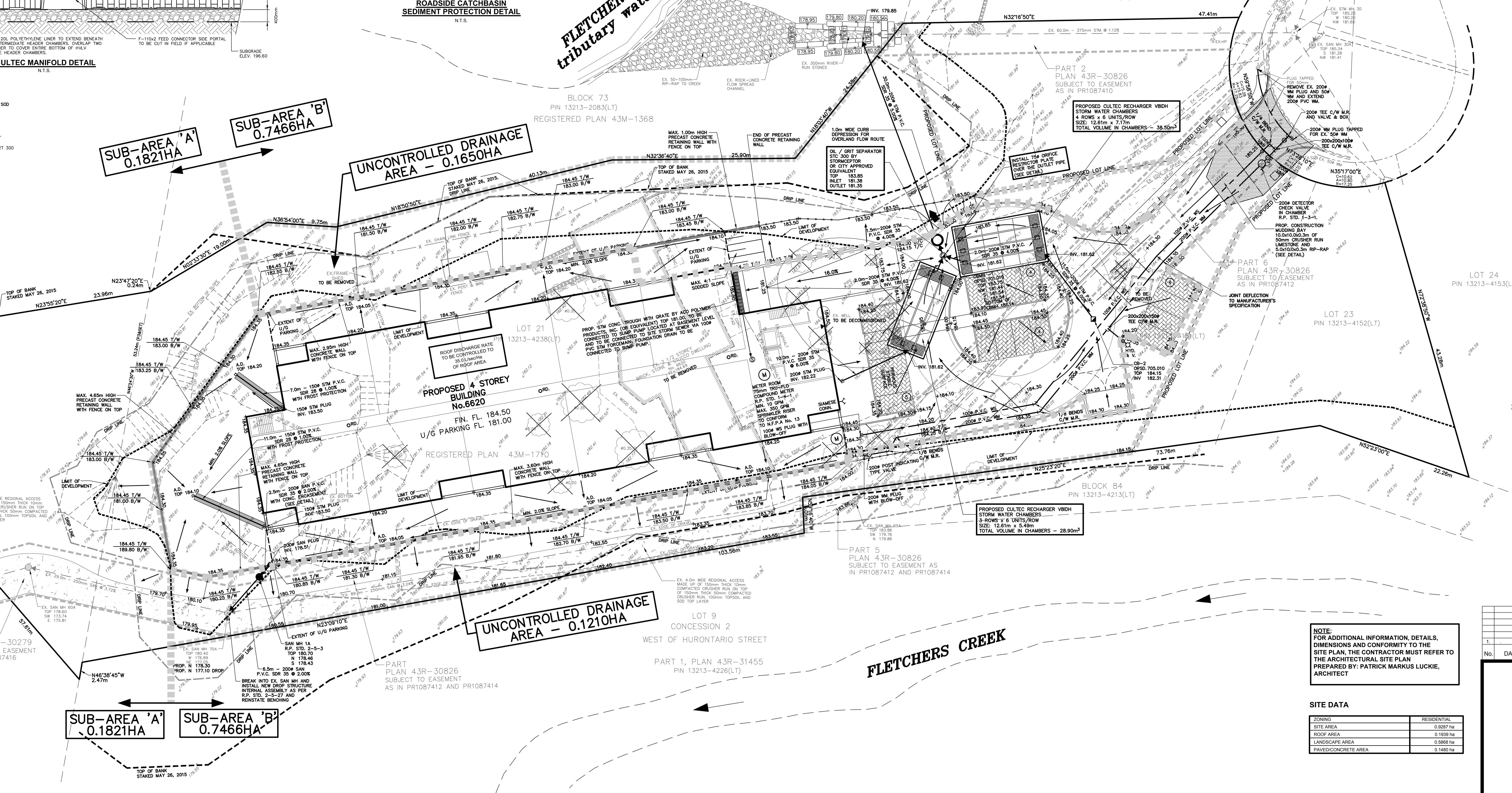


NOTE

1. TO BE USED UNDER APPROPRIATE DRAINAGE CIRCUMSTANCES, BETWEEN APRIL AND DECEMBER.
2. WOVEN GEOTEXTILE TO HAVE EQUIVALENT OPENING SIZE OF 0.15mm AND A MAXIMUM EQUIVALENT OPENING SIZE OF 0.25mm.
3. WOVEN GEOTEXTILE TO BE REPLACED PERIODICALLY WHEN ACCUMULATED SEDIMENTS INTERFERES WITH DRAINAGE.

ROADSIDE CATCHBASIN SEDIMENT PROTECTION DETAIL

N.T.S.



STANDARD SITE PLAN DEVELOPMENT NOTES

(A) DEVELOPMENT DIVISION, PLANNING AND BUILDING DEPARTMENT

(i) I/WE HEREBY CERTIFY THAT THIS DRAWING CONFORMS IN ALL RESPECTS TO THE SITE DEVELOPMENT PLANS AS APPROVED BY THE CITY OF MISSISSAUGA UNDER FILE NUMBER: **S.P.I.-**

SIGNED BY ARCHITECT OR ENGINEER

(ii) THE CITY OF MISSISSAUGA REQUIRES THAT ALL WORKING DRAWINGS SUBMITTED TO THE BUILDING DIVISION AS PART OF AN APPLICATION FOR THE ISSUANCE OF A BUILDING PERMIT SHALL BE IN CONFORMITY WITH THE SITE DEVELOPMENT PLAN AS APPROVED BY THE **CITY OF MISSISSAUGA, DEVELOPMENT AND DESIGN DIVISION.**

(iii) THE OWNER IS RESPONSIBLE FOR ENSURING THAT TREE PROTECTION HOARDING IS MAINTAINED THROUGHOUT ALL PHASES OF DEMOLITION AND CONSTRUCTION IN THE LOCATION AND CONDITION AS APPROVED BY THE PLANING AND BUILDING DEPARTMENT. NO MATERIALS (BUILDING MATERIALS, SOILS, ETC.) MAY BE STOCKPILED WITHIN THE AREA OF HOARDING. FAILURE TO MAINTAIN THE HOARDING AS ORIGINALLY APPROVED OR THE STORAGE OF MATERIALS WITHIN THE HOARDING WILL BE CAUSE FOR THE LETTER OF CREDIT TO BE HELD FOR **TWO (2)** YEARS FOLLOWING COMPLETION OF ALL SITE WORKS.

SIGNED BY OWNER

(iv) SHOULD THE INSTALLATION OF BELOW GROUND SERVICES REQUIRE HOARDING TO BE REMOVED, PLANNING AND BUILDING STAFF ARE TO BE CONTACTED PRIOR TO THE COMMENCEMENT OF SUCH WORK. SHOULD AN ALTERNATIVE SERVICE ROUTE NOT BE POSSIBLE, STAFF WILL INSPECT AND DOCUMENT THE CONDITION OF THE VEGETATION AND SERVICING INSTALLATION IN ORDER TO MINIMIZE DAMAGE TO THE VEGETATION.

(v) THE APPLICANT WILL BE RESPONSIBLE FOR THE COST OF ANY UTILITIES RELOCATIONS NECESSITATED BY THE SITE PLAN.

(vi) CONSTRUCTION MATERIALS ARE **NOT** TO BE PUT OUT FOR COLLECTION.

(vii) ALL DAMAGED LANDSCAPE AREAS TO BE REINSTATED WITH TOPSOIL AND SOD PRIOR TO THE RELEASE OF SECURITIES.

(viii) ALL EXCESS EXCAVATED MATERIALS WILL BE REMOVED OFF SITE.

(ix) ALL EXTERIOR LIGHTING WILL BE DIRECTED ONTO THE SITE AND WILL NOT INFRINGE UPON THE ADJACENT PROPERTIES.

(x) IF A WELL IS DISCOVERED, IT WILL BE DECOMMISSIONED BY A **LICENSED WELL CONTRACTOR** OR TECHNICIAN IN ACCORDANCE WITH THE ONTARIO WATER RESOURCES ACT REGULATION 903 (FORMERLY 612/64) AND ANY OTHER APPLICABLE REGULATIONS AND GUIDELINES.

(xi) ANY FENCING ADJACENT TO MUNICIPAL LANDS IS TO BE LOCATED 15cm (6.0in.) INSIDE THE PROPERTY LINE.

(xii) THE APPLICANT WILL BE RESPONSIBLE FOR ENSURING THAT ALL PLANS CONFORM TO TRANSPORT CANADA'S RESTRICTIONS.

(xiii) THE DESIGN AND NUMBER OF BARRIER FREE PARKING SPACES ARE TO CONFORM TO THE REQUIREMENTS OF BY-LAW NUMBER 0190-2014 TO ZONING BY-LAW 0225-2007, AS AMENDED, AND TO THE REVISED ACCESSIBLE PARKING BY-LAW NUMBER 0010-2016. PARKING SPACES RESERVED FOR PEOPLE WITH DISABILITIES BUST BE IDENTIFIED BY A SIGN, INSTALLED AT THE APPLICANT'S EXPENSE. ONE BARRIER FREE PARKING SIGN MUST BE RPOVIDED FOR EACH ACCESSIBLE SPACE. SIGNS FOR TYPE 'A' SPACES MUCT INCLUDE A 'VAN ACCESSIBLE' DESIGNATION. EACH SPACE MUCT BE IDENTIFIED BY PAVEMENT MARKINGS CONSISTING OF A 1525x1525mm WHITE BORDER CONTAINING THE INTERNATIONAL SYMBOL OF ACCESS ON A BLUE BACKGROUND FIELD.

(xiv) ALL ROOF TOP UNITS MUST BE SCREENED FROM VIEW BY THE APPLICANT.

(xv) TYPICAL AISLE WIDTH SHALL BE **7.00m** (23.0') WHERE ADJACENT TO PARKING SPACES.

(B) DESIGN DIVISION, PLANNING AND BUILDING DEPARTMENT

(i) GRADE WILL BE MET WITHIN A 33% MAXIMUM SLOPE AT THE PROPERTY LINES AND WITHIN THE SITE.

(ii) UNDERGROUND PARKING STRUCTURES WITH LANDSCAPING ARE TO BE CAPABLE OF SUPPORTING THE FOLLOWING LOADS:

15cm OF DRAINAGE GRAVEL PLUS 40cm TOPSOIL FOR SOD
15cm OF DRAINAGE GRAVEL PLUS 60cm TOPSOIL FOR SHRUBS
15cm OF DRAINAGE GRAVEL PLUS 90cm TOPSOIL FOR TREES

(iii) THE STRUCTURAL DESIGN OF ANY RETAINING WALL OVER **0.6m** IN HEIGHT OR ANY RETAINING WALL LOCATED ON THE PROPERTY LINE IS TO BE SHOWN ON THE SITE GRADING PLAN FOR THIS PROJECT AND IS TO BE APPROVED BY THE CONSULTING ENGINEER FOR THIS PROJECT.

(iv) CONTINUOUS **15cm** HIGH BARRIER-TYPE POURED CONCRETE CURBING WILL BE PROVIDED BETWEEN ALL ASPHALT AND LANDSCAPED AREAS THROUGHOUT THE SITE.

(C) TRANSPORTATION AND WORKS DEPARTMENT

(i) THE PORTIONS OF THE DRIVEWAY WITHIN THE MUNICIPAL BOULEVARD WILL BE PAVED BY THE APPLICANTS.

(ii) ALL SURFACE DRAINAGE WILL BE SELF-CONTAINED, COLLECTED AND DISCHARGED AT A LOCATION TO BE APPROVED PRIOR TO THE ISSUANCE OF A BUILDING PERMIT AND THE EXISTING DRAINAGE PATTERN WILL BE MAINTAINED.

(iii) ALL PROPOSED CURBING WITHIN THE MUNICIPAL BOULEVARD AREA FOR THE SITE IS TO SUIT AS FOLLOWS: FOR ALL SINGLE FAMILY RESIDENTIAL PROPERTIES INCLUDING ON STREET TOWNHOUSES, ALL CURBING IS TO STOP AT THE PROPERTY LIMIT OR THE BACK OF THE MUNICIPAL SIDEWALK.

(iv) THE TOPS OF ANY CURBS BORDERING DRIVEWAYS WITHIN THE MUNICIPAL BOULEVARD WILL BE FLUSH WITH THE MUNICIPAL SIDEWALK.

(v) THE EXISTING DRAINAGE PATTERN WILL BE MAINTAINED EXCEPT WHERE NOTED.

(D) REGION OF PEEL WASTE MANAGEMENT

(i) ON-SITE WASTE COLLECTION WILL BE DONE THROUGH A PRIVATELY-ARRANGED CONTRACTOR.

(ii) THE STORAGE OF WASTE IN OUTDOOR AREAS OF FREE-STANDING BINS IS NOT PERMITTED.

(iii) THERE WILL BE NO CURBSIDE COLLECTION.

(iv) CARDBOARD AND GARBAGE REAR PACKER COLLECTION.

NOTES

1. ALL ROOF DOWNSPOUTS FROM EAVESTROUGH TO DISCHARGE ONTO SURFACE AND THE RUNOFF DIRECTED TOWARDS THE REAR WHERE POSSIBLE AND TO THE ROAD.
2. ROOF DOWNSPOUT IS LOCATED IN SUCH A MANNER AS TO DIRECT DRAINAGE AWAY FROM WALKWAYS, DRIVEWAYS OR PATIO AREAS.
3. FOUNDATION DRAINS TO HAVE SUMP PUMP FITTED WITH BACKWATER VALVE AND DISCHARGE ONTO SURFACE AND DIRECTED TO THE ROAD.
4. PRIOR TO CONSTRUCTION, THE CONTRACTOR IS TO VERIFY IN THE FIELD, THE EXACT SIZE AND INVERTS OF THE EXISTING W/S, SANITARY CONNECTION AND TO REPORT THEM TO THE ENGINEER.
5. CONTRACTOR TO MATCH EXISTING GRADES ALONG PROPERTY LINE.
6. APPLICANT / BUILDER IS TO BE ADVISED THAT THE EDGE OF ALL DRIVEWAYS MUST HAVE **1.20m** CLEARANCE BETWEEN IT AND THE EDGE OF ANY ABOVEGROUND UTILITIES.
7. PRIOR TO ANY CONSTRUCTION THE CONTRACTOR IS TO OBTAIN A ROAD CUT PERMIT FOR INSTALLATION OF ANY STORM, SANITARY AND/OR WATERSERVICE CONNECTIONS.
8. IF DURING CONSTRUCTION ANY SEPTIC SYSTEM IS DISCOVERED, THE SYSTEM MUST BE DECOMMISSIONED REMOVED IN ACCORDANCE WITH ALL APPLICABLE GUIDELINES.

EROSION & SEDIMENT CONTROL

1. SEDIMENT CONTROLS ARE REQUIRED IN ACCORDANCE WITH CITY OF MISSISSAUGA BY-LAW No. **512-91** AND ANY SUBSEQUENT AMENDMENTS AND THE REQUIRED PERMIT SHALL BE OBTAINED BY THE OWNER PRIOR TO THE COMMENCEMENT OF ANY CONSTRUCTION WORKS.
2. ALL REQUIRED EROSION AND SEDIMENT CONTROLS SHALL BE REGULARLY MAINTAINED UNTIL ALL CONSTRUCTION ACTIVITIES ARE COMPLETED AND ALL DISTURBED AREAS RESTORED.
3. ALL CATCHBASINS WITHIN LANDSCAPED AREAS ARE TO HAVE SEDIMENT BARRIER **C.M. STD. 2930.030** ERECTED IMMEDIATELY AFTER CB INSTALLATION. SEDIMENT BARRIER TO BE MAINTAINED ON A REGULAR BASIS UNTIL NO LONGER REQUIRED.
4. SEDIMENT CONTROL BULKHEADS AT 1/3 DEPTH OF RECEIVING SEWER TO BE INSTALLED AT ALL CONNECTION MANHOLES WITH EXISTING STORM SEWER SYSTEMS. BULKHEADS TO BE MAINTAINED ON A REGULAR BASIS (SILT REMOVED) UNTIL THEIR REMOVAL UPON COMPLETION OF BASE COURSE PAVING.
5. ROADSIDE CATCHBASIN SEDIMENT PROTECTION TO BE INSTALLED AS PER **C.M. STD. 2930.040** AND MAINTAINED ON A REGULAR BASIS UNTIL NO LONGER REQUIRED.
6. ALL SEDIMENT CONTROL FENCE TO BE ERECTED PRIOR TO COMMENCEMENT OF ANY GRADING OPERATIONS AND TO BE INSTALLED AS PER **C.M. STD. 2940.010**.
7. DURING ALL CONSTRUCTION PHASES, MUD TRACKING CONTROL, CONSISTING OF FLUSHING AND SWEEPING ROADS, IS TO BE PROVIDED FOR ALL ROADS, AS WARRANTED, IN ACCORDANCE WITH THE CITY OF MISSISSAUGA MUD TRACKING CONTROL POLICY.
8. **CONSTRUCTION SEQUENCE**

SEDIMENT CONTROLS - ....
SITE GRADING - ....
UNDERGROUND SERVICING - ....
BLDG. CONSTRUCTION - ....
FINAL GRADING / SODDED - ....

NOTE

SITE AREA = **X.XXX Ha**

2. "THIS CONTROL PLAN IS PREPARED FOR SUBMISSION TO THE CITY OF MISSISSAUGA IN CONJUNCTION WITH AN APPLICATION FOR EROSION AND SEDIMENTATION CONTROL PERMIT #________UNDER THE EROSION AND SEDIMENT CONTROL BY LAW No. 512-91 AND ANY SUBSEQUENT AMENDMENTS"
3. IF BUILDING CONSTRUCTION IS INTERRUPTED AND/OR INACTIVITY EXCEEDS 30 DAYS ALL
1. STRIPPED AND/OR BARE AREAS WILL BE STABILIZED BY SEEDING.

GENERAL NOTES

1. THE CONTRACTOR IS TO CHECK AND VERIFY ALL DIMENSIONS. IF ANY DISCREPANCIES, THEY MUST BE REPORTED TO THE ENGINEER IMMEDIATELY PRIOR TO CONSTRUCTION.
2. THE CONTRACTOR IS RESPONSIBLE FOR LOCATING AND PROTECTING ALL UTILITIES DURING CONSTRUCTION. GAS, HYDRO, TELEPHONE OR ANY OTHER UTILITIES THAT MAY EXIST ON THE SITE OR WITHIN THE STREETLINES MUST BE LOCATED BY ITS OWN UTILITIES AND VERIFIED PRIOR TO CONSTRUCTION.
3. ALL CONNECTIONS SHALL BE INSTALLED AS PER MUNICIPAL STANDARDS AND SPECIFICATIONS.
4. BUILDER IS TO VERIFY TO THE ENGINEER THAT THE FINAL FOOTING ELEVATION AND TOP OF FOUNDATION WALL ELEVATION ARE IN CONFORMITY WITH THE BUILDING CODE AND THE CERTIFIED GRADING PLAN PRIOR TO PROCEEDING.
5. THE ELEVATION OF THE SIDE SWALE AT THE BUILDING LINE SHALL BE A MINIMUM OF **150mm** BELOW THE BUILDING LINE AT THE CENTRE OF THE SWALE.
6. OUTSIDE FINISHED GRADE TO BE A MINIMUM OF **150mm** BELOW BRICK VENEER ELEVATION.
7. PRIOR TO ANY SODDING, THE BUILDER IS TO ENSURE TO THE SOILS CONSULTANT AND/OR THE ENGINEER THAT THE LOT HAS BEEN GRADED AND TOPSOILED AND SODDED COMPLETELY WITH A MINIMUM DEPTH OF **100mm** OF TOPSOIL AND **NO 1**. NURSERY SOD AND A MINIMUM DEPTH OF **150mm** OF CRUSHED STONE TO BE PROVIDED ON THE ENTIRE LENGTH OF EACH DRIVEWAY ON A FIRM SUBGRADE AND THE DRIVEWAY TO BE PAVED WITH A MINIMUM COMPACTED DEPTH OF **75mm** OF ASPHALT BETWEEN THE CURB AND THE GARAGE.
8. NO SODDING ON ANY LOTS IS PERMITTED UNTIL PRELIMINARY INSPECTION IS DONE BY THE ENGINEER AND THE BUILDER.
9. AT ALL ENTRANCES TO THE SITE THE ROAD CURB AND SIDEWALK WILL BE CONTINUOUS THROUGH THE DRIVEWAY, THE DRIVEWAY GRADE WILL BE COMPATIBLE WITH THE EXISTING OR FUTURE SIDEWALK AND CURB DEPRESSION WILL BE PROVIDED FOR EACH ENTRANCE.
10. DRIVEWAY GRADES SHOULD NOT BE LESS THAN **2.0%** AND NOT GREATER THAN **8%**.
11. LAWN AND SWALES SHALL HAVE A MINIMUM SLOPE OF **1.5%** (PREFERRED 2%) AND A MAXIMUM SLOPE OF **6%**.
12. WHERE GRADES IN EXCESS OF 6% ARE REQUIRED, THE MAXIMUM SLOPE SHALL BE 3:1. GRADE CHANGES IN EXCESS OF 1.0m ARE TO BE ACCOMPLISHED BY USE OF A RETAINING WALL. RETAINING WALLS HIGHER THAN 0.6m SHALL HAVE A FENCE INSTALLED ON THE HIGH SIDE.
13. THE SERVICE CONNECTION TRENCH WITHIN THE TRAVELLED PORTION OF THE ROAD ALLOWANCE SHALL BE BACKFILLED WITH UNSHRINKABLE BACKFILL MATERIAL AS PER **C.M. STDS. 2220.030, 2220.031 AND 2220.032** UNLESS OTHERWISE SPECIFIED PRIOR APPROVAL FOR OTHER BACKFILL MATERIAL HAS BEEN OBTAINED.
14. ALL WATERMAINS AND WATER SERVICE MATERIALS AND CONSTRUCTION METHODS MUST CORRESPOND TO CURRENT MUNICIPAL STANDARDS & SPECIFICATIONS.
15. WATERMAINS AND/OR WATER SERVICES ARE TO HAVE A MIN. DEPTH OF **1.7m** WITH A MIN. HORIZONTAL SPACING OF **1.2m** FROM THEMSELVES AND OTHER UTILITIES.
16. SEDIMENT CONTROL FENCE TO BE INSTALLED AS PER **C.M. STD. 2940.010**.
17. ALL DAMAGED AND DISTURBED AREAS TO BE REINSTATED WITH TOPSOIL AND SOD.

FIRE DEPARTMENT

1. FIRE ROUTE WILL BE DESIGNATED AS PER CITY OF MISSISSAUGA **BYLAW (1036-81)** AS AMENDED PRIOR TO OCCUPANCY OF THE BUILDINGS.
2. FIRE ROUTES TO BE DESIGNED TO WITH STAND A LOAD NOT LESS THAN **11,363Kg**. PER AXLE AND HAVE A CHANGE IN GRADIENT OF NOT MORE THAN **1 IN 12.5** OVER A DISTANCE **15.0m** AS PER **BY LAW 1036-81**.
3. ALL **12.0m** TURNING RADII HAVE MIN. CLEARANCE OF **3.0m** BETWEEN THE CENTRE LINE OF TURNING RADII AND ANY CURB OR PART OF BUILDING.
4. PRIVATE FIRE HYDRANTS SHALL BE FLOW TESTED AND COLOUR CODED IN CONFORMANCE WITH THE REGION OF PEEL "UNIFORM MARKING OF HYDRANTS".

ROADS

1. ALL FILL WITHIN ROAD ALLOWANCE AND EASEMENTS TO BE COMPACTED TO MIN **95%** STANDARD PROCTOR DENSITY. THE SUITABILITY AND COMPACTION OF ALL FILL MATERIALS TO BE CONFIRMED BY A RECOGNIZED SOIL CONSULTANT TO THE CITY ENGINEER AND THE SUBGRADE OF ALL ROADWAYS SHALL BE PROOF ROLLED UNDER THE SUPERVISION OF THE SOILS CONSULTANT PRIOR TO THE INSTALLATION OF ANY ROAD BASE MATERIALS.
2. THE DEVELOPER/CONTRACTOR IS RESPONSIBLE FOR LOCATING AND PROTECTING ALL EXISTING UTILITIES PRIOR TO AND DURING CONSTRUCTION. LOCATION OF EXISTING UTILITIES, WATERMAINS, SEWERS AND OTHER UNDERGROUND OR ABOVEGROUND UTILITIES AND STRUCTURES ARE NOT NECESSARILY SHOWN ON THE DRAWINGS. PRIOR TO COMMENCEMENT OF WORK, CONTRACTOR MUST EXAMINE THE ACCURACY OF SUCH EXISTING UTILITIES AND STRUCTURES WHETHER SHOWN OR NOT AND ASSUME ALL LIABILITY FOR DAMAGE TO THEM. ANY DISCREPANCIES TO LOCATION OF EXISTING WATERMAINS AND SEWERS TO BE RECTIFIED AT DEVELOPER/ CONTRACTOR'S EXPENSE.
3. THE DEVELOPER/CONTRACTOR MUST ENSURE THAT A SUBGRADE CERTIFICATE IS ISSUED BY THE GEOTECHNICAL SOILS CONSULTANT TO THE ENGINEER. ONLY UPON VERIFICATION AND APPROVAL OF THE SUBGRADE BY THE LOCAL AUTHORITY INSPECTION DEPARTMENT WILL COMMENCEMENT OF ANY ROAD BASE MATERIALS BE PLACED. FAILURE TO FOLLOW THIS PROCEDURE WILL MEAN THE REMOVAL OF ROAD BASE MATERIALS AND/OR ADDITIONAL TESTING THAT PROPER COMPACTION HAS BEEN ACHIEVED AT THE SUBGRADE AT DEVELOPER/CONTRACTOR'S EXPENSE.
4. TRENCH BACKFILLING ON PROPOSED ROADS SHALL COMPLY WITH CITY OF MISSISSAUGA **SECTION 4.02.06** - (TRENCH BACKFILLING ON ROADS) AS PROVIDED IN THE CITY'S DEVELOPMENT REQUIREMENT MANUAL.
   a) THE TOP **1000mm** OF THE SUBGRADE IS TO BE COMPACTED TO A MINIMUM **98%** OF SPD WITHIN **2%** OF THE OPTIMUM MOISTURE CONTENT.
5. ALL CONNECTIONS WITHIN PAVED PORTION OF ANY EXISTING ROAD TO BE BACKFILLED WITH UNSHRINKABLE BACKFILL MATERIAL AS PER **C.M. STDS. 2220.030, 2220.031 AND 2220.032**, UNLESS OTHERWISE SPECIFIED PRIOR APPROVAL FOR OTHER BACKFILL MATERIAL HAS BEEN OBTAINED.
6. ALL OTHER EXCAVATIONS WITHIN EXISTING ROAD ALLOWANCE SHALL BE BACKFILLED TO SUBGRADE ELEVATION WITH GRANULAR 'C' MATERIAL AND COMPACTED TO A MINIMUM OF **95%** STANDARD PROCTOR DENSITY. SURFACE RESTORATION SHALL BE EQUAL TO OR BETTER THAN EXISTING CONDITION IN ACCORDANCE WITH **O.P.S.S. 507**
7. CURB TO BE AS PER **O.P.S.D. 600.110** UNLESS OTHERWISE NOTED.
8. SUBDRAIN UNDERNEATH ALL CURBS TO BE MINIMUM **100dia.** AS PER **C.M. STDS. 2220.040 AND 2220.05** AND ON EXISTING ROADS.
9. ALL DISTURBED AREAS WITHIN EXISTING ROAD ALLOWANCE TO BE REINSTATED WITH TOPSOIL AND SOD TO THE SATISFACTION OF CITY OF MISSISSAUGA.
10. SIDEWALKS TO BE AS PER **C.M. STD. 2240.010** AND PEDESTRIAN RAMPS TO BE PROVIDED AT ALL INTERSECTIONS AS PER **C.M. STDS. 2240.020 AND 2240.030.**

REGISTERED PROFESSIONAL ENGINEER
ROMAN T. KERKUSZ
JUNE 04/18
PROVINCE OF ONTARIO

C.M. BENCHMARK No. 1050 **ELEVATION: 194.056m**

DESCRIPTION: A TABLET SET HORIZONTALLY AT THE BASE OF A 750mm DIAMETER CONCRETE TRAFIC POLE AT THE SOUTHEAST CORNER OF McLAUGHLIN ROAD AND ARROWSMITH DRIVE

LEGEND

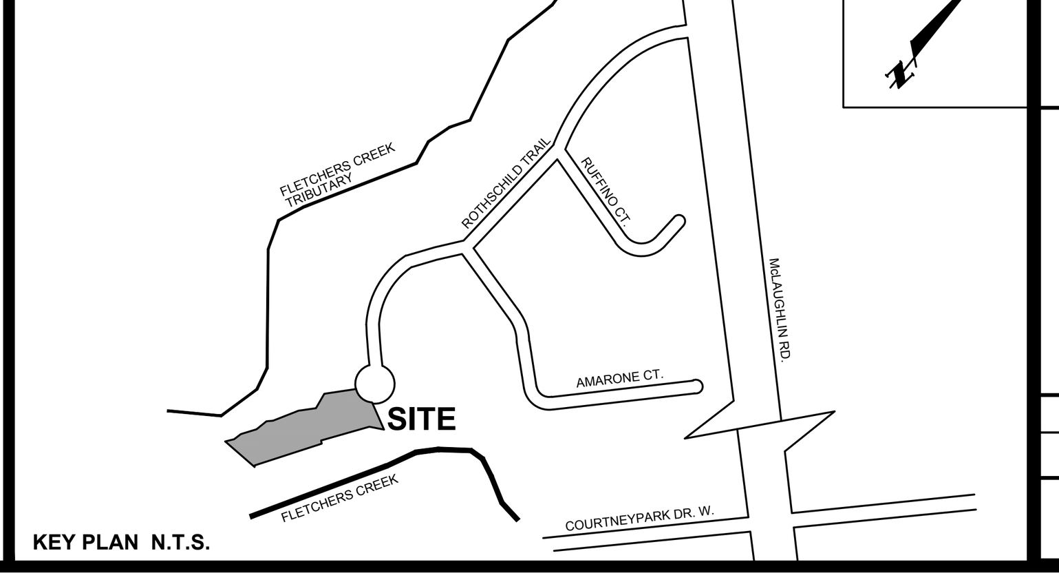
×(000.00) - EXISTING ELEVATION TO REMAIN
× 000.00 - EXISTING ELEVATION
→ - DIRECTION OF SURFACE FLOW
+ 000.00 - PROPOSED ELEVATION
- PROPOSED CATCHBASIN
- EXISTING TREE TO REMAIN
- EXISTING TREE TO BE REMOVED
Ⓢ - SUMP PUMP
- OVERLAND FLOW ROUTE
- DRAINAGE AREA BOUNDARY

NOTE:
FOR ADDITIONAL INFORMATION, DETAILS, DIMENSIONS AND CONFORMITY TO THE SITE PLAN, THE CONTRACTOR MUST REFER TO THE ARCHITECTURAL SITE PLAN PREPARED BY: PATRICK MARKUS LUCKIE, ARCHITECT

SITE DATA

ZONING	RESIDENTIAL
SITE AREA	0.9287 ha
ROOF AREA	0.1939 ha
LANDSCAPE AREA	0.5868 ha
PAVED/CONCRETE AREA	0.1480 ha

No.	DATE	REVISION	INIT.
1.	.	.	.



KEY PLAN N.T.S.

SKIRA & ASSOCIATES LTD.
CONSULTING ENGINEERS
3464 Semenyk Court, Suite 100, Mississauga, Ontario L5C 4P8
Tel. (905) 276-5100 Fax. (905) 270-1936 Email - info@skiraconsult.ca

pml.A
patrick markus luckie, Architect
7283 BENDIGO CIRCLE • MISSISSAUGA, ON • L5N 1Z4 • TEL: 416 885 0108

PROPOSED 4 STOREY BUILDING "SIXTY SIX TWENTY"

LOT 21, 22 REG. PLAN 43M-1710

6620 ROTHSCHILD TRAIL

Di BLASIO HOMES

6620 ROTHSCHILD TRAIL, MISSISSAUGA, ON L5W 0A6 TEL:(905)890-2263

MISSISSAUGA

SITE SERVICING AND SITE GRADING PLAN S.P.

DATE: MARCH 2018	AREA: Z-44W	DWG.No. C102	
SCALE: 1:300	DRAWN BY: E.W.		
CITY FILE:	REGION FILE:	PROJECT No. 218-M14	