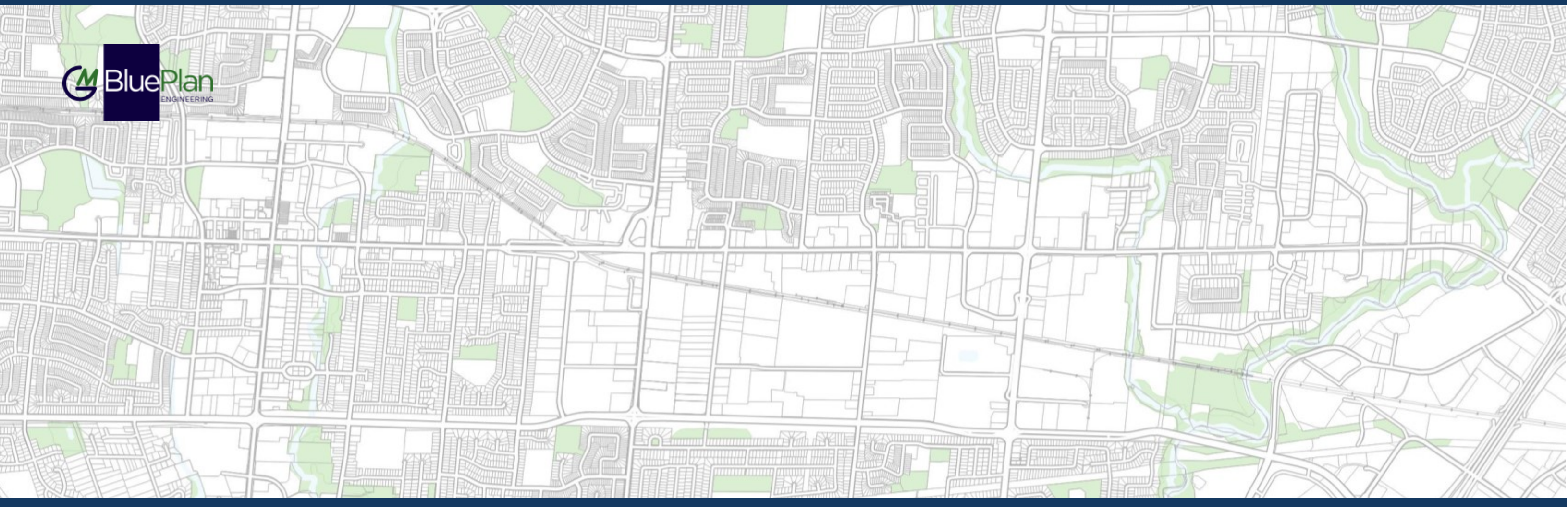
REGION OF PEEL

WASTEWATER CAPACITY IMPROVEMENTS IN CENTRAL MISSISSAUGA

APPENDIX 2-B

Hydrogeological Reports



REGION OF PEEL

WASTEWATER CAPACITY IMPROVEMENTS IN CENTRAL MISSISSAUGA

Hydrogeological Reports

Desktop

Date:	1/24/2020	File:	718018
To:	Chris Campbell and GMBP Project Team		
From:	Joanna Olesiuk and Matt Long		
Project:	Central Mississauga Wastewater System EA		
Subject:	Desktop Hydrogeological Study		

TECHNICAL MEMO

Background

The Region of Peel retained GM BluePlan Engineering Limited (GM BluePlan) to provide consulting services for a Schedule 'C' Municipal Class Environmental Assessment (EA) for the capacity expansion of the Central Mississauga wastewater system (the Project). It has been identified that a hydrogeological study will provide useful information at the planning stage with respect to route selection for infrastructure and budgeting. The preliminary hydrogeological assessment entails the EA study area (study area) as shown on **Figure 1,** which is located in the City of Mississauga within the Region of Peel and is bounded by Etobicoke Creek to the east, Confederation Parkway to the west, Highway 403 to the north, and QEW to the south. **Figure 2** illustrates the study area for this Class EA study. It includes Mississauga City Centre, the Hurontario Corridor and the Dundas Corridor intensification areas.

Objectives

The main objective of this desktop hydrogeological study is to provide a high-level review of the hydrogeology of the Study Area, as shown on **Figure 2.** Particular tasks include:

- Description of the geological setting (i.e. physiography, surficial geology).
- Identification of Source Water Protection (SWP) policy areas and the potential for special mitigative measures or route-selection for sewer infrastructure.
- Initial assessment for construction site dewatering requirements based on geological information and probable construction methodology.

Physiographic and Geological Setting

Review of Publications from Ontario Geological Survey

The study area covers a varied terrain as it intersects two physiographic regions, the South Slope (the northwestern part of the study area) and Iroquois Plain (the southeastern part of the study area). Within these two regions, are five distinct physiographic landforms including the northwesterly Drumlinized Till Plains and southeastern Sand Plains, within which the majority of the Study area is located. Based on OGS mapping, the study area also includes smaller landforms referred to as the Bevelled Till Plains, Beaches and Shale Plains (Chapman and Putnam 1984; Chapman and Putnam 2007) which cover less than approximately 10% of the study area. These regions contain characteristic landforms and soil depositional patterns, so it is helpful to describe the geological setting with respect to these physiographic regions and landforms.

Table 1 provides a summary of this information. For visual reference, **Figures 3** and **3a** illustrate the physiographic regions and the physiographic landforms, respectively, that are characteristic of the study area.

Table 1: Physiographic, Hydrologic and Geological Summary of the Study Area

Physiographic Region/ Landform	Covers these Parts of Study Area	Drainage	Surficial Geology Characteristics
South Slope/ Drumlinized Till Plains	Northerly portion of the study area. Largest landform in the study area. Approximately 55% of study area.	Toward Lake Ontario (southeast)	Fine-textured till (Halton Till) predominates in this region, with some fine-textured glaciolacustrine deposits, deltaic and lacustrine deposits, interspersed within the till plain.
Iroquois Plain/ Sand Plains	Southerly portion of the study area. Approximately 40% of study area.	Toward Lake Ontario (southeast)	A patchwork of coarse-textured glaciolacustrine, fine-textured glaciolacustrine, clayey-till and sandy till.
South Slope/ Beaches	Central portion of the study area, located near the boundary of the two physiographic regions, between Till Plains and Sand Plains. Approximately 2% of study area.	Toward Lake Ontario (southeast)	A band of gravelly deposits associated with the shores of former Lake Iroquois.
Iroquois Plain/Shale Plains	Small portion extending into the central southwestern portion of the study area. Less than 1% of the study area.	Toward Lake Ontario (southeast)	Shallow bedrock of the Georgian Bay Formation, which is largely shale but also contains dolostone and limestone.
Iroquois Plain/ Bevelled Till Plains	Small portion extending into the south-southeastern portion of the study area. Less than 1% of the study area.	Toward Lake Ontario (southeast)	Till that has been modified by fluvial/alluvial erosion. Sandy deposits anticipated at the surface.

Generally, the northwestern part of the study area is located within the South Slope physiographic region which is the southern slope of the Oak Ridges Moraine, extending from Niagara Escarpment to the Trent River and sloping towards Lake Ontario (Chapman and Putnam, 1984). This region lies atop of an extensive Drumlinized Till Plain frequented by streams which have cut into the till creating sharp valley walls in some areas. In the Mississauga area, this region is characterized by low-lying, undulating ground moraine with irregular knolls and hollows (Chapman and Putnam, 1984). Surficial soils in this region predominately consist of fine-textured clay to silt glacial till derived from glaciolacustrine or shale deposits. Generally, these soils have low permeability. Localized pockets of coarse deposits consisting of sand, gravel with minor silt and clay and organic remains typical of modern alluvial and glaciolacustrine origin, also occur throughout.

The southern part of the study area is within the Iroquois Plain physiographic region, a lowland extending along the shores of Lake Ontario from Niagara River to Trent River (Chapman and Putnam, 1984). During the most recent glaciation period, this region was inundated by a body of water known as glacial Lake Iroquois (Chapman and Putnam, 1984). This region is characterized by a slightly sloping plain with frequent river valleys of modern alluvial, glaciolacustrine and deltaic deposits, broader areas with Glacial Lake Iroquois lacustrine and near shore deposits overlying till and shale bedrock. According to the Ontario Geological Survey (OGS) mapping, the southeastern part of the study area is located within the Sand Plains physiographic landform with deltaic and lacustrine deposits, and outwash sand overburden (Chapman and Putnam, 2007), as shown on **Figure 4.** As such, soils in this area are expected to be variable and stratified, with significant differences in hydraulic properties between locations and depths.

A small portion of the study area lying at the boundary between the two physiographic regions (i.e. just north of Dundas Street and running parallel to it) is a band of beach deposits attributed to the shores of ancient/former Lake Iroquois. These deposits are described having coarse, gravelly texture.

In the southwesterly portion of the study area a Shale Plains landform extends into the study area (**Figure 4)**. This area is characterized by shallow shale bedrock.

Bedrock in the study area is expected to be of the Georgian Bay Formation (see **Figure 6**), which is composed of shale, limestone, dolostone, and siltstone.

Review of Water Well Records

Based on review of MECP water well records, fine-textured soils (widely reported as clay with gravel, clay with sand, or silt) dominate the surficial materials in the northwestern portion of the study area. In the southeastern portion of the study area, surficial soils are reported as sand, sand and gravel with some occurrence of silt and clay at depth. Overburden thickness in this portion of the study area is thinner than in the northeastern portion.

Based on the available MECP well records in the area, the shallow water wells (depth less than 7.6 mbgs) show that the groundwater table may be as shallow as 1.6 mbgs in the Study Area but it is noted that the water well record search did not return static water level data for a large portion of the Study Area (see **Figure 5**). During the well search, no water wells were found to be indicated as “flowing” or with a static water level above ground surface, which would indicate artesian conditions. However, from the author’s prior experience, it is known that there are some artesian wells in the vicinity of Eglinton Ave and Highway 403. These artesian wells are presumed to be installed within the Oak Ridges Moraine aquifer.

The water well database search also indicates that within the study area the surface of the bedrock (i.e. the bedrock subcrop) lies at depth ranging between 0.4 and 16.8 mbgs (see **Figure 6a**). According to the MECP well records within the Shale Plains physiographic landform, brown and grey shale bedrock deposits were encountered more consistently near to the surface, subcropping at depths typically within 1.5 mbgs to 5 mbgs, and overlain by till with sand and silt.

Stratigraphic Information from YPDT Database

For this project, stratigraphic data was also obtained from the York-Peel-Durham-Toronto (YPDT) hydrogeological database via the Region of Peel. Three cross-sections were obtained (see **Appendix A**):

- One (A-A’) taken longitudinally within the Etobicoke Creek catchment across Queensway near the eastern limit of the Study Area;
- two taken within the Cooksville Creek catchment, one (A-A’) transverse to the creek along Queensway and one (B-B’) along the Creek extending between Queen Elizabeth Way and the railroad lines just north of Dundas Street.

The stratigraphy shown in the cross-sections is dominated by sand/silt-sand aquifers of the Thorncliffe Formation and underlying Scarborough Formation.

Along Etobicoke Creek, the depth to bedrock is typically about 8 m below ground surface, but varies between about 6 m and 10 m, with the bulk of overburden sediments belonging to the Scarborough Formation. Groundwater levels are not indicated in this plot.

Along the Queensway near Cooksville Creek, though the ground surface topography is very flat, the depth to bedrock generally ranges between 2.5 m and 5 m, with depth to groundwater varying between about 1 m and 4 m below ground surface. The Scarborough Formation also predominates in this area.

Along Cooksville Creek, the Thorncliffe Formation tapers from about 6 m thick in the north end and pinching out near the Queensway to give way to the Scarborough Formation, which increases in thickness gradually across the section from less than 1 m in the north end to about 6 m in the south end. Depth to bedrock varies from 6 m (north and south ends) to about 2 m in central parts of the section. The groundwater surface roughly mimics the topography of the ground surface, and typically lies at a depth of about 1 m to 3 m, though there are some locations in the southern portion of this section where groundwater has been interpreted to lie essentially at surface.

Source Water Protection

The *Clean Water Act* (2006) and the Source Protection Plans that follow under it provide guidance and requirements in land use planning for the protection of Ontario’s water resources. In some circumstances, sewage infrastructure may be considered an activity that poses a “Significant” threat to drinking water quality. As such, it is relevant to this study to complete a review of the Source Protection framework for the study area.

The Study Area lies on the divide between two Source Protection Areas (see **Figure 7**):

1. Credit Valley Source Protection Area, which occupies approximately the southwestern half of the Study Area and falls within the Credit Valley/Toronto and Region/Central Lake Ontario (CTC) Source Protection Region.
2. Toronto and Region Source Protection Area (TRSPA): which occupies the remaining northeastern portion of the Study Area and falls within the Credit Valley/Toronto and Region/Central Lake Ontario (CTC) Source Protection Region.

The Approved Drinking Water Source Protection Plan for the above Source Protection Areas contain unique policies that apply to certain designated zones/areas and certain activities.

Within the study area boundaries, there are no identified Wellhead Protection Areas (WHPA), however, the portions of southeasterly study area, lands along the shore of Lake Ontario are within Intake Protection Zones (IPZ-2, see **Figure 7a**). There are also some Event Based Areas coinciding with IPZ-3 zones along the shores of Etobicoke Creek, Little Etobicoke Creek, Mary Fix Creek, and the Credit River (see **Figure 7a**). Significant Groundwater Recharge Areas (SGRAs) and Highly Vulnerable Aquifers (HVAs) are scattered throughout the area as well, with SGRAs largely being associated with areas near major roads which, due to the presence of ditches or other grade breaks, may encourage ponding and infiltration as well as natural areas near riparian areas (see **Figure 7b**).

Based on a search of the Source Water Protection Threats Tool (MECP 2019), it was identified that within the IPZ-2 areas in the study area the highest threat rating associated with sewage-related activities is “Low”. Therefore Risk Management Plans will not be required by the municipality’s Risk Management Office for sewer system upgrades in these areas. Indeed, the CTC Source Protection Plan does not appear to have any policies associated with “Low” threat activities (i.e. sewage collection pipes) for these IPZ-2 areas. However, there are policies (i.e. policy ID LO-SEW-2) regarding potential for trunk sewer breaks within an Event Based Area along Etobicoke Creek between the confluence with Little Etobicoke Creek and the shore of Lake Ontario but these are to be implemented by the Ministry of the Environment, Conservation and Parks.

The only risk management policies associated with the SGRAs and HVAs are with respect to road salt application and dense non-aqueous phase liquids, neither of which would be expected to be associated with upgrades, expansion or other development of the Peel wastewater system.

The Region of Peel Risk Management Official (RMO) has been consulted with respect to this EA. They have advised that, for the study area under consideration, the proposed activities (i.e. sewage conveyance/sewer pipes) will not trigger a Risk Management Plan. Additional modeling of risks related to sewer trunk breaks will not be necessary. However, the RMO did indicate that in certain Event Based Areas (i.e. on the lower part of Etobicoke Creek as identified above), the Ministry of the Environment, Conservation and Parks will be required to implement some monitoring and mitigation plans. These are expected to be executed through the Environmental Compliance Approvals process.

Construction Site Dewatering

The requirement for construction site dewatering has the potential to increase construction costs where intensive dewatering is required or where contaminated groundwater is encountered. Considerable effort may be expended to collect, treat, discharge or otherwise manage the groundwater to maintain adequately dry conditions in trenches, tunneling shafts, or trenchless launch shafts while also mitigating environmental impacts. It may also cause significant delays if the need for dewatering is not known until after construction begins.

It is recommended that a Phase One Environmental Site Assessment be performed to identify potential contaminating activities and provide an assessment of the risk of contaminated groundwater to support the design phases of planned works.

Generally speaking, projects that involve deeper excavations have a greater chance of intersecting the groundwater table and so incur greater risk of requiring dewatering. Furthermore, the deeper the excavation extends below the groundwater table, the greater the dewatering flows.

However, with respect to the existing geological system, several characteristics have been identified within the Study Area that may contribute to higher discharge quantities for construction dewatering. These are as follows:

- Shallow groundwater table: the YPDT data indicates that, in the southern part of the Study Area, groundwater is especially likely to be encountered within the typical range of excavation for sanitary servicing (i.e. up to 3 m depth), especially in the Cooksville Creek catchment area.
- Increased permeability or hydraulic conductivity of geological materials (e.g. coarse deposits with high proportions of sand and gravel or conductive bedrock layers): the YPDT data and water well record review both corroborate the existence of coarse materials (i.e. Scarborough Formation or Thorncliffe Formation Aquifers, outwash, sandy deltaic deposits) within the Study area, especially in the southern part.
- Artesian conditions (i.e. groundwater under pressure in deeper strata so that the piezometric level within those strata is above the ground surface): certain locations in the northern part of the study area (i.e. near Eglinton Ave and Highway 403) may be especially prone to artesian conditions.

In most cases, geotechnical/hydrogeological investigations should include some means of determining piezometric conditions and hydraulic conductivity of subsurface materials. A potential means of determining hydraulic conductivity would be to undertake single-well response testing as well as grain-size distribution tests to determine the hydraulic characteristics of the various materials that may be intersected by project excavations. Piezometric head of groundwater can be determined through the installation of monitoring wells and supplemented by detailed soil logging with the intent of conceptually evaluating groundwater level fluctuations and flow patterns.

<u>Shallow Groundwater Table</u>

A review of well records from shallow wells (total depth less than 7.6 m) within the study area was undertaken and a contour plot of the static water level was produced (see **Figure 5**). The wells meeting this criterion tended to be clustered in the eastern part of the study area, and the depth to the groundwater table tended to range between 1.5 m to 4.4 mbgs. This is generally in agreement with the YPDT data, which shows groundwater levels typically within about 1 m to 4 mbgs.

Though no shallow water level data was found through the well records search for the southwestern portion of the study area, due to the similarity in level of development, surficial geology, and physiography from southwest to northeast across the study area one may expect similar groundwater levels. In general, one would expect shallower depths to groundwater in areas that are within local depressions or topographic low-points. The YPDT data from the Cooksville Creek sections corroborates this interpretation as it shows a similar range of depth to water in the southwestern part of the Study Area as identified in the northeastern part through the water well records search.

<u>Geological Materials</u>

There is significant variability in the types of geological materials within the study area so each of the major types of deposits will be addressed in turn.

Deltaic and Lacustrine/ Glaciolacustrine

These types of deposits were deposited in and at the margins of ancient lakes. Lacustrine/ Glaciolacustrine deposits often show significant layering or stratification due to the seasonality of deposition. There is also significant variability at the margins of lakes where streams may have entered the glacial lake (e.g. deltas).

In general, within the southeastern portion of the study area this material is of a coarse (i.e. sandy) texture (e.g. Scarborough Formation). In these areas, it would be expected that where excavations extend below the groundwater table water-taking will be in excess of 50,000 L/d. A water-taking approval in the via the Environmental Activity and Sector Registry (EASR) would likely be applicable in most cases, except where deep shafts are proposed without the use of impermeable shoring.

An exception would be where excavations are planned to occur within the beach deposits, which lie in a band running parallel to and just north of Dundas Street (see “Lake Iroquois Deposits” on **Figure 4** and “Beaches” on **Figure 3b**). Excavations below the groundwater table in these areas would be expected to require intensive dewatering, potentially millions of litres per day, depending on the depth and size of excavation. A Permit to Take Water may be required for dewatering in this area. Where high groundwater is expected or encountered during hydrogeological investigations, alternate construction methods (e.g. trenchless methods such as horizontal directional drilling or microtunneling) should be considered as a means of reducing the requirement or reliance on dewatering.

Glacial Till/ Diamicton
The northern part of the study area is largely underlain by glacial diamicton referred to as the Halton Till (see **Figure 4**). Halton Till is generally a silty to clayey silt material of high density. These characteristics result in a soil mass of very low hydraulic conductivity. Construction in these areas may be able to proceed with little to no dewatering, depending on the depth of excavation and the variability of the soils at depth. However, developed areas with disturbed or altered ground (e.g. buried services) may yield greater-than-expected potential for groundwater flow to excavations. An EASR approval for construction dewatering would most likely be applicable in soils of this type.

It is noted that the further north one goes, the greater the potential for the work area to be underlain at depth by deposits of the Oak Ridges Moraine, which may bear artesian pressures and may require substantial depressurization at high discharge rates to prevent base heave or internal erosion failure of the soils in the excavation subgrade. For this reason, a Permit to Take Water may be required to gain approval for high-discharge dewatering (i.e. over 400,000 L/d). Alternate construction methods may also be of interest here to reduce reliance on dewatering.

Fluvial Deposits and Alluvium
Fluvial deposits or alluvium are those soils that are deposited by the action of rivers. Due to the nature of deposition by flowing water, these materials tend to be heterogeneous. Additionally, being located near rivers, the water table in these areas is often relatively near the surface and there is potential for topographically-driven artesian pressures to be encountered when excavating within ravines or valleys. The amount of dewatering required in these areas can be moderated by the discontinuity of the productive strata (i.e. lateral extent of coarse deposits may be very limited), but can also be exacerbated due to proximity to a watercourse which may discharge rapidly through interconnected sand seams.

Conditions will vary from site to site and so site-specific investigation would be especially important for these areas. Additionally, these soils are frequently soft and often constitute Type 4 soils when below the groundwater table. Due to the difficulty of providing shoring in such soils, it may be preferable to provide dewatering in advance of excavation.

In any case, it may be worthwhile to avoid sinking deep excavations (i.e. shafts for tunneling) within these areas, unless an impermeable shoring can be provided (e.g. secant pile walls with tremie-plug base). Trenchless methods which do utilize a pressure-balanced face (e.g. MTBM) are recommended in these areas.

Bedrock
The bedrock in the study area is largely dominated by shale and so tends to have low yield. Even still, excavations into Georgian Bay Formation may result in considerable dewatering requirements, especially where the bedrock is particularly fractured.

Where project works are anticipated to involve open cut excavations through bedrock outcrops or areas where bedrock is shallow (see **Figure 4** for surficial expression of bedrock, **Figure 6** for general overview of bedrock depth), site-specific investigation should include coring through bedrock and packer testing where groundwater is encountered.

Artesian Conditions
As previously noted, the water well record database was searched within the study area for wells reported as being “flowing” or with a static water level above ground surface. No such water wells were identified.

However, from prior experience on other Region of Peel projects it is known that artesian conditions do exist within some deep strata of the Oak Ridges Moraine. One location in particular that is known to the authors is the area around Highway 403 and Eglinton Ave. Though it is understood that there is a passive bleeder well drainage system being used to control these artesian pressures (Permit to Take Water 7555-9RQHG3) at that location, other areas may not be similarly protected. Therefore, a PTTW may be required to facilitate construction involving deep excavations in this part of the study area.

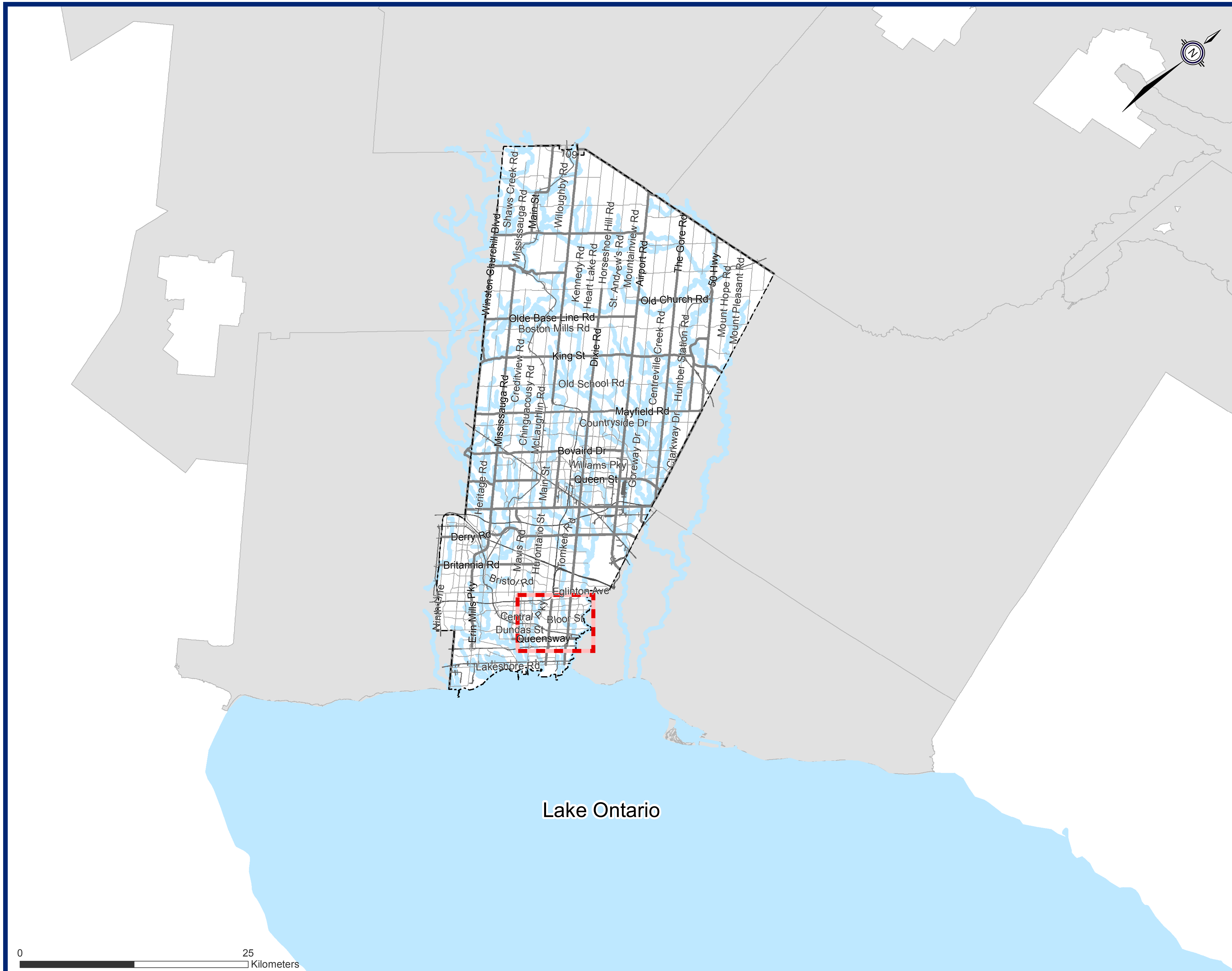
Summary

A planning-level hydrogeological review has been conducted to support a Class EA for the Region of Peel Central Mississauga wastewater system.

Main findings of the study are as follows:

- The study area cuts across two physiographic regions: the South Slope in the northwestern part and the Iroquois Plain in the southeastern part.
- Surficial geology of the area consists largely of four types of deposits:
  - Halton Till dominates the northwestern part
  - Deltaic and Lacustrine/Glaciolacustrine material (Scarborough Formation) dominates the southeastern part
  - Recent alluvium lies adjacent to present day watercourses and
  - Shale bedrock
- Depth to bedrock varies from as shallow as 0.4 m below ground surface to as deep as 16.8 mbgs.
- Depth to groundwater has been identified to be typically 1 to 4 mbgs within the study area but in areas adjacent to creeks or other watercourses it could be essentially at surface.
- In terms of Source Protection, no “Significant” drinking water threats have been identified with respect sewage collection/transmission activities within the Intake Protection Zones, Significant Groundwater Recharge Areas or Highly Vulnerable Aquifers in the study area.
- A source protection policy may apply to the project in the event that a sewer trunk is installed within the Event Based Area associated with the lower part of Etobicoke Creek. However, this policy will be the responsibility of the MECP to undertake and will be executed through the Environmental Compliance Approval for the trunk sewer.
- To provide confidence in construction dewatering discharge estimates, hydrogeological/ geotechnical investigations are recommended to include, at minimum, identification of piezometric groundwater levels (i.e. through installation and observation of monitoring wells supplemented by detailed soil/core logging) a combination of single-well response tests and grain size distribution tests to characterize the hydraulic conductivity of subsurface materials below the groundwater table.
- Where dewatering must occur in the vicinity of impacted groundwater, significant costs may be incurred due to either treating the dewatering discharge or in providing cut-offs or seepage barriers to minimize handling of impacted groundwater: a Phase One Environmental Site Assessment is recommended to help identify potentially-impacted areas, and subsequent geotechnical/hydrogeological testing should include at least some general water quality analyses.
- In general, an EASR approval is recommended to ensure regulatory compliance for construction dewatering. However, some areas within the study area that have been identified as having generally higher risk of requiring construction dewatering beyond EASR eligibility (i.e. more than 400,000 L/d):
  - Gravelly Beach Deposits near Dundas Street: most likely require a Permit to Take Water (PTTW) where excavation is below the groundwater table.
  - Fluvial Deposits/ Alluvium: may require a PTTW due to variability of soils and proximity to surface water, except where impermeable shoring and/or pressure-balanced trenchless method (e.g. MTBM) are employed.
  - Deep excavations in the northern part of the study area: may require a PTTW to provide for depressurization of deep Oak Ridges Moraine deposits to facilitate excavation stability.
  - Excavations into Bedrock: excavation in fractured bedrock may require considerable dewatering and possible PTTW, therefore packer testing is recommended geotechnical investigations in areas where excavation into bedrock is proposed.

FIGURES



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Wastewater Capacity Improvements in Central Mississauga - Schedule 'C' EA

General Features

Study Area	Railway
Municipal Boundary	Provincial Freeways
Other Municipal	Regional Roads
	Major Roads

Figure 1: Study Area Location

Hydrogeological Study

Baseline System Understanding

GM BluePlan ENGINEERING

July, 2019
718018-G-000
NAD 1983 UTM Zone 17N

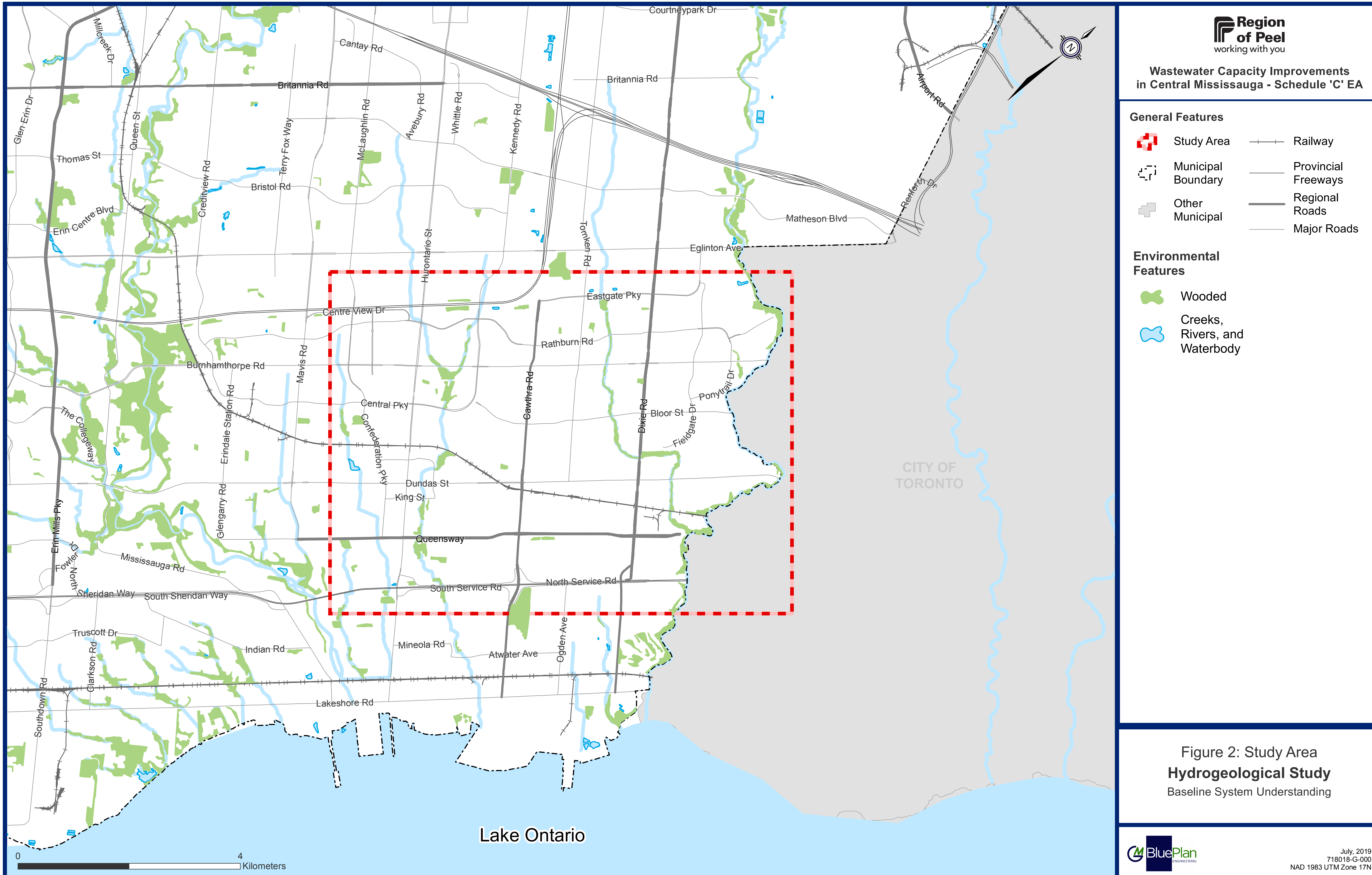

Figure 2: Study Area
Hydrogeological Study
Baseline System Understanding

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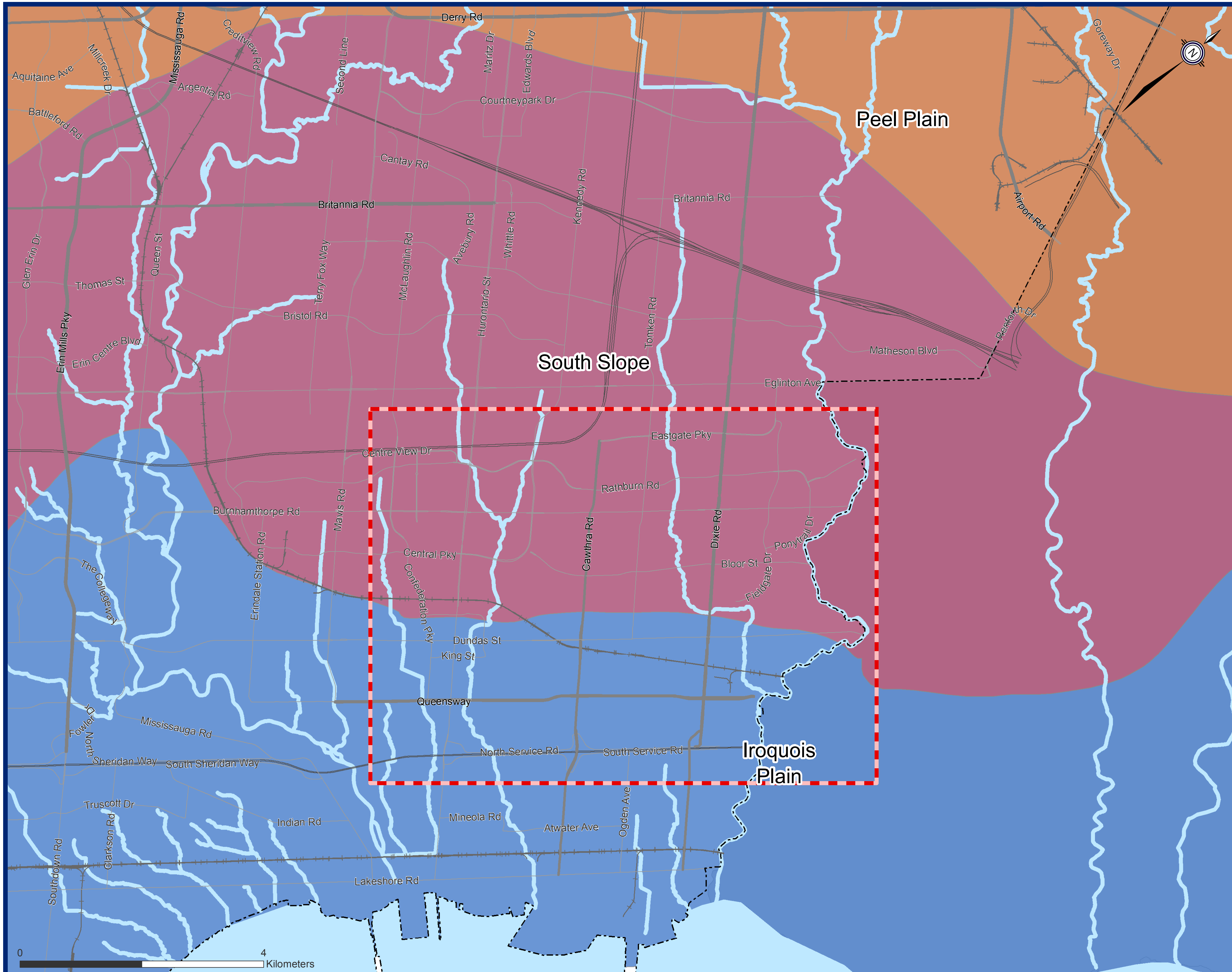
Wastewater Capacity Improvements in Central Mississauga - Schedule 'C' EA



General Features

- Study Area
- Municipal Boundary
- Other Municipal
- Railway
- Provincial Freeways
- Regional Roads
- Major Roads

Environmental Features

Physiographic Regions

Unit, Region

- 32, South Slope
- 33, Peel Plain
- 41, Iroquois Plain

Map includes data from:
Chapman and Putnam 2007

Figure 3: Physiographic Regions
Hydrogeological Study

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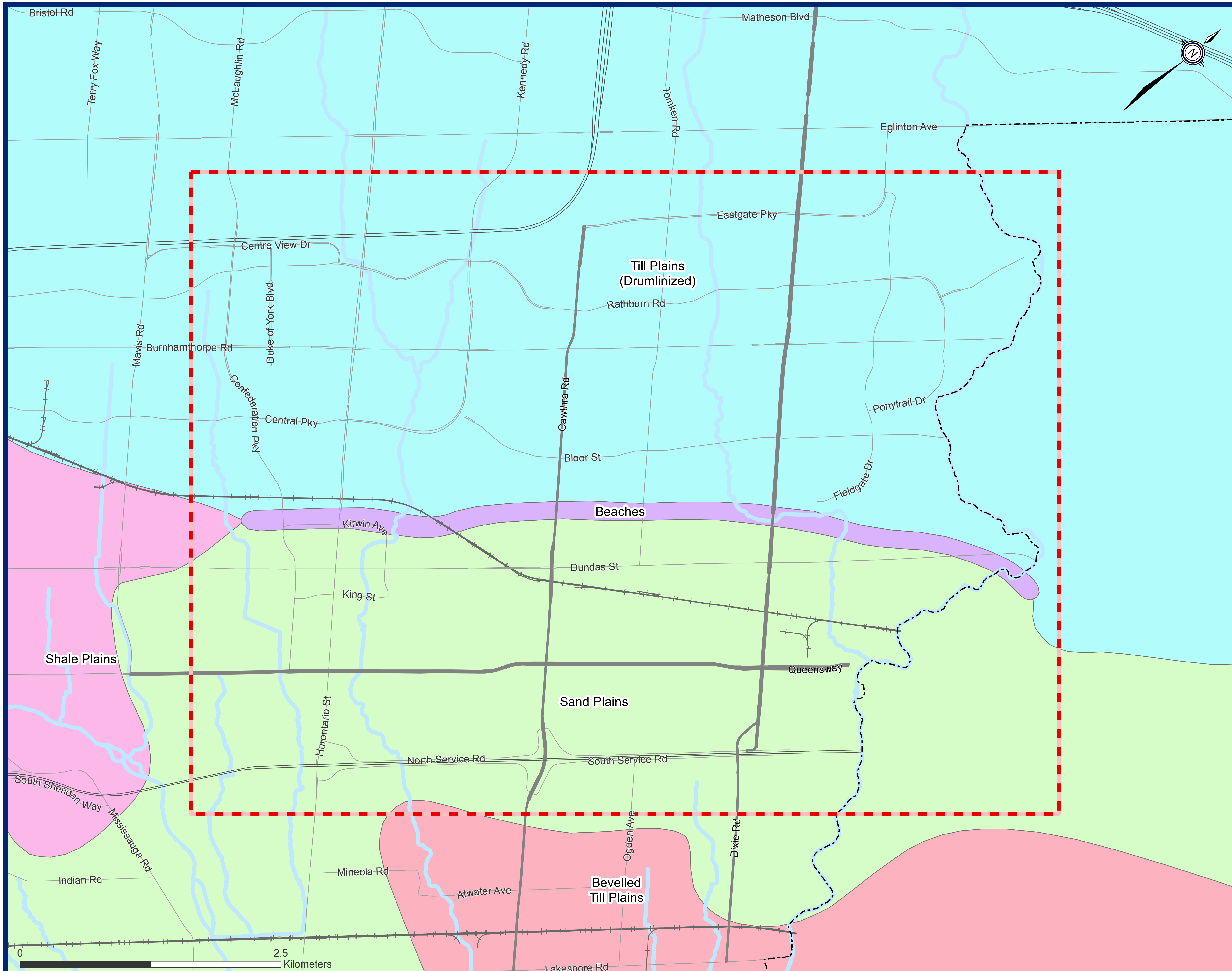

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Wastewater Capacity Improvements in Central Mississauga - Schedule 'C' EA

General Features

- Study Area
- Municipal Boundary
- Other Municipal
- Railway
- Provincial Freeways
- Regional Roads
- Major Roads

Environmental Features

Physiography

- Beaches
- Bevelled Till Plains
- Sand Plains
- Shale Plains
- Till Plains (Drumlinized)

Map includes data from:
Chapman and Putnam 2007

Figure 3a: Physiographic Landforms Hydrogeological Study

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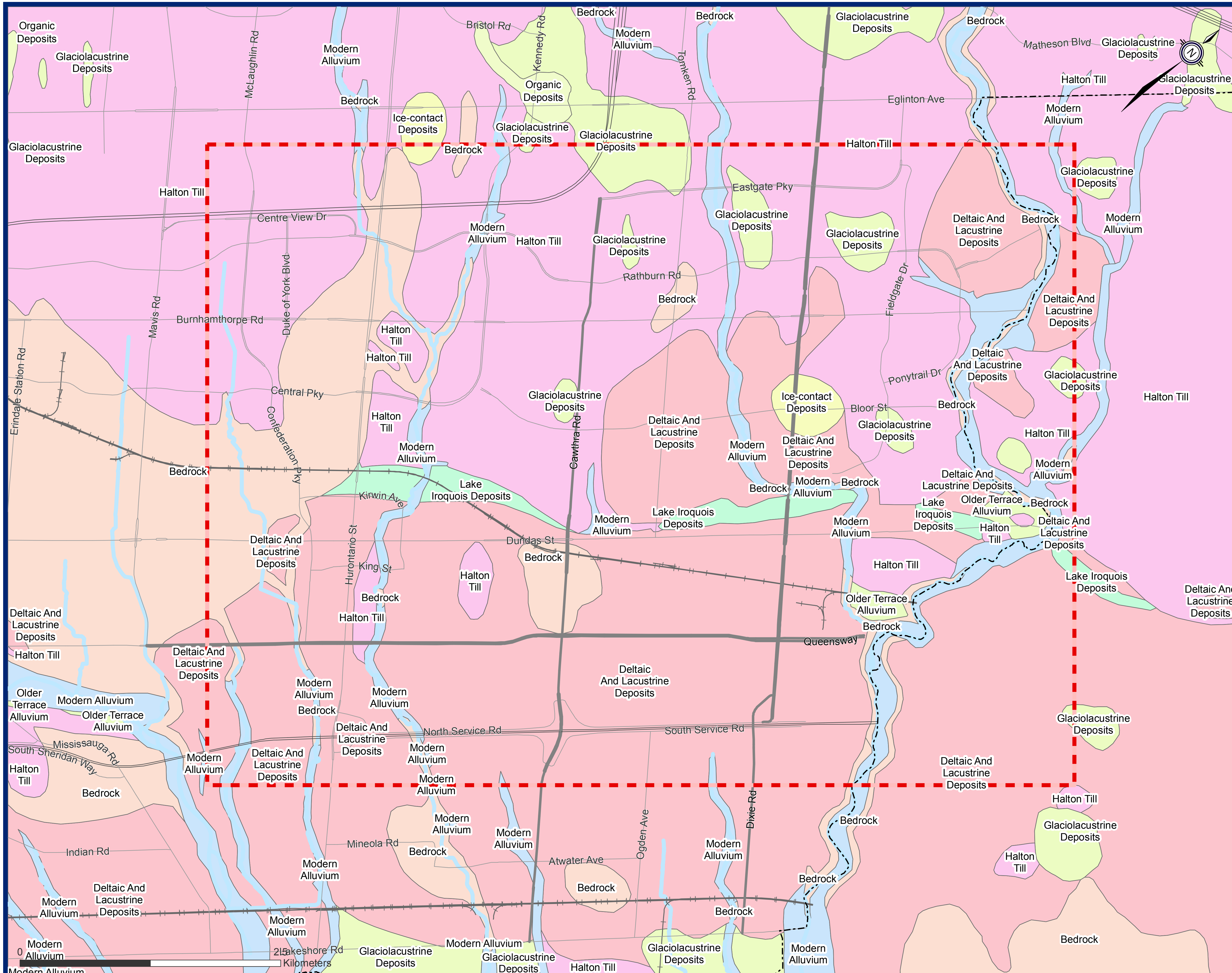

Region of Peel
working with you

Wastewater Capacity Improvements in Central Mississauga - Schedule 'C' EA

General Features

- Study Area
- Municipal Boundary
- Other Municipal
- Railway
- Provincial Freeways
- Regional Roads
- Major Roads

Environmental Features

Surficial Geology

- Bedrock
- Deltaic And Lacustrine Deposits
- Glaciolacust... Deposits
- Halton Till
- Ice-contact Deposits
- Lake Iroquois Deposits
- Modern Alluvium
- Older Terrace Alluvium
- Organic Deposits

Map includes data from:
Ontario Geological Survey

Figure 4: Surficial Geology Hydrogeological Study

Baseline System Understanding

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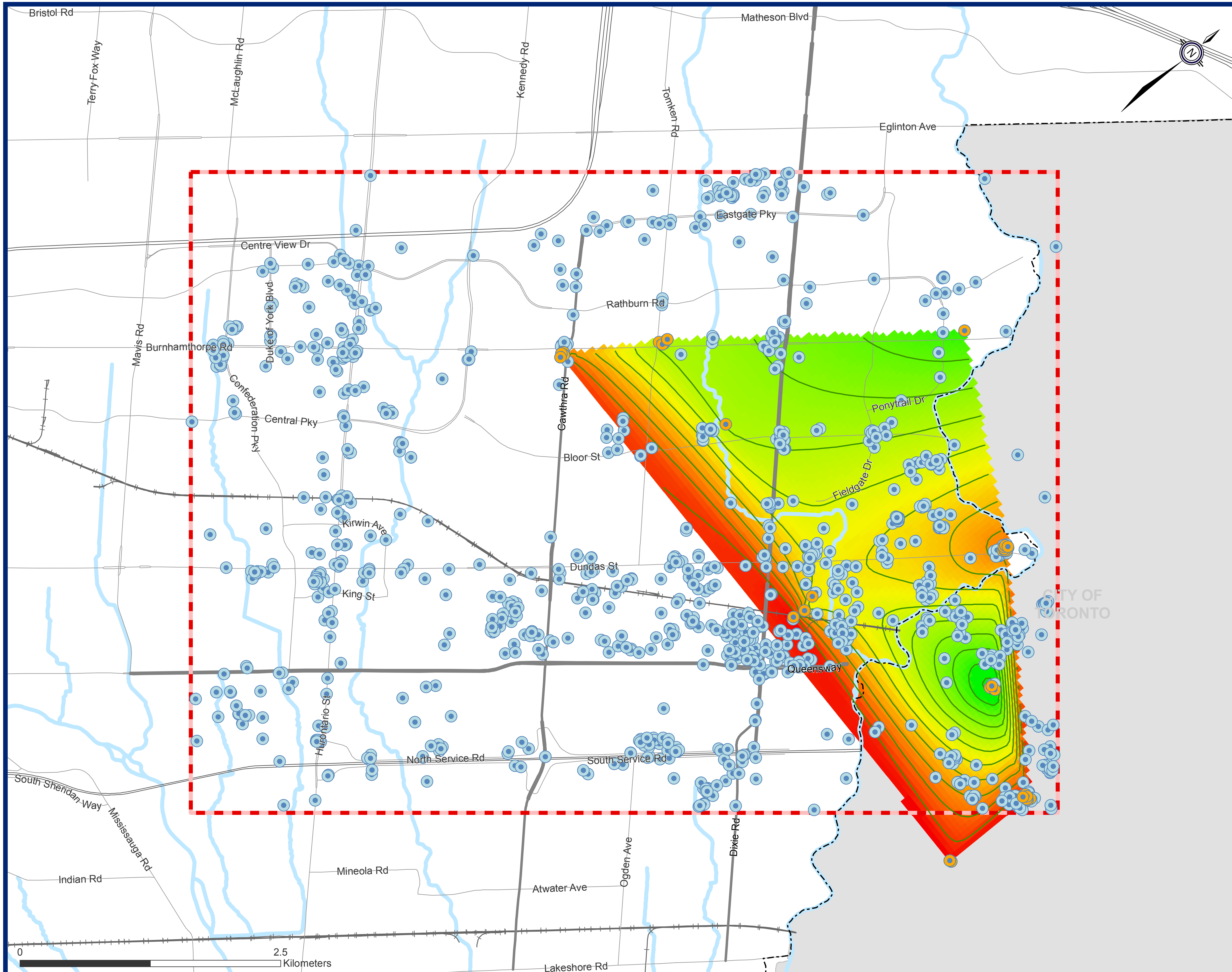
working with you

Wastewater Capacity Improvements in Central Mississauga - Schedule 'C' EA



General Features

- Study Area
- Railway
- Municipal Boundary
- Provincial Freeways
- Other Municipal
- Regional Roads
- Major Roads

Environmental Features

Static Water Level (mbgs)

Value

High : 4.4

Low : 1.6

- MECP Water Well Records (w/ Water Level Data)
- MECP Water Well Records
- Ground Water Table (Contours)

Figure 5: MECP Well Records and Shallow Groundwater Table Hydrogeological Study

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Wastewater Capacity Improvements in Central Mississauga - Schedule 'C' EA

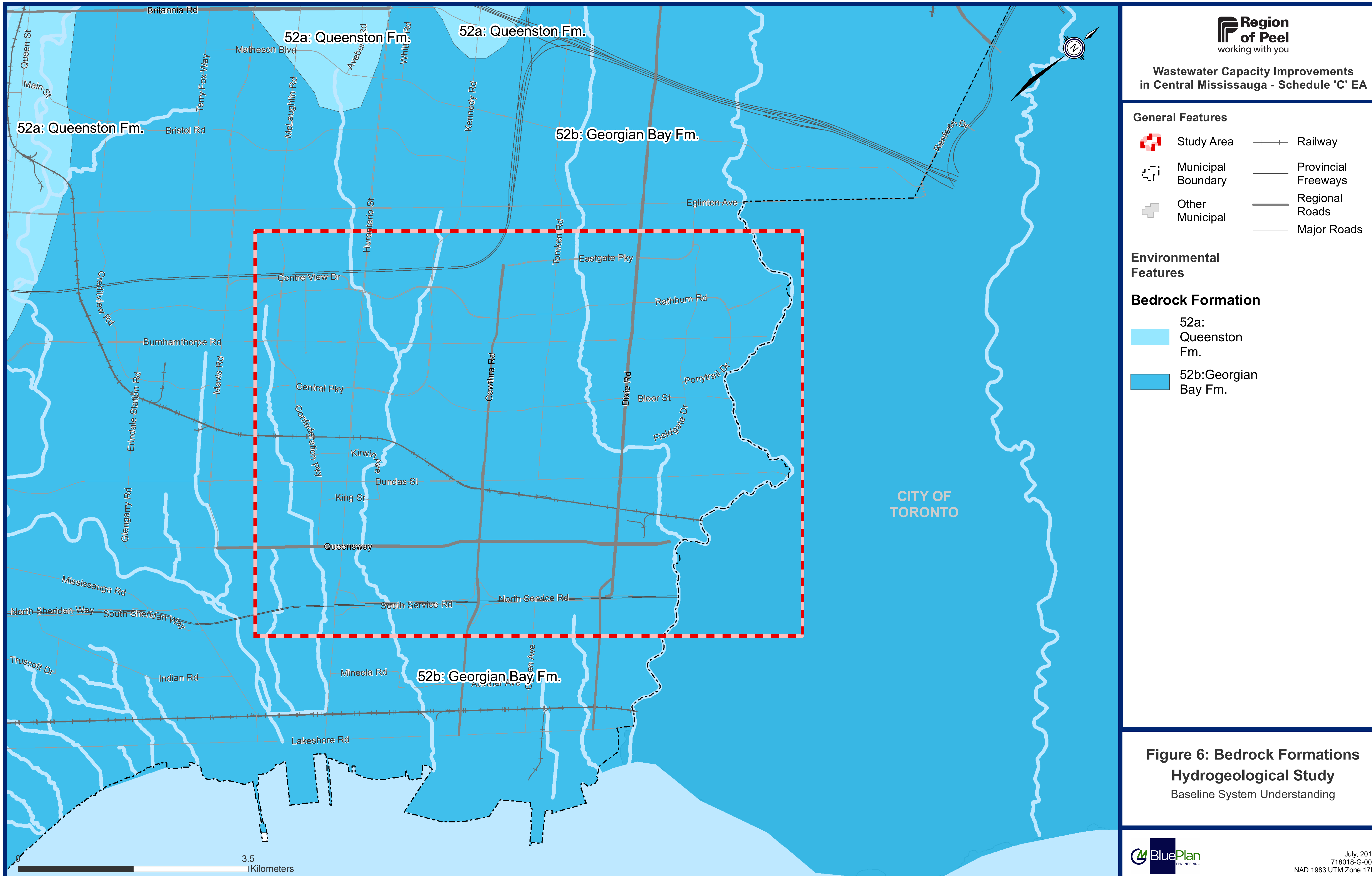

Figure 6: Bedrock Formations Hydrogeological Study

Baseline System Understanding

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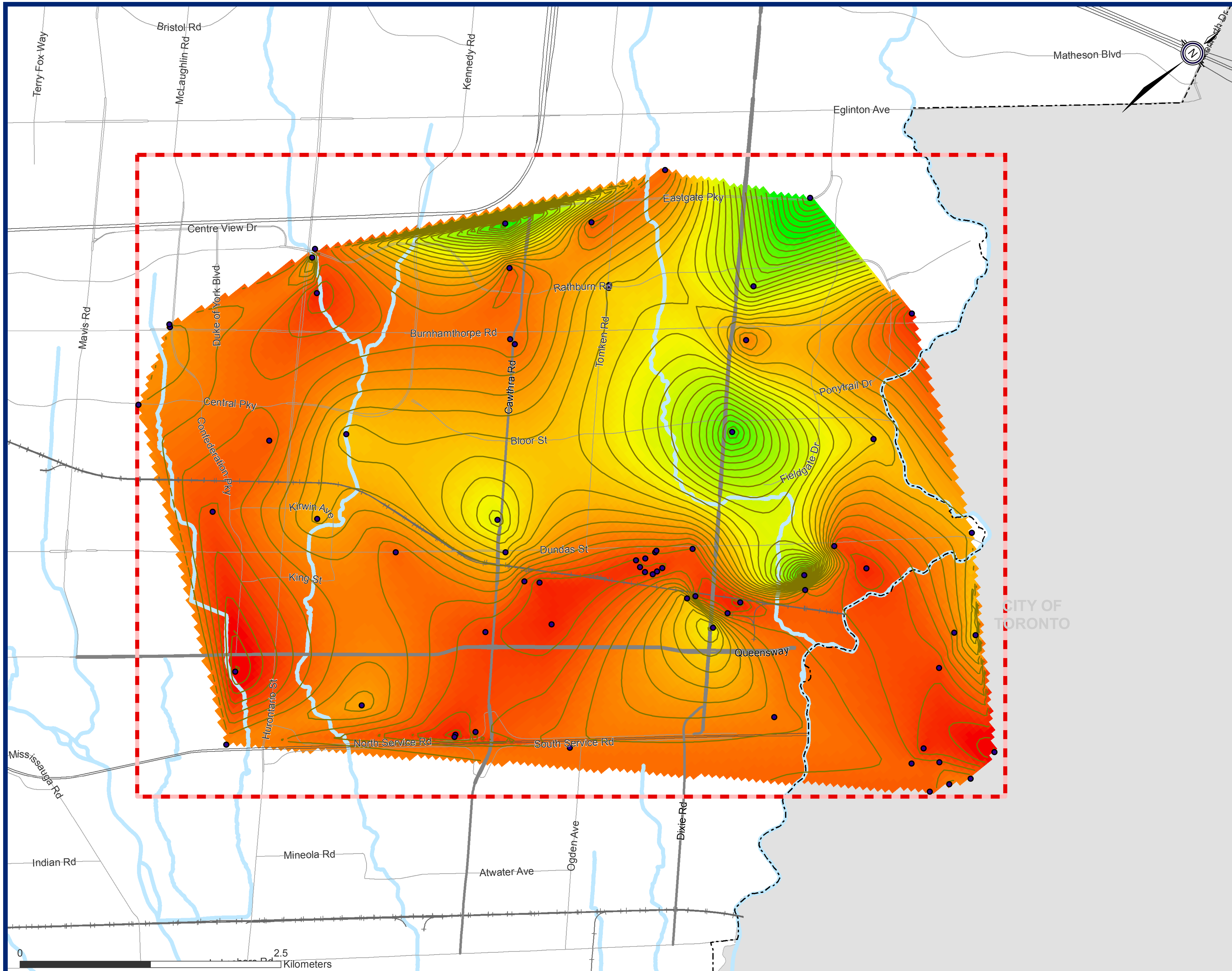
718018-G-000
NAD 1983 UTM Zone 17N



Region of Peel
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Wastewater Capacity Improvements in Central Mississauga - Schedule 'C' EA

General Features

- Study Area
- Railway
- Municipal Boundary
- Provincial Freeways
- Other Municipal
- Regional Roads
- Major Roads

Environmental Features

- Bedrock Subcrop Surface
- Bedrock Subcrop Surface (Contours)

Depth to Bedrock (mbgs)

Value

High : 16.7788

Low : 0.441133

Figure 6a: Depth to Bedrock Hydrogeological Study

Baseline System Understanding

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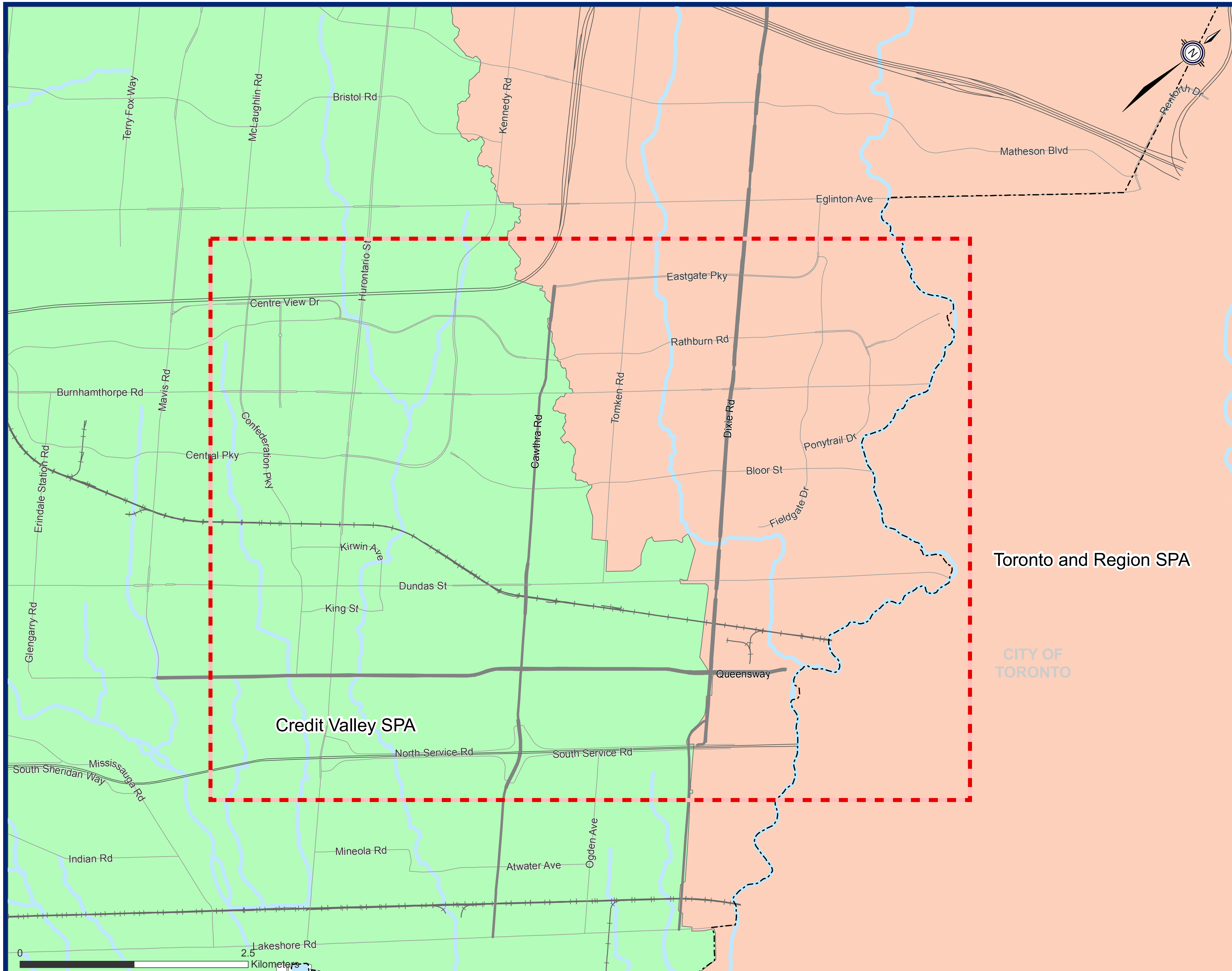
July, 2019
718018-G-000
NAD 1983 UTM Zone 17N



Region of Peel
working with you

Wastewater Capacity Improvements in Central Mississauga - Schedule 'C' EA

General Features

- Study Area
- Municipal Boundary
- Other Municipal
- Railway
- Provincial Freeways
- Regional Roads
- Major Roads

Environmental Features

Source Protection Area

- Credit Valley Source Protection Area
- Toronto and Region Source Protection Area

Map includes data from:
Toronto and Region Conservation Authority,
Credit Valley Conservation Authority

Figure 7: Source Protection Areas
Hydrogeological Study

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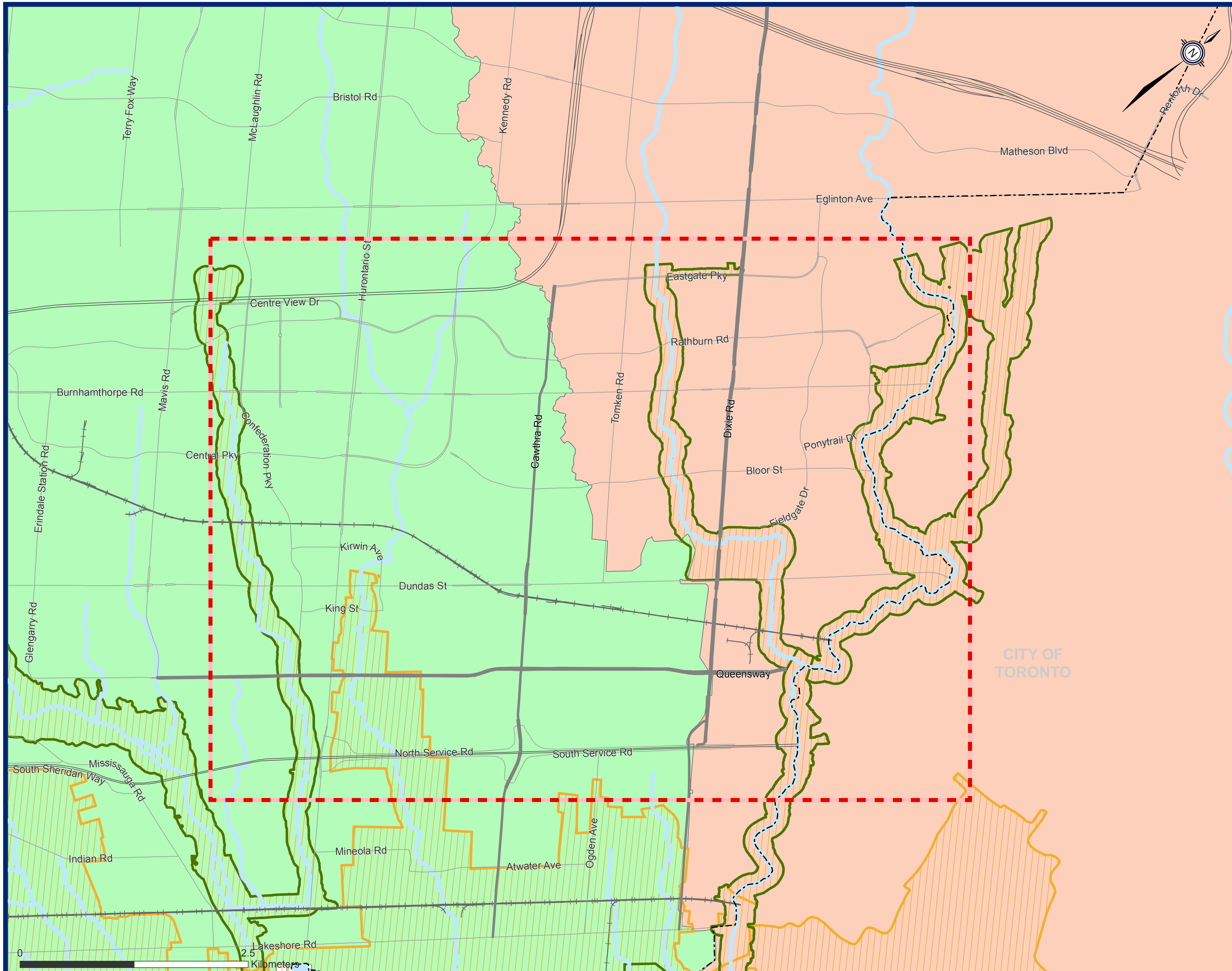
July, 2019
718018-G-000
NAD 1983 UTM Zone 17N



Region of Peel
working with you

Wastewater Capacity Improvements in Central Mississauga - Schedule 'C' EA

General Features

- Study Area
- Municipal Boundary
- Other Municipal
- Railway
- Provincial Freeways
- Regional Roads
- Major Roads

Environmental Features

Source Protection Area

- Credit Valley Source Protection Area
- Toronto and Region Source Protection Area
- Event-Based Areas
- Intake Protection Zones

Map includes data from:
Toronto and Region Conservation Authority,
Credit Valley Conservation Authority

Figure 7a: Source Protection: EBAs and IPZs Hydrogeological Study

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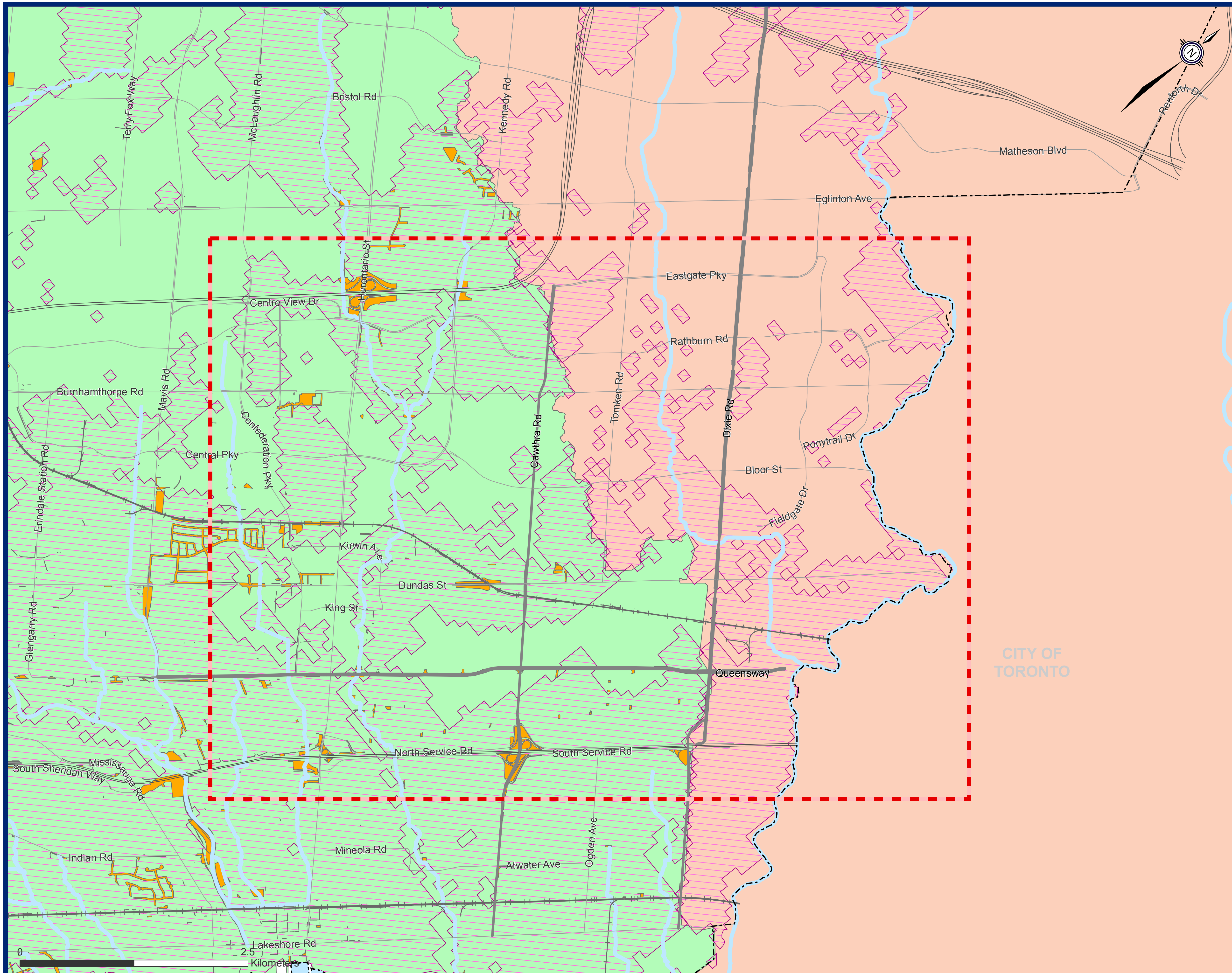
NAD 1983 UTM Zone 17N



Region of Peel
working with you

Wastewater Capacity Improvements in Central Mississauga - Schedule 'C' EA

General Features

- Study Area
- Municipal Boundary
- Other Municipal
- Railway
- Provincial Freeways
- Regional Roads
- Major Roads

Environmental Features

Source Protection Area

- Credit Valley Source Protection Area
- Toronto and Region Source Protection Area
- Highly Vulnerable Aquifers
- Significant Groundwater Recharge Areas

Map includes data from:
Toronto and Region Conservation Authority,
Credit Valley Conservation Authority

Figure 7b: Source Protection: SGRAs and HVAs Hydrogeological Study

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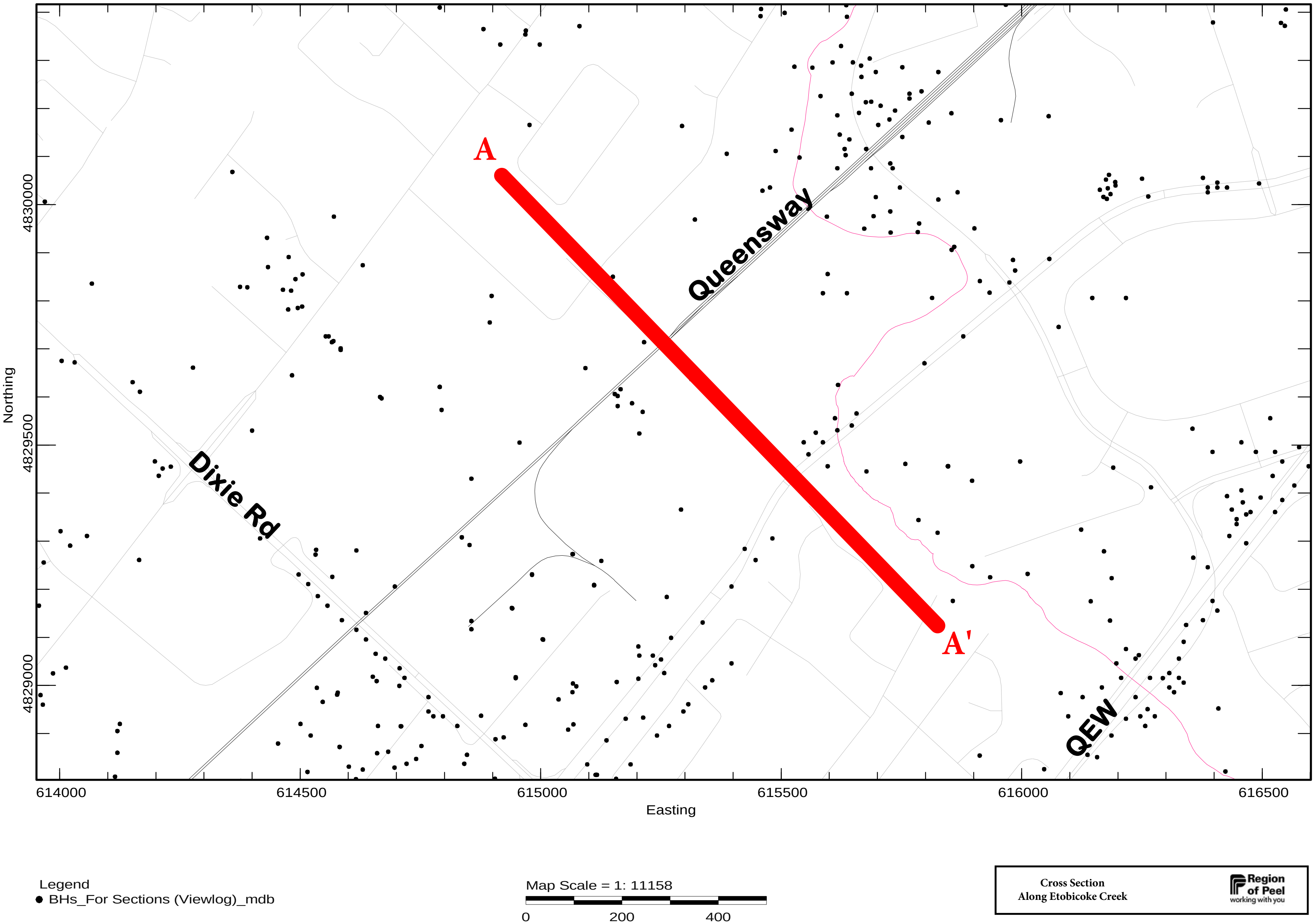
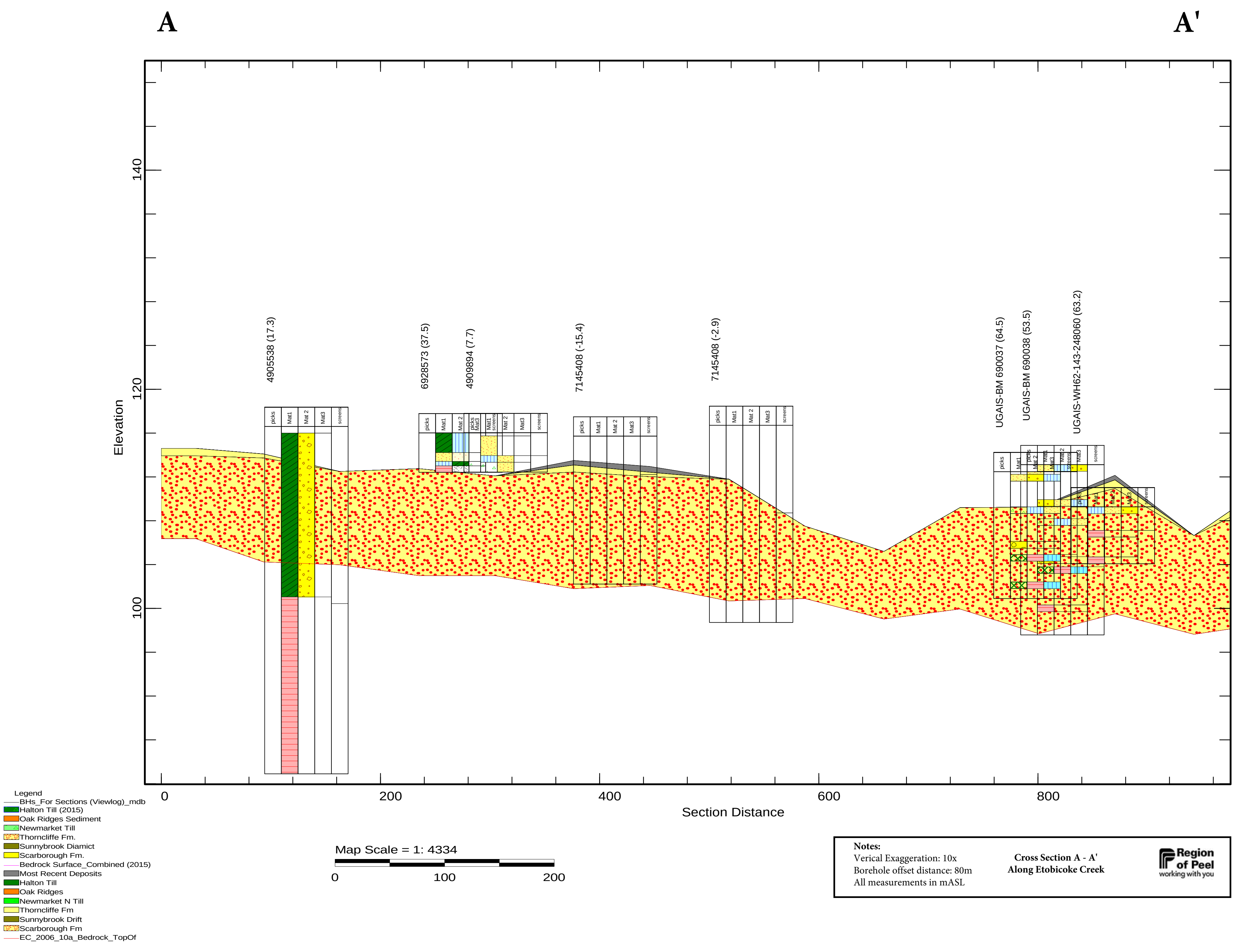
July, 2019
718018-G-000
NAD 1983 UTM Zone 17N

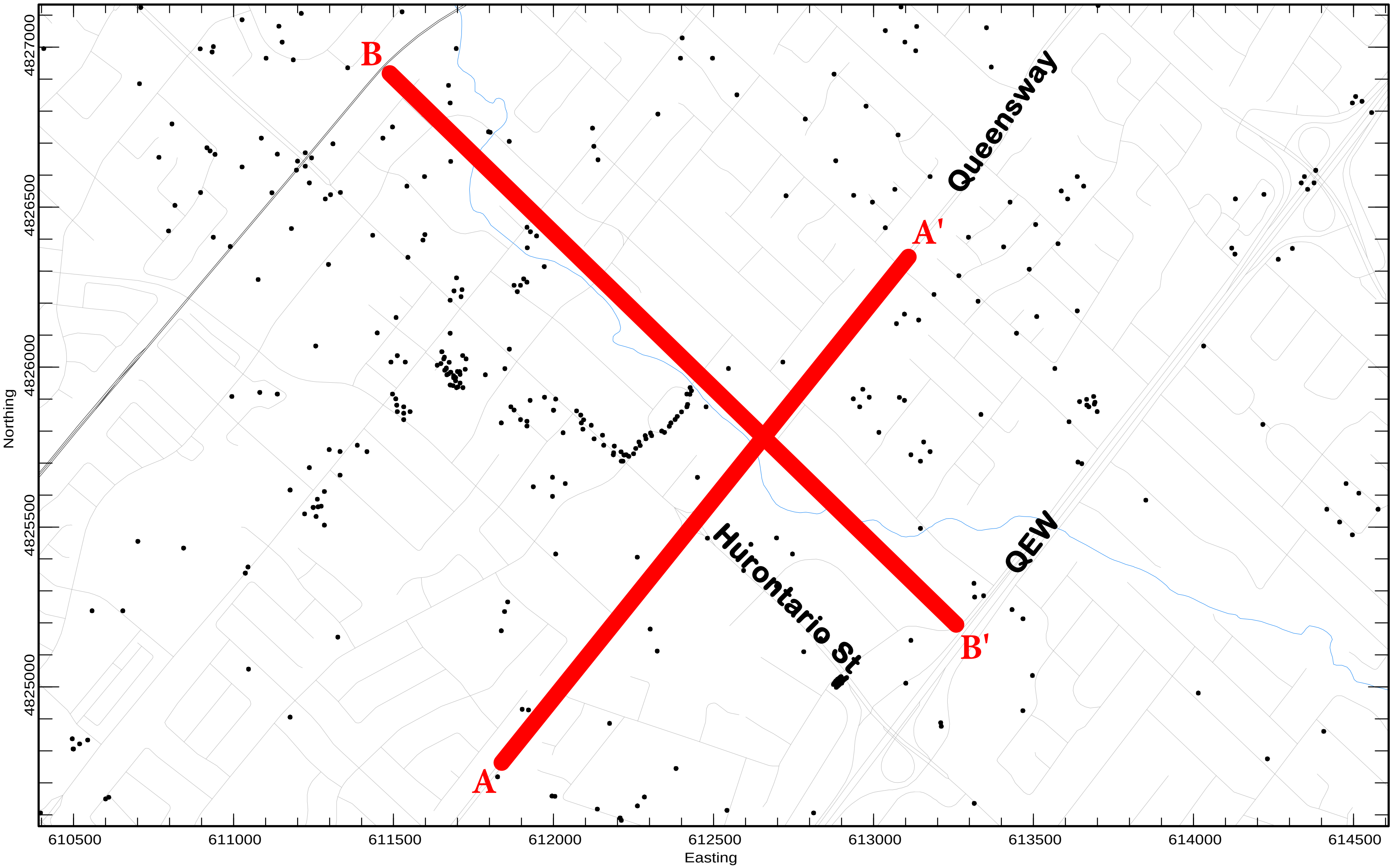
APPENDIX A:
INFORMATION FROM YPDT-CAMC



A
A'
Queensway
Dixie Rd
QEW
Northing
4830000
4829500
4829000
Easting
614000
614500
615000
615500
616000
616500
Legend
BHs_For Sections (Viewlog)_mdb
Map Scale = 1: 11158
0
200
400
Cross Section
Along Etobicoke Creek
Region of Peel
working with you



A
A'
Elevation
140
120
100
4905538 (17.3)
6928573 (37.5)
4909894 (7.7)
7145408 (-15.4)
7145408 (-2.9)
UGAIS-BM 690037 (64.5)
UGAIS-BM 690038 (53.5)
UGAIS-WH62-143-248060 (63.2)
picks
Mat1
Mat 2
Mat3
screens
0
200
400
600
800
Section Distance
Legend
BHs_For Sections (Viewlog)_mdb
Halton Till (2015)
Oak Ridges Sediment
Newmarket Till
Thorncliffe Fm.
Sunnybrook Diamict
Scarborough Fm.
Bedrock Surface_Combined (2015)
Most Recent Deposits
Halton Till
Oak Ridges
Newmarket N Till
Thorncliffe Fm
Sunnybrook Drift
Scarborough Fm
EC_2006_10a_Bedrock_TopOf
Map Scale = 1: 4334
0
100
200
Notes:
Verical Exaggeration: 10x
Borehole offset distance: 80m
All measurements in mASL
Cross Section A - A'
Along Etobicoke Creek
Region of Peel
working with you

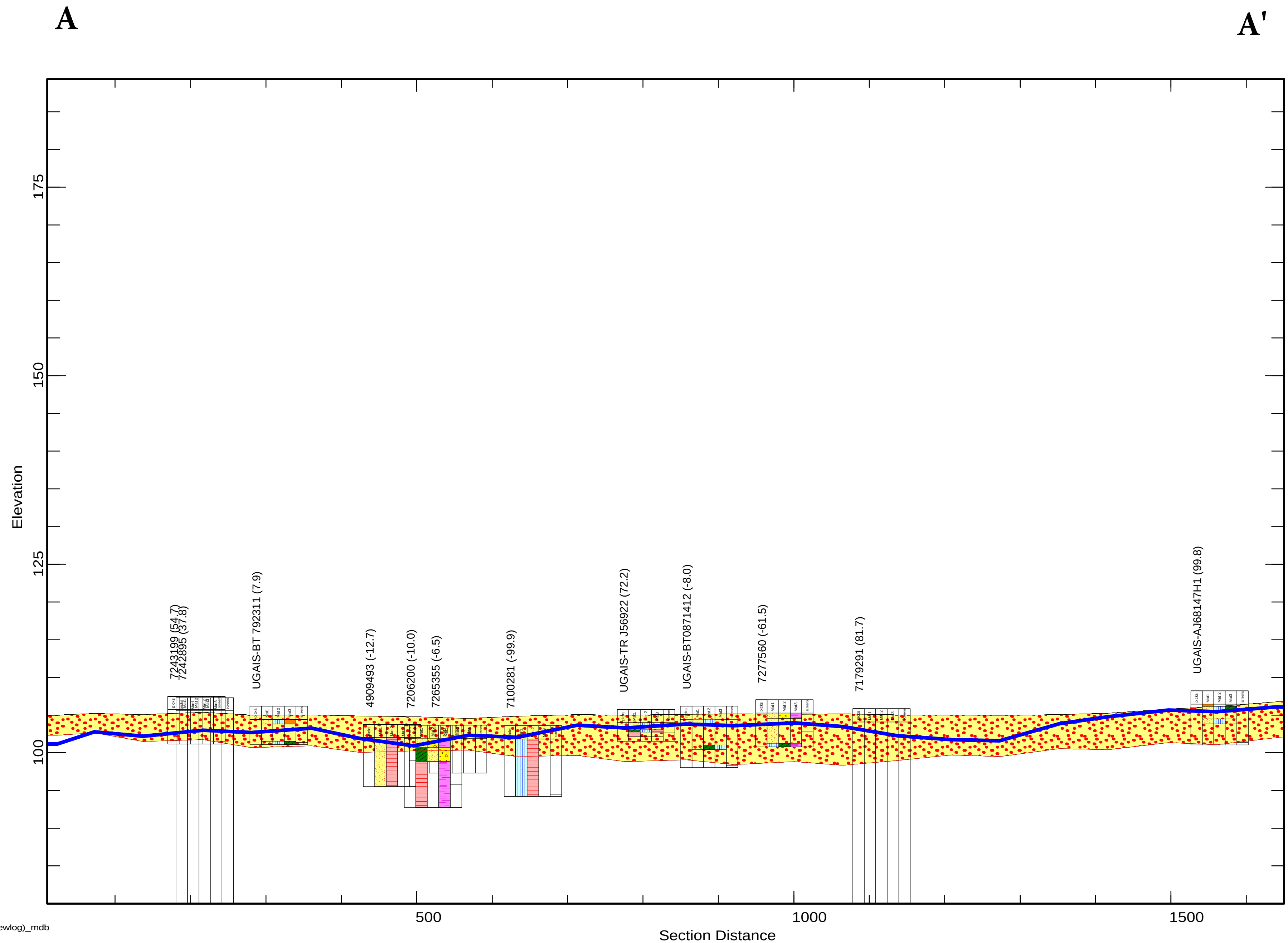


Legend
● BHs_For Sections (Viewlog)_mdb

Map Scale = 1: 17768
0 400 800

Cross Sections
Along Queensway & Cooksville Creek

Region of Peel
working with you



Legend
- BHs_For Sections (Viewlog)_mdb
- Halton Till (2015)
- Oak Ridges Sediment
- Newmarket Till
- Thorncliffe Fm.
- Sunnybrook Diamict
- Scarborough Fm.
- Bedrock Surface_Combined (2015)
- Regional Water Table (Stream Corrected - 2015)
- Most Recent Deposits
- Halton Till
- Oak Ridges
- Newmarket N Till
- Thorncliffe Fm
- Sunnybrook Drift
- Scarborough Fm
- EC_2006_10a_Bedrock_TopOf

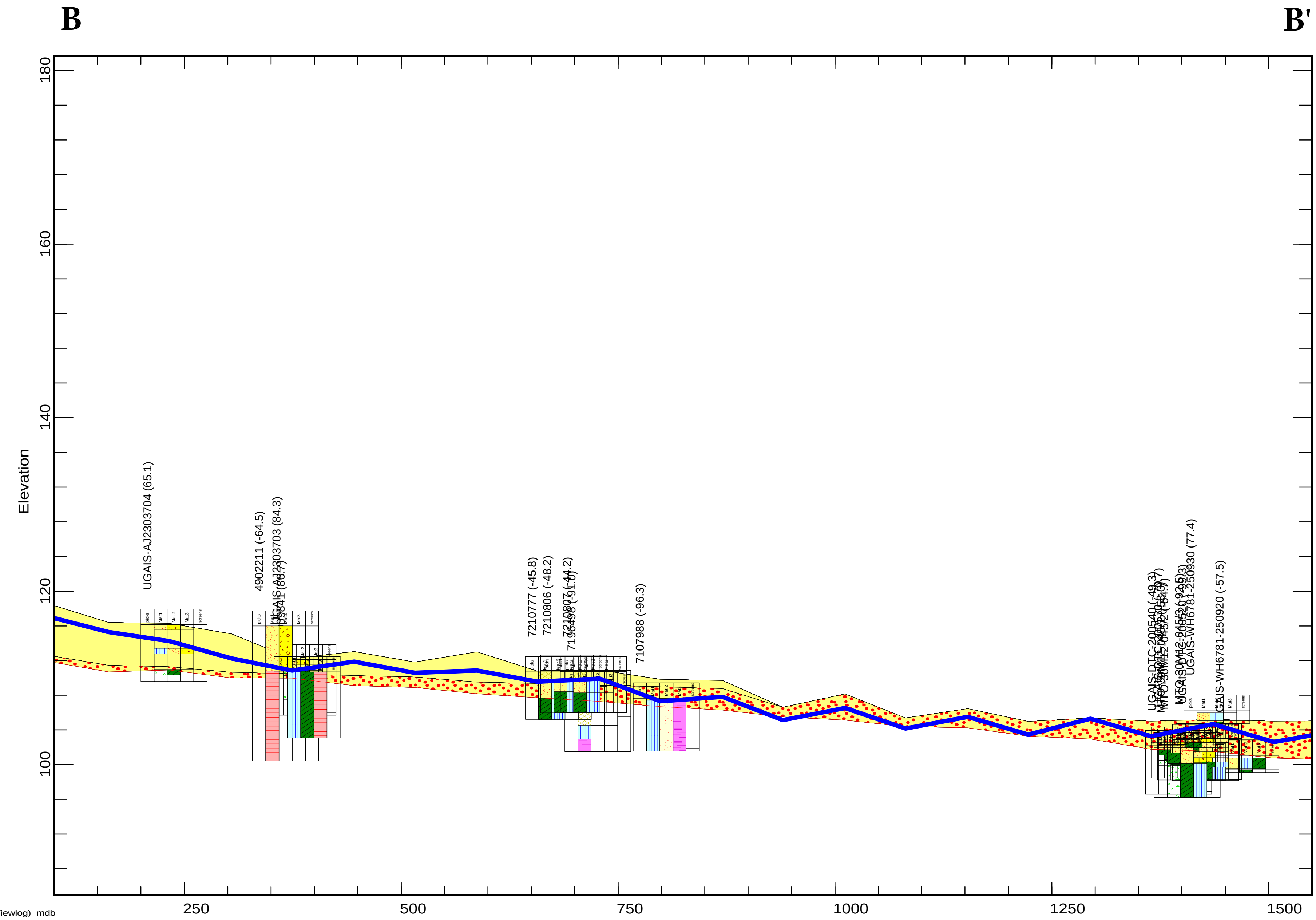
Map Scale = 1: 7174

0 100 200 300

Notes:
Verical Exaggeration: 10x
Borehole offset distance: 100m
All measurements in mASL

Cross Section A - A'
Along Queensway

Region of Peel
working with you



Legend
- BHs_For Sections (Viewlog)_mdb
- Halton Till (2015)
- Oak Ridges Sediment
- Newmarket Till
- Thorncliffe Fm.
- Sunnybrook Diamict
- Scarborough Fm.
- Bedrock Surface_Combined (2015)
- Regional Water Table (Stream Corrected - 2015)
- Most Recent Deposits
- Halton Till
- Oak Ridges
- Newmarket N Till
- Thorncliffe Fm
- Sunnybrook Drift
- Scarborough Fm
- EC_2006_10a_Bedrock_TopOf

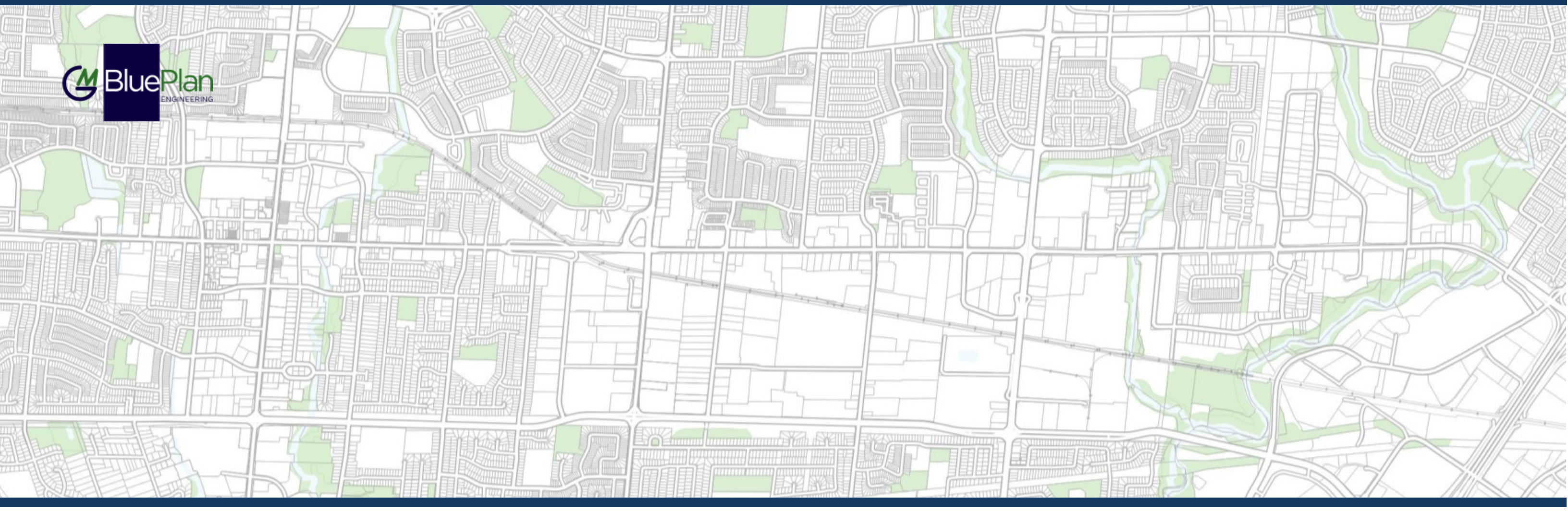
Map Scale = 1: 6343

0 100 200

Notes:
Verical Exaggeration: 10x
Borehole offset distance: 100m
All measurements in mASL

Cross Section B - B'
Along Cooksville Creek

Region of Peel
working with you



REGION OF PEEL

WASTEWATER CAPACITY IMPROVEMENTS IN CENTRAL MISSISSAUGA

Hydrogeological Reports

Baseline

Shaft Site Numbering

Table 1 provides a summary of the changes in shaft numbering during the study from the shaft site evaluation ("Previous Shaft No.") to preferred design ("Final Shaft No.").

The Baseline Hydrogeological Report references the previous shaft numbering. The Environmental Study Report (Section 7 to Section 11) and Supporting Technical Studies completed on the preferred design reference the final shaft numbering.

Table 1: Shaft Site Number Updates

Alignment	Intersection	Previous Shaft No.	Final Shaft No.
Etobicoke Creek	Sherway Drive	1	1
Queensway East	Etobicoke Creek	2	2
Queensway East	Dixie Road	3	3
Queensway East	Stanfield Road	4	Screened out
Queensway East	Haines Road	5	Screened out
Queensway East	Cawthra Road	6	4
Queensway East	Tedlo Street	7	5
Queensway East	Hensall Street	8	6
Queensway East	Cliff Road	9	7
Queensway East	Camilla Road	10	Screened out
Queensway East	Cooksville Creek	11	8
Queensway East	Hurontario Street	12	9
Cawthra Road	Needham Lane	13	Screened out
Cawthra Road	Dundas Street East	14	10
Burnhamthorpe Road	Cawthra Road	15	11
Burnhamthorpe Road	Wilcox Road	16	Screened out
Burnhamthorpe Road	Central Parkway	17	12

Prepared By:

GM BluePlan ENGINEERING

Region Of Peel

Baseline Hydrogeological Report for Schedule "C" MCEA Wastewater Capacity Improvements in Central Mississauga

GMBP File: 718018

December 2020

Region of Peel working with you

GUELPH | OWEN SOUND | LISTOWEL | KITCHENER | LONDON | HAMILTON | GTA
650 WOODLAWN RD. W., BLOCK C, UNIT 2, GUELPH ON N1K 1B8 P: 519-824-8150
WWW.GMBLUEPLAN.CA

EXECUTIVE SUMMARY

As part of a greater Schedule "C" Municipal Class Environmental Assessment, a desktop hydrogeological assessment ("Study") has been completed to support the selection of a preferred solution for the capacity improvements in the central Mississauga wastewater drainage/collection system.

The proposed solution for the wastewater capacity improvements project includes the installation of 13 shaft sites and the installation of approximately 7 km of sewer pipe by trenchless techniques, as well as an open-cut crossing of Etobicoke Creek near Sherway Drive.

This Study involved the review of a variety of publicly available documents and reports on-file. A conceptual hydrogeological model was prepared using the results of the review information. Some key points identified in the conceptual model are as follows:

- Hydrogeology generally dominated by units generally considered to be aquitards (e.g. Georgian Bay Formation shale, various dense/fine-textured till and drift)
- A few shaft Sites (03A, 06A, 09C, and 17C) were found to be located where the proposed shafts will intersect local overburden aquifers, such as the Thorncliffe Formation or the Oak Ridges Moraine aquifer complex.
- A few shaft Sites were found to be located where there is some increased potential to encounter contaminated groundwater:
  - Site 15C: past reports indicate impacted groundwater on-Site in association with former fuel usage at the Site.
  - Site 17C and 06A: these Sites are located within 100 m of a gas station (or former gas station), so there is potential for migration of impacted groundwater to the Site if prolonged construction dewatering is undertaken.

An impact assessment was completed to identify potential impacts that groundwater may have on the proposed project and vice versa. Key findings of the impact assessment were as follows:

- The project is not expected to trigger issues, risk management plans, or "Significant" drinking water threat activities with respect to Source Protection.
- The project is not likely to cause impacts to ecological systems, though it has been recommended that additional protection be provided to the pipe where it crosses Etobicoke Creek.
- The main effect of groundwater on the project is with respect to construction dewatering as it will affect approvals requirements.
- Dewatering rates at a given shaft Site are expected to be greater than 50,000 L/d but less than 400,000 L/d. The construction dewatering approval that is most likely to be required would be registration through the Environmental Activity and Sector Registry (EASR). Exceptions to this would be cases where:
  - The bedrock at the shaft location is of exceptionally high transmissivity and watertight shoring is not provided.
  - Multiple shafts require construction dewatering simultaneously.
- Management of discharge from dewatering activities will likely require the approval/permission of the operator of the receiving structure (e.g. City of Mississauga for discharge to storm sewers; Region of Peel for discharge to sanitary sewers). Approval from Conservation Authorities may also be required for select sites near watercourses (TRCA for Sites 01B and 02A; CVC for Site 11A). Treatment of discharge water will likely be required.

A brief overview of monitoring, mitigation and contingency activities has been included in this Study, however the scope of these activities should be refined and developed more fully through the detailed design stage.

Additional recommendations have also been provided, some of which are as follows:

- Watertight shoring is recommended to be provided, especially where shafts are expected to penetrate aquifers (i.e. Sites 03A, 06A, 09C, and 17C) or where there is elevated potential to intersect contaminated groundwater (i.e. Sites 06A, 15C, 17C).
- Further study to confirm groundwater quality on-Site and to confirm hydraulic properties of subsurface materials (especially if watertight shoring is not to be provided).
- At minimum, a construction dewatering approval in the form of EASR should be anticipated, though a PTTW may be required if the results of detailed investigation or construction methodology or scheduling requirements indicate otherwise.

- Construction sites should be laid out to ensure that there is capacity to provide sufficient treatment to construction dewatering discharge water before release.

In general, the proposed solution presents minimal risk from the perspective of potential hydrogeological impacts. Activities that may present some degree of risk are expected to be manageable using common or typical construction approaches to address the risks within the framework/layout of the proposed solution.

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BASELINE HYDROGEOLOGICAL REPORT FOR SCHEDULE "C" MCEA
WASTEWATER CAPACITY IMPROVEMENTS IN CENTRAL MISSISSAUGA

REGION OF PEEL

DECEMBER 2020

GMBP FILE: 718018

1. INTRODUCTION

The Region of Peel (the Region) have retained GM BluePlan Engineering Limited (GMBP) to undertake a Schedule “C” Municipal Class Environmental Assessment (MCEA) to select a preferred solution for the capacity improvements of the wastewater collection system in central Mississauga.

This hydrogeological baseline report has been prepared to provide information to support the decision-making process as well as to provide insight as to potential impacts that the project and its construction may have on the local hydrogeology and vice versa.

1.1 Project Description

From the MCEA work completed to date, a set of 13 locations have been identified as likely candidates to serve as sites for the construction of shafts which will facilitate the other upgrades/capacity improvement work (the Project). Figure 1 shows the locations of these potential shaft sites within the City of Mississauga.

These shafts will be used to gain access to facilitate the trenchless installation of new infrastructure. One section of the proposed sewer installation will cross Etobicoke Creek: this is likely to be completed using open-cut methods.

1.2 Objectives

The objectives of this report are:

1. to present a summary of relevant hydrogeological information regarding the shaft sites (Sites) and other works that form part of the Project;
2. to identify potential hydrogeological impacts that may be caused by or may affect the Project; and
3. to provide preliminary considerations for impact management.

The findings of this study will be factored into the decision-making process to select the preferred solution for the wastewater system capacity improvements in the Central Mississauga area.

1.3 Background

A preliminary hydrogeological memorandum was prepared by GMBP (dated January 24, 2020). That study was based on a general project area and not on specific sites or proposed works within the area. As such, where this report differs from the preliminary memorandum, the information, analysis and conclusions in this report shall prevail.

This report has been prepared with the intent of focusing on 13 shaft sites (Sites) which form the selected locations under consideration for the preferred solution. The Table 1 below provides a list of the Site IDs and a brief description of the location:

Table 1: Shaft Locations and Prospective Pipe Invert Elevations.

Site ID (Pipe Invert Elev)	Site Location	Site ID (Pipe Invert Elev)	Site Location
01B (90.9 masl)	Queensway and East Trunk	10A (96.1 masl)	Queensway and Camilla
02A (91.1 masl)	Queensway and Etobicoke Creek	11A (96.2 masl)	Queensway and Cooksville Creek
03A (92.3 masl)	Queensway and Dixie	12B (96.7 masl)	Queensway and Hurontario
06A (94.4 masl)	Queensway and Cawthra	14B (117.5 masl)	Cawthra and Dundas
07A (94.8 masl)	Queensway and Tedlo	15C (120.8 masl)	Burnhamthorpe and Cawthra
08B (95.1 masl)	Queensway and Hensall	17C (122.7 masl)	Burnhamthorpe and Central Parkway
09C (95.5 masl)	Queensway and Cliff		

*masl – metres above sea level

Figure 1 shows the locations of the Sites within the City of Mississauga.

Appendix A provides a series of figures showing a preliminary/ proposed profile of the new sanitary sewer to be constructed between the various shaft locations.

New pipe will be installed along a more-or-less straight alignment using trenchless methods (e.g. a tunnel-boring machine) between Sites 17C and 15C, between 14B and 6A, and between 12B through to 02A. From 02A to 01B there are several alignments under consideration, but all are common in that open cut methods will be used for the crossing of Etobicoke Creek. Based on the preliminary profiles, an estimated elevation for the pipe invert at each shaft has also been entered in Table 1 above.

2. METHODOLOGY

This Baseline Hydrogeological Report was completed using desktop methods only. As such, this document will frequently refer to particular sources, cited in the text and listed in Section 11.

The information reviewed generally falls into the following categories:

- Publicly available geological and hydrogeological maps and reports from the Ontario Geological Survey, Ministry of Energy, Northern Development and Mines
- Water well records and approvals information available from the Ministry of the Environment, Conservation and Parks
- Relevant geotechnical and hydrogeological reports on-file from the Region of Peel
- York, Peel, Durham and Toronto and the Conservation Authorities Moraine Coalition (YPDT-CAMC) model information.

Section 3 and 4 of this report will present a summary of this information by category.

Section 5 will synthesize the collected information and present a conceptual hydrogeological model.

Section 6 will identify and assess potential hydrogeological impacts due to and/or incident upon the project.

Section 7 will discuss the management of those impacts.

3. HYDROGEOLOGICAL SETTING

3.1 Topography and Drainage

The topography of the area follows a relatively uniform slope at a grade of about 1% southeastward toward Lake Ontario, though there are local variations where drainage is more predominantly northeast or southwest toward nearby watercourses, such as Etobicoke Creek and Cooksville Creek.

All of the shaft Sites are located within catchments that drain to Lake Ontario. Table 2 below gives a summary of the associated tributary streams corresponding to each Site:

Table 2: Hydrological/Watershed Information for each Site.

Site ID	Catchment Area / Stream Name	Distance and Direction from Site
01B	Etobicoke Creek	Near*
02A	Etobicoke Creek	Near*
03A	Etobicoke Creek	650 m, NE
06A	Cooksville Creek	1380 m, SW
07A	Cooksville Creek	1000 m, SW
08B	Cooksville Creek	830 m, SW
09C	Cooksville Creek	500 m, SW
10A	Cooksville Creek	180 m, SW
11A	Cooksville Creek	Near*
12B	Cooksville Creek	215 m, NE
14B	Cooksville Creek	1260 m, SW
15C	Cooksville Creek	900 m, SW
17C	Cooksville Creek	160 m, SW

*Near – the Site is located within or across the ravine area of this stream.

The Sites lie in a heavily developed area within the City of Mississauga: most of the drainage is controlled by the municipal stormwater management system.

3.2 Physiography

Each of the Sites lies within one of two physiographic regions (per Chapman and Putnam 1984):

- Sites 15C and 17C lie within the South Slope
- The remaining Sites lie within the Iroquois Plain

Figure 2 shows the layout of the Sites across these physiographic regions.

The South Slope is so-named as it forms the southern slope of the Oak Ridges Moraine. It occupies an extensive drumlinized till plain which features numerous streams that typically cut northwest to southeast across this region, in some areas creating steep-walled ravines in the till soils. The area is also characterized by low-lying, undulating ground moraine with irregular knolls and hollows.

The Iroquois Plain is named after the glacial Lake Iroquois which was situated in roughly the same basin area occupied by Lake Ontario today. This region was inundated by then-Lake Iroquois and so lacustrine and deltaic deposits dominate, as well as alluvial deposits formed by more recent stream erosion.

In terms of physiographic landforms, the Sites are similarly distributed across two landforms:

- Sites 15C and 17C lie upon a drumlinized till plain
- The remaining Sites lie upon a sand plain.

Figure 3 shows physiographic landforms in the vicinity of the Sites.

3.3 Surficial Geology

The surficial geology in the vicinity of the Sites is predominantly coarse glaciolacustrine material (sand) and glacial till (silt to clayey texture). Table 3 below identifies the surficial geology of each Site and greater detail (Ontario Geological Survey 2010) is provided in the text to follow:

Table 3: Summary of Surficial Geological Material at each Site.

Site ID	Surficial Geology	See Figure
01B	Modern Alluvium	4a
02A	Paleozoic Bedrock	4a
03A	Glaciolacustrine Sand	4a
06A	Paleozoic Bedrock/ Glaciolacustrine Sand	4b
07A	Glaciolacustrine Sand	4b
08B	Glaciolacustrine Sand	4b
09C	Glaciolacustrine Sand	4b
10A	Glaciolacustrine Sand	4b
11A	Modern Alluvium	4b
12B	Glaciolacustrine Sand	4b
14B	Glaciolacustrine Sand/ Beach Gravel	4b
15C	Glacial Till (Halton Till)	4c
17C	Glacial Till (Halton Till)	4c

Modern alluvium is typically a stratified deposit of gravel, sand, silt, clay and organic material. It is formed by the erosion/deposition action of watercourses (in the case of Site 01B, Etobicoke Creek and in the case of Site 11A, Cooksville Creek).

Glaciolacustrine Sand in this area is mainly lacustrine (i.e. lake bed) and deltaic (i.e. delta deposits that form at the mouth of a river) associated with glacial/historic Lake Iroquois. The material is described as being gravelly sand and silty sand and is likely stratified/heterogeneous across the area.

Paleozoic Bedrock of this area is of the Georgian Bay Formation. More information on the local bedrock is provided in Section 3.4.

Beach Gravel refers to a beach deposit that was formed at the margin of former glacial Lake Iroquois. This material would be expected to be relatively uniform in texture and free-draining.

3.4 Bedrock Geology

The Georgian Bay Formation underlies the City of Mississauga in the vicinity of the Sites (Ontario Geological Survey 2011). It is an Upper Ordovician-age deposit consisting mainly of shale (blue-grey to brown to black). It also contains thin layers of limestone and calcareous (i.e. calcium carbonate-rich) siltstones interbedded in the shale (Armstrong and Dodge 2007).

The upper portion of the bedrock is weathered and the weathered bedrock unit often extends for a significant thickness (several metres). In some locations the weathered bedrock forms a till-shale complex with overlying glacial till deposits.

3.5 Hydrostratigraphy and Groundwater Flow

The following is a list of the major hydrostratigraphic units identified in the vicinity of the Sites according to the Peel Region Water Management Model (2019). Aquifers are identified in bold text and the units are listed in reverse chronological order according to deposition time (i.e. younger deposits listed first).

- Post-Glacial Deposits
    - Mainly associated with recent alluvial deposits and areas near streams or former streams. Likely to be a heterogeneous/stratified deposit of sand, silt and gravel.
- Halton Till
    - Silt to clayey silt till.
- **Lower Oak Ridges Moraine Aquifer Complex Sand**
    - Oak Ridges Moraine deposits are predominantly glaciofluvial to glaciolacustrine and deltaic sediments.
- Upper Newmarket Till
    - Aquitard unit (Groundwater Information Network 2020) whose irregular upper surface is marked by drumlins and erosional features like incised channels.
- **Thorncliffe Formation (Aquifer)**
    - Wisconsinan age deposit (30,000 to 50,000 ya) composed primarily of sand and silt: closer to Lake Ontario it is of glaciolacustrine origin while further north it is of glaciofluvial origin. (TRCA 2009)
- Sunnybrook Drift
    - An aquitard consisting of fine-textured (i.e. silt and clay) glaciolacustrine material (TRCA 2009).
- Weathered Bedrock
    - In this case presumably weathered shale of the Georgian Bay Formation.
    - In the vicinity of the Sites this may include what is commonly described in file geotechnical reports as being a “till-shale complex”, indicating mechanical breakdown of bedrock material during glacial erosion and till deposition.
    - Potential irregularities (i.e. fractures, coarse infills) in weathered bedrock may result in elevated hydraulic conductivity and groundwater flows.
- Georgian Bay Formation
    - Predominantly shale.
    - See Section 3.4.

Based on the static water levels reported in water well records and the shallow depth to bedrock in many locations in the vicinity of the Sites, groundwater gradients are understood to be mainly "recharge" gradients. That is the vertical component of groundwater flow is downward. In the vicinity of streams where deeply incised channels/ravines exist there may be some limited areas where "discharge" gradients (i.e. upward groundwater flow) predominate. However, due to the typically-low hydraulic conductivity of the Georgian Bay Formation, it is expected that discharge flows are relatively limited.

In most cases, the shallow groundwater table is expected to mimic the topography of the ground surface. As such, groundwater flow patterns are expected to follow the topography, generally flowing from areas of high elevation to areas of low elevation. Figure 5 shows a generalized plan of groundwater flow and a plot from the Peel Water Management Model (2019) is provided in Appendix B to show groundwater level contours across all of the Sites. The regional groundwater flow pattern indicates groundwater flow toward Lake Ontario in the southeast, whereas local groundwater flow patterns may be more toward nearby watercourses (e.g. Etobicoke Creek, Cooksville Creek). Furthermore, at the Site-scale, groundwater directions are likely to be influenced in part by underground services/utilities which may provide preferential drainage pathways.

3.6 Site Specific Information from Historical Reports

Various geotechnical, hydrogeological, and environmental site assessment reports from Peel archives have been made available and have been reviewed as part of this project. These file reports provide more detailed, site-specific information than other provincially-available records and geological survey reports. This section will provide a brief summary of notable findings from the documents reviewed.

Site 1B

- With potential/proposed sewer elevations of 95 masl (i.e. below the stage of Etobicoke Creek) dewatering and unwatering considerations will need to be accounted for in shaft construction (Golder 2020b).
- The overburden at this Site is understood to be Sunnybrook Drift (aquitard), with an interval of weathered bedrock extending from about 99 masl down to 94 masl on the west side of the creek and from about 95 masl down to 90 masl on the east side of the creek.

Site 2A

- Stratigraphy from geotechnical boreholes (Golder 1969) is indicated roughly as follows:
    - Sand/Sandy Gravel, extending from surface to about 109.4 masl, overlying
    - Silt/Sand Till, extending to about 105.2 masl, overlying
    - Shale bedrock, weathered and with limestone bands, extending to 102.1 masl (becoming sound below that elevation).
- Groundwater levels (Golder 1969) vary from 102.4 masl to 106.5 masl (i.e. coincides with till or bedrock units, not rising into overlying sand/sandy gravel).
- With potential/proposed sewer elevations of 95 masl (i.e. below the stage of Etobicoke Creek) dewatering and unwatering considerations will need to be accounted for in shaft construction (Golder 2020b).

Site 3A

- Geotechnical Investigation by JEGEL (2006) at a site a short distance north of Site 3A indicates the following stratigraphy in borehole J1:
    - Sand, extending to about 110.4 masl, overlying
    - Clayey silt till, extending to about 109.7 masl, overlying
    - Sandy silt till, extending to about 109.2 masl

- The same geotechnical report identified static water levels at 111.2 masl (1.5 metres below ground surface [mbgs]) and indicated potential need for wellpoint dewatering to control groundwater.
- Stratigraphic sequence (Region of Peel 2019) indicates weathered bedrock extending from about 109 masl to 104 masl:

Site 6A

- Stratigraphic sequence (Region of Peel 2019) is:
  - Upper Newmarket Till, extending to about 107 masl, overlying
  - Thorncliffe Formation Aquifer extending to about 105 masl, overlying
  - Sunnybrook Drift (thin layer), overlying
  - Weathered Bedrock, extending to about 100 masl, overlying
  - Georgian Bay Formation.
- Geotechnical investigation by SPL (2012) indicates static water level at approximately 106.8 masl (0.8 mbgs) at a site just southeast the Queensway from 06A.

Site 7A

- Stratigraphic information (Region of Peel 2019) indicates weathered bedrock extending from 107 masl down to 102 masl.

Site 8B

- Stratigraphic information (Region of Peel 2019) indicates weathered bedrock from about 106 masl down to about 101 masl.

Site 9C

- Stratigraphic sequence (Region of Peel 2019) is:
  - Post-glacial deposits extending to about 106.5 masl, overlying
  - Halton Till, (thin layer), overlying
  - Thorncliffe Formation aquifer, extending to about 104.5 masl, overlying
  - Weathered Bedrock, extending to about 100.5 masl, overlying
  - Georgian Bay Formation.
- Geotechnical investigation by SPL (2013) indicated a layer of silty sand between elevations about 106.9 down to 104.5 masl overlying sand and gravel in the area just north of Site 9C.
- Static water levels were measured at approximately 105.9 masl, indicating a substantial thickness of soil with potentially moderate-to-high hydraulic conductivity (SPL 2013).
- Geotechnical investigation by JEGEL (2007) indicated groundwater levels at 104.5masl (about 2 mbgs) just south of Site 9C at the north end of Chantenay Drive. The soils encountered were fine sand and silty sand.

Site 10A

- Stratigraphic sequence (Region of Peel 2019) is:
  - Post-glacial deposits extending to about 105 masl, overlying
  - Thorncliffe deposit, extending to about 104 masl, overlying
  - Sunnybrook Drift, extending to about 102 masl, overlying
  - Weathered Bedrock, extending to about 97 masl, overlying
  - Georgian Bay Formation.

Site 11A

- Stratigraphic information (Region of Peel 2019) indicates weathered bedrock extending from about 100 masl down to 95 masl.

Site 12B

- Stratigraphic information (Region of Peel 2019) indicates weathered bedrock extending from about 99 masl down to 94 masl.

Site 14B

- Stratigraphic sequence (Region of Peel 2019) is:
  - Halton Till (thin layer) overlying
  - Weathered Bedrock (up to 8 m thick) extending to about 120 masl overlying
  - Georgian Bay Formation.
- Geotechnical report (Universal 1957) indicates groundwater near surface in the vicinity of the crossing of the CP Railway over Dundas Street.

Site 15C

- Stratigraphic sequence (Region of Peel 2019) is:
  - Halton Till, extending from surface to about 138 masl, overlying
  - Weathered bedrock (Georgian Bay Formation), extending to about 134 masl
- Potential for impacted soil or groundwater (WSP 2018a, WSP 2018b)
  - This Site formerly hosted a gas station/automotive service centre.
  - Investigation indicated that the groundwater in the eastern part of the Site was impacted with certain parameters (e.g. benzene, naphthalene, some metals) exceeding the Table 2 Site Condition Standards.
  - Groundwater sampling indicated benzene in concentrations exceeding the local sewer by-law requirements (Region of Peel By-law 53-2010).
- Monitoring wells on-Site indicate static water level of about 141 masl (WSP 2018a).

Site 17C

- Stratigraphic sequence (Region of Peel 2019) is:
  - Post-glacial deposits, extending from surface to about 137 masl, overlying
  - Halton Till, extending to about 134 masl, overlying
  - Oak Ridges Moraine Aquifer Complex (Lower Sand), extending to about 133 masl, overlying
  - Weathered bedrock (Georgian Bay Formation), extending to about 128 masl
- There exists a buried bedrock valley running approximately north-northwest to south-southeast, intersecting Burnhamthorpe Road East for a stretch of some 400 m at Central Parkway East (Hatch 2017).
  - This valley is understood to be infilled at its deepest point with a layer of silty sand till (non-plastic, upper interface at about 132 masl) that appears to drain the local subsurface, causing a depression in the water table along the length of the valley. Local borehole information indicates the deepest point of the valley is approximately 126 masl (i.e. corresponding to bedrock surface), some 9 m deeper than in surrounding areas (Hatch 2017).
  - The interpreted groundwater level in the overburden is at approximately 135 masl, whereas in the bedrock it is much lower at about 126 masl (Hatch 2017).

Sites not detailed above are indicated in the Peel Region Water Management Model (2019) to have stratigraphy dominated by till, weathered bedrock and Georgian Bay Formation shale. These are generally deposits of low-hydraulic conductivity, though in certain situations fractures in the (weathered) bedrock may have appreciable transmissivity: due to the ubiquity of the (weathered) bedrock, it should be noted for all areas as being a potentially significant source of groundwater flow to excavations and should be characterized accordingly.

Appendices C1 through C3 contain the cross-section printouts from the Peel Region Water Management Model (2019):

- Appendix C1 for Sites along Queensway (01B through 12B),
- Appendix C2 for the Site at Dundas and Cawthra (14B), and
- Appendix C3 for the Sites along Burnhamthorpe (15C and 17C).

4. GROUNDWATER RESOURCE REVIEW

4.1 Groundwater Users

4.1.1 Permits to Take Water

Only one Permit to Take Water was found to be registered for a location within a 500 m radius of any of the Sites (see Figure 6).

- Permit Number 0121-B8VT3N
    - Toronto Zenith Contracting Limited
    - Construction Dewatering
    - A total of 20 sources (wells for groundwater taking):
        - 19 sources located along the abutments of Queen Elizabeth Way over Etobicoke Creek approximately 350 m southwest from Site 01B
        - 1 source located near the intersection of The Queensway and The West Mall, approximately 300 m northeast of Site 02A and north of Site 01B.

To gain greater understanding of the nature of this dewatering activity, a review was conducted of the water well records in the vicinity of this PTTW registration. However, no water wells with the use of “dewatering” were found in the area.

4.1.2 Water Well Records

A search of the provincial water well records database has indicated a total of 568 water well records attributed to locations within 500 m of the Sites. The vast majority of these water wells are listed for monitoring (83), test hole (251) or monitoring and test hole (171) purposes. A summary of information from the water well records found in these areas is provided in Appendix D.

Only two water well records appear to be listed for actual water supply purposes: one domestic (Well ID 4902247) and one industrial (Well ID 4902250). The domestic well record is located approximately 400 m south of Site 01B and lies just north of Queen Elizabeth Way. The industrial well record is located approximately 100 m east of Site 14B, near the intersection of Dundas Street and Cawthra Road. Both wells are listed as bedrock wells. Given the dates of construction (one in 1957 and one in 1949) and the development of the municipal water system, it is likely that these wells have been decommissioned and are no longer in use.

None of the water well records indicate “negative” static water levels or flowing conditions. Therefore, it seems unlikely that artesian conditions exist in the vicinity of the Sites.

Figure 6 shows the water well records within 500 m of the Sites with symbols varying by well usage type.

4.2 Source Protection

Each of the Sites lies within one of two Source Protection Areas:

- Sites 01B, 02A, 03A are located within the Toronto and Region Source Protection Area
- The remaining Sites are located within the Credit Valley Source Protection Area.

Some of the Sites lie within vulnerable areas as determined in the applicable Source Protection Plans or Approved Assessment Reports. Table 4 below provides a summary of those areas (and their vulnerability score, if applicable). The Sites and the nearby vulnerable Source Protection areas are shown in Figures 7a (Intake Protection Zones and Event-Based Areas) and 7b (Highly Vulnerable Aquifers and Significant Groundwater Recharge Areas).

Table 4: Source Protection Information – Designated Vulnerable Areas for each Site.

Site ID	Intake Protection Zone	Event-Based Area	Highly-Vulnerable Aquifer	Significant Groundwater Recharge Area
01B	IPZ-3	Yes - Lower Etobicoke Creek	Yes	~
02A	IPZ-3	Yes - Lower Etobicoke Creek	Yes	~
03A	~	~	Yes	~
06A	~	~	~	~
07A	~	~	~	Yes
08B	~	~	~	Yes
09C	IPZ-2 (4.5)	~	~	Yes
10A	IPZ-2 (4.5)	~	Yes	Yes
11A	IPZ-2 (4.5)	~	~	Yes
12B	~	~	Yes	~
14B	~	~	Yes	~
15C	~	~	Yes	~
17C	~	~	Yes	~

Intake Protection Zones are marked around waterbodies where there exists a potential route for contaminants or drinking water threats to be transported to a surface-water intake for a municipal drinking water system. In this case, the intakes in question are associated with the R.L. Clark (Toronto) and Lakeview (Region of Peel/Mississauga) water treatment plants. Two IPZ types have been identified: IPZ-3 for 01B and 02A near Etobicoke Creek and IPZ-2 (vulnerability score 4.5) for 09C, 10A, and 11A which are near Cooksville Creek. A review of drinking water threats associated with these IPZ areas will be given in Section 6.3.

The Event-Based Areas that affect sites 01B and 02A have been assigned following modeling exercises which identified that trunk sewer breaks (i.e. "events") may result in a release of contaminants to Etobicoke Creek which may eventually become a threat to the municipal drinking water intake (CTC SPR 2019). This will be discussed further in Section 6.3.

A Highly Vulnerable Aquifer (HVA) is an aquifer (i.e. a geological stratum that contains water and effectively transmits groundwater flow) which is susceptible to adverse effects from external sources. Eight of the 13 Sites have been identified to overlap with HVA areas. In these cases, the aquifer to which the HVA is assigned is understood to be the surficial glaciolacustrine aquifer (i.e. Iroquois Plain area) or possibly areas where the overburden is thin, thus leaving the bedrock susceptible to impacts by surface activity. Potential risks associated with these areas will be discussed in Section 6.3.

Significant Groundwater Recharge Areas (SGRAs) are areas which permit infiltration of precipitation or surface water into the ground at a rate significantly higher than the average infiltration rate for the watershed or catchment area. Several of the Sites are associated with SGRAs that coincide with the edges of the Queensway right-of-way. These likely correspond to depressions formed at roadside ditches which provide the opportunity for precipitation to collect and percolate into the soil. Potential risks associated with these areas will also be discussed in Section 6.3.

4.3 Productive Aquifers

The most likely productive aquifers of note in the Site vicinity are those overburden sand/gravel deposits associated with the Thorncliffe Formation and the Oak Ridges Moraine Aquifer. The following Sites are noted to be situated in locations where such overburden aquifers exist: 02A, 03A, 06A, 09C, 10A, and 17C. However, background information indicates that the static water level may lie below these otherwise, or “potential”, aquifer materials at 02A and 10A. Where water is encountered, overburden aquifers are anticipated to behave as unconfined (or “water-table”) aquifers.

The alluvial deposits associated with Etobicoke Creek and Cooksville Creek may also host aquifers of varying capacity. Generally, alluvial deposits may be highly permeable (i.e. sandy texture) and due to the proximity to surface water may be capable of supporting substantial water demand: sometimes the stratification and interlaying of alluvial deposits means that these permeable members are of limited lateral extent and their productivity is of limited duration. For this project, the shaft locations near Creeks (i.e. 01B, 02A, 11A) appear to be in locations where low-lying, saturated alluvial deposits are limited. At the Etobicoke Creek crossing (i.e. near 01B), the deeply incised channel is mainly into the bedrock, so overburden aquifers are not expected to be of issue.

The bedrock of the Georgian Bay Formation in the vicinity of the Site area is typically shale-rich and therefore is not considered a productive aquifer. Singer *et al* (2003) note that the geometric mean of transmissivities in the Georgian Bay Formation is 2.9 m^2/d, indicating “poor water-yielding capability”, but note that the 90th percentile transmissivity is 36.5 m^2/d. Due to this variability, there is some potential for substantial dewatering effort in an exposed (i.e. non-watertight) excavation where these exceptional conditions (i.e. high transmissivity) do occur.

5. CONCEPTUAL HYDROGEOLOGICAL MODEL

A conceptual hydrogeological model describes the major hydrogeological features and characteristics of a system and provides a basis for the interpretation of its behaviour under current conditions and in proposed conditions (e.g. under construction).

Appendix E provides an overview summary of stratigraphic, groundwater level, and groundwater flow information based on the background documents reviewed.

The hydrostratigraphy (described in greater detail in Section 3.5) at most of the shaft Sites is generally dominated by fine-textured materials, whether overburden tills and drift (e.g. Sunnybrook Drift, Halton Till, or Newmarket Till) or the shale bedrock of the Georgian Bay Formation. As such, the static water level at most Sites is at an elevation such that all of the saturated materials would be considered aquitards.

Sites where aquifers have been identified to be present at elevations below the identified groundwater level are as follows:

- Site 03A: which has a sand layer at surface which may be saturated between about 111 masl and 110 masl (i.e. well above the proposed pipe invert at 92.3 masl).
- Site 06A: which likely has saturated sands of the Thorncliffe Formation between about 107 masl and 105 masl (i.e. well above pipe invert at 94.8 masl).
- Site 09C: which also has sands of the Thorncliffe Formation, likely saturated between about 106 masl and 104.5 masl (pipe invert at 95.5 masl).

- Site 17C: which has sands of the Oak Ridges Moraine aquifer complex, saturated between about 134 masl and 133 masl (with pipe invert at 122.7 masl).

It is noted that for all Sites, the weathered bedrock and Georgian Bay Formations are anticipated to be saturated and that the proposed pipe invert / shaft depth extends into or entirely through the weathered bedrock. Due to potential variation in hydraulic characteristics of the bedrock (weathered or not), the potential for hydraulic conductivity to be governed by secondary porosity (i.e. fractures), there may be significant groundwater flow through this zone. However, it is expected that these situations would be the exception rather than the rule and that these units would more likely behave as aquitards.

Generally, the vertical gradients are downward or “recharge” gradients. Potential exceptions may be observed at Site 11A which is located in the Cooksville Creek ravine or at Sites 01B and 02A, which are located near or within the Etobicoke Creek ravine. Though upward gradients may be encountered at these Sites, it is likely that such conditions would only manifest at elevations near or below the water level of the creek.

Groundwater flow directions across the study area are generally southeast toward Lake Ontario (see Figure 5). Deviations from this general flow directions should be expected to occur where Sites are located near local watercourses. Due to the fact that the hydrostratigraphy is largely dominated by aquitards, groundwater flow direction at most Sites is not expected to be of significant importance. Sites where groundwater flow direction may be of higher importance are as follows:

- Site 06A: inferred groundwater flow direction is south-southeast. A gas station is located approximately 70 m west (cross-gradient) and the stratigraphy at the Site indicates presence of the Thorncliffe aquifer.
- Site 17C: inferred groundwater flow direction is south. The property across Burnhamthorpe from the Site (30 m southeast) was formerly occupied by a gas station (GMBP 2020) and the stratigraphy at the Site indicates the presence of the Oak Ridges Moraine lower sand aquifer.

Groundwater quality at most Sites is generally likely to be suitable for discharge to sanitary or storm sewers following typical treatment to remove suspended solids. Salt impacts or high electrical conductivity are likely to be common due to the proximity of most Sites to roadways but sodium and chloride are not listed in the quality control parameters in either the City of Mississauga storm sewer by-law or in the Region of Peel sewer use by-law. Some Sites have been identified to have increased potential for groundwater of poor quality due to environmental impacts from on- or off-Site activities, such as:

- Site 06A: a gas station is presently located 70 m west (cross-gradient) of the Site. There is potential for contaminants (if present) to migrate toward Site 06A if prolonged dewatering is required at that Site.
- Site 15C: a former gas station Site, historic groundwater quality testing has indicated trace hydrocarbon contaminants and benzene in excess of the allowable limit under the Peel Sewer Use By-Law and the Mississauga storm sewer by-law.
- Site 17C: which overlies sands of the Oak Ridges Moraine aquifer lies across Burnhamthorpe from a former gas station (now commercial building). There is potential for deeper contaminants to migrate toward Site 17C if prolonged dewatering is required at that Site to facilitate construction.

6. IMPACT ASSESSMENT

6.1 Construction and Dewatering

The construction of a project may be affected by groundwater conditions and likewise construction may result in impacts to the natural hydrogeological system. The most common groundwater-related issue is with regard to construction dewatering, wherein groundwater must be managed to ensure that excavation conditions are safe and amenable to the proposed construction activities.

6.1.1 Potential Effects of Groundwater on Construction

Where construction extends below the groundwater table and into saturated soil or rock materials, there is potential for the groundwater to affect the construction process. In most cases, the degree of the effect is governed by the depth below groundwater, the hydraulic conductivity of the soil or rock materials, and the construction methodology (i.e. shoring).

At each of the Sites, the proposed pipe invert is below (at least 5 m) the groundwater table. However, only four of the Sites (03A, 06A, 09C, and 17C) indicate that excavations will intersect aquifer materials. At the remaining Sites, the geological materials are dominated by aquitards (e.g. till materials).

All of the Sites, however, are expected to require excavation intersecting the (weathered) bedrock, which may or may not have appreciable hydraulic conductivity depending on the particular circumstances at each individual Site (e.g. fracture patterns, prevalence of limestone seams).

Where contaminated groundwater is present, there may be potential hazards to workers or the public if suitable groundwater management is not in place.

Potential effects that groundwater may have on construction of the project are as follows:

- For each Site:
  - Groundwater pressures may influence excavation support or shoring design. Earth and hydrostatic pressures should be quantified by geotechnical engineers at the detailed design stage.
- For Sites which intersect saturated aquifers (03A, 06A, 09C and 17C)
  - Excavations may require a moderate amount of dewatering (each Site less than 400,000 L/d) to maintain a dry excavation if watertight shoring is not provided.
- For Sites at which there may be pre-existing groundwater contamination (i.e. Sites 15C and 17C)
  - There may be some risk to workers, who may come in contact with contaminated groundwater, and the environment or other receivers (e.g. sewer systems) which may receive the discharge from a construction dewatering system.

6.1.2 Dewatering to Facilitate Construction

Construction and Dewatering Methodology at Shafts

Whether watertight shoring is provided or not, some level of construction dewatering is expected to be required at each of the Sites.

If watertight shoring is provided then, because all shafts extend below the groundwater table, it is expected that some amount of groundwater will enter the shafts during the excavation process. In such a case, following the completion of shoring construction and excavation, the shafts may be “unwatered” using submersible pumps.

Where watertight shoring is not utilized, dewatering of overburden materials is likely to be feasibly addressed using sump dewatering, though wellpoint or deep well dewatering may be of interest to provide advance dewatering to facilitate shoring construction at Sites where overburden aquifers are intersected by the shafts (i.e. Sites 03A, 06A, 09C, 17C). Hydrogeological investigations during detailed design should seek to characterize these aquifers, especially if watertight shoring is not proposed.

In an excavation without watertight shoring, dewatering of the (weathered) bedrock material is likely to be minimal. However, there does exist some potential for the (weathered) bedrock to have elevated hydraulic conductivity where there is substantial and extensive fracturing of the unit. As such, at detailed design, some effort should be made to characterize the hydraulic properties of the weathered bedrock where for any location where watertight shoring will not be provided.

Construction and Dewatering Methodology for Linear Sections

Between Sites, the pipe installation is expected to be completed mainly using a tunneling method, which generally will minimize the need to provide groundwater control for the linear portions of construction between individual shaft locations.

However, between Sites 02A and 01B, open cut construction is anticipated to be used to install sewer pipe across Etobicoke Creek. It is recommended that this open cut section be as short as possible to minimize dewatering requirements. Excavations for this open cut installation will penetrate into the (weathered) bedrock unit below the anticipated groundwater level: if the weathered bedrock is sufficiently fractured, there may be connection between the surface water of the creek and the excavation via the subsurface. As such, significant dewatering efforts may be required, potentially requiring a PTTW. However, it is also possible that the (weathered) bedrock is generally impermeable and construction dewatering will be limited. In terms of ensuring proper hydraulic characterization of the (weathered) bedrock zone, the Etobicoke Creek crossing is the most important part of the study area to characterize.

It must be noted that though the actual diversion of the creek will not constitute a "water-taking" per the regulatory requirements for approvals for construction dewatering, the actual groundwater inflow into this excavation may be sufficient to trigger an EASR registration (> 50,000 L/d) or Permit to Take Water (> 400,000 L/d). The latter would likely only be necessary in the event that bedrock materials indicate a high transmissivity or hydraulic conductivity.

Area of Influence

For Sites where excavations will intersect an overburden aquifer (i.e. Site 03A, 06A, 09C, or 17C) and at which no impermeable shoring or cutoff wall is deployed, the area of influence of the dewatering is likely to be less than 100 m from the edge of excavation. For other Sites where overburden groundwater control is required but only aquitards (e.g. till materials) are present, the area of influence is likely to be less than 10 to 20 m from the edge of excavation.

The area of influence of dewatering the weathered bedrock unit will be highly dependent upon Site-specific hydraulic characteristics. Due to the depth of the bedrock units and the likelihood that they will behave as confined aquifers, it is possible that the area of influence may extend for several hundred metres, but this may also be limited by the extent of the zone of fractures in the bedrock.

If watertight shoring is provided, the area of influence is expected to be negligible.

6.1.3 Anticipated Approvals

Under certain conditions, construction dewatering may require approvals from the Ministry of the Environment, Conservation and Parks (MECP). Furthermore, local approvals may be required to obtain permission to discharge to a certain location (e.g. to a sanitary sewer). This section highlights the potential approvals requirements.

Ministry of the Environment, Conservation and Parks

Approvals for water-taking for construction dewatering from the MECP fall into one of two categories, generally dictated by the daily discharge volume expected:

- Environmental Activity and Sector Registry, for daily discharge less than 400,000 L/d but greater than 50,000 L/d.
  - No review by MECP necessary.
  - Short turnaround: Approved once a complete application is submitted.
  - Requires water-taking and discharge plan prepared by a Qualified Person per Ontario Regulation 63/16.
- Permit to Take Water, for daily discharge greater than 400,000 L/d.
  - MECP conducts technical review of application (takes up to 90 days)
  - Requires comprehensive hydrogeological study report, including identification of water-taking sources and mitigation and monitoring plans.

As discussed above, the amount and nature of water-taking for construction dewatering will depend primarily on whether watertight shoring is provided and on the condition of the bedrock materials.

If watertight shoring is provided, the total dewatering volume for a given shaft is expected to be less than a maximum of about 1,500,000 L (20-m water column in a shaft with 10-m diameter). This indicates that an EASR should be obtained so that “unwatering” of the shaft (i.e. removal of water that had filled the interior of the shaft during construction) can be conducted in a reasonable timeframe.

If watertight shoring is not provided, it is likely that dewatering/drawdown requirements can be achieved at discharge rates of less than 400,000 L/d per shaft, and so an EASR would also be applicable in that case. For example, some of the Sites are expected to involve shaft construction penetrating into or through an overburden aquifer (i.e. Site 03A, 06A, 09C and 17C). Due to the small thickness of saturated material being intersected (generally less than 2 m) and the typical texture of these materials (e.g. sand), it is likely that groundwater control would be in excess of 50,000 L/d but less than 400,000 L/d for a given Site. However, if multiple shafts must remain open at once and active dewatering is continuously required, it is possible that the combined dewatering rate will exceed 400,000 L/d and a Permit to Take Water will be required. Furthermore, if bedrock materials turn out to be of sufficiently high hydraulic conductivity, a PTTW may be required. This should be confirmed at the detailed design stage when construction scheduling has been more clearly determined and dewatering rates can be more accurately estimated.

Municipal and Conservation Authority Approvals

It is expected that in most cases, discharge from the construction dewatering system at one of the shaft Sites will be released to either the City of Mississauga storm sewer system or the Region of Peel sanitary sewer system.

Whichever the case may be, the operator of the system shall be contacted to ensure that there is sufficient capacity in the system to accommodate the dewatering flows. In the case of discharging to sanitary sewer, the project may be billed for sewage treatment costs according to the volume of water discharged.

In the case of the shaft Sites near watercourses, it may be required to obtain a discharge approval from the conservation authority: this will especially be of interest in scenarios where discharge will be directly to land instead of to a municipal sewer. Applicable conservation authorities are expected to be as follows:

- Toronto and Region Conservation Authority: Sites 01B and 02A
- Credit Valley Conservation Authority: Site 11A

6.2 Ecological Impacts

The potential for ecological impacts to occur due to groundwater-related or hydrogeological effects is not likely to occur at most of the Sites. It is expected that it will be feasible to provide sufficient quality control to ensure that the discharge from construction dewatering systems meets the water quality standards of the receiving systems (e.g. Provincial Water Quality Objectives, Mississauga storm sewer by-law). For most Sites, this will mean providing sediment capture to prevent release of excessively turbid water to storm sewers (if storm sewers are selected as the receiver).

At three of the Sites (06A, 15C, 17C), it has been identified that there may be potential for contaminated groundwater to already exist on-Site or to migrate onto the Site as a result of dewatering. For these Sites, there should be provisions in place to provide suitable treatment to remove contaminants (i.e. BTEX, hydrocarbons) to ensure that the quality standards for the receiving system (e.g. storm or sanitary sewer) will be met. As an added precaution, watertight shoring should be preferred for those Sites, and where construction dewatering is necessary it should be arranged for discharge to the sanitary sewer system.

However, for Sites 01B, 02A and 11A, due to their proximity to a watercourse, it may be that discharge will be more feasibly managed outside of the minor system for stormwater management. Where this is the case, discharge quality shall be managed through an erosion and sediment control program and environmental monitoring should be conducted to characterize baseline (i.e. pre-construction) and background (i.e. upgradient during construction) water quality in the watercourse and track ongoing quality of the discharge and downgradient waters. Energy dissipation should be provided to limit erosion and disturbance of sediments in the existing watercourse. It is expected that these activities will be feasible for these Sites but it may be more convenient to rely on the existing outlets of the minor stormwater system: the benefits of each should be weighed at detailed design.

Once constructed, the operating sewer is expected to present minimal ecological or environmental risk. Due to the shallow cover over the sewer pipe at the crossing of Etobicoke Creek, additional protection should be considered, whether by armouring, double-walled piping, or other scour protection.

6.3 Impacts Regarding Source Protection

The Intake Protection Zones associated with the project Sites have been identified as IPZ-3 (no vulnerability score identified) and IPZ-2 (4.5). In the *Tables of Drinking Water Threats*, neither of these IPZ areas have any associated threat activities which would constitute a “Significant” drinking water threat.

With respect to the SGRA and HVA areas, the only risk management policies listed in the Source Protection Plans are to do with road salt and dense non-aqueous phase liquids (DNAPLs), neither of which are activities associated with the construction or operation of sanitary sewers. As such, it is expected that the proposed works will present little risk, if any, to SGRA or HVA areas.

It is noted that the construction of a new trunk sewer in the vicinity of the Event-Based Area along Etobicoke Creek (i.e. in the vicinity of Sites 02A and 01B), may trigger one of the risk management policies under the Source Protection Plan (specifically, policy LO-SEW-2). However, the action under this policy is intended to be enacted by the MECP and will be initiated following the submission of the Environmental Compliance Approval, if any is required.

Prior correspondence with the Risk Management Official for the Region of Peel has confirmed that the activities associated with the project (i.e. construction and eventual operation of sanitary sewers) will not constitute a “Significant” drinking water threat per the *Tables of Drinking Water Threats* and the affected vulnerable areas (i.e. Intake Protection Zones, Event-Based Areas, Significant Groundwater Recharge Areas, or Highly Vulnerable Aquifers). A Risk Management Plan is not expected to be required.

Source protection, therefore, is not expected to present constraints or obstacles to the proposed project.

6.4 Impacts to Groundwater Users

Impacts to groundwater users are not likely to occur as none have been identified within the study area and access to and reliance on the municipal, lake-based water system predominates.

7. IMPACT MANAGEMENT

The management of potential hydrogeological impacts is expected to be manageable for this project. From the information available it does not appear that the proposed shaft locations will result excessive risk or unfeasible management requirements.

The following provides a brief overview of potential mitigation, monitoring and contingency actions that may be considered for construction.

The actual scope of mitigation, monitoring and contingency plans should be confirmed and refined for deployment during the detailed design stage.

7.1 Mitigation

7.1.1 Regarding Water-Taking from Construction Dewatering

The primary means of mitigation to consider is to prevent ongoing ingress of groundwater into the excavation through the use of watertight shoring.

If watertight shoring is not feasible to provide, then dewatering of the excavation shall be provided through the use of a means compatible with the shoring system. Where aquifers are anticipated (e.g. at 03A, 06A, 09C, 17C) to be intersected by excavations without watertight shoring, it would be preferable to provide dewatering in advance using wellpoints (if the required lift is less than about 5 metres) or eductor wells. Sump dewatering may also be feasible in these excavations if advance dewatering is not critical for the shoring system installation, and sump dewatering will also be applicable for excavations where aquitard materials prevail.

Where feasible, a “filtered” intake should be provided for any dewatering implement (i.e. sump, well or wellpoint) to prevent excessive uptake of fines and reduce the load on downstream sediment capture facilities.

7.1.2 Regarding Discharge from Construction Dewatering

In all cases, sufficient sediment capture should be provided to ensure that total suspended solids (TSS) of the discharge does not exceed the quality standards of the receiving system. Sediment capture may be provided by sedimentation tanks or filter bags, as is best suited to the situation.

Confirmatory testing of groundwater should be completed at any Site where discharge to the municipal storm or sanitary system is anticipated. This is especially the case for Sites 06A, 15C, and 17C, which appear to have some potential for hydrocarbon/BTEX contamination.

7.1.3 Regarding the Sewer Itself

As previously mentioned in Section 6.2, the sewer itself, in its completed and operational state, is expected to present minimal environmental or ecological risk.

Mitigation would be most applicable in the design of the crossing of Etobicoke Creek due to the relatively shallow burial depths there. Appropriate pipe protection should be provided, respecting the recommendations of the Hydraulic and Geomorphic Hazard Assessment.

7.2 Monitoring

Monitoring requirements are mainly to be associated with construction dewatering activities, especially with respect to the quality, handling, and release of the discharge water.

For all Sites, the monitoring program should consider including:

- Measurement of daily discharge volumes by use of a suitable flow meter (i.e. turbine flow meter or magnetic flow meter)
- Inspection of erosion and sediment control devices and/or treatment facilities (i.e. daily)
- Ground settlement monitoring, if warranted following an assessment by the geotechnical design engineer.

Where discharge will be released to a municipal system (i.e. storm sewer or sanitary sewer) monitoring programs should include consideration for the following:

- Measurement of instantaneous flow rates by the use of a suitable flow meter (i.e. turbine flow meter or magnetic flow meter)
- Field monitoring of TSS or turbidity of the discharge water quality at point of release on a regular basis
- Laboratory sampling and analyses of discharge water quality where discharge water quality is anticipated to change (e.g. Sites 06A, 15C, 17C) or where confirmatory (pre-construction) sampling indicates that water quality parameters besides TSS may be in exceedance of the quality standards of the receiving system.

Where discharge will be released to land, ultimately received by a nearby watercourse, monitoring programs should consider including the following activities:

- Background (i.e. pre-construction) surface water quality sampling and laboratory analysis for a suite of applicable or general water chemistry parameters.
- Field monitoring of TSS or turbidity on a daily or twice daily basis.
- Frequent (e.g. daily) inspection of the discharge stream to check for hydrocarbon sheen.
- Frequent (e.g. daily or weekly) sampling and laboratory analysis of the discharge water as well as baseline (i.e. upgradient) and downgradient surface water.

The details of monitoring plans should be confirmed and developed further at the detailed design stage according to the site-specific information about groundwater quality, dewatering rates, and discharge locations.

7.3 Contingency

Contingency plans may need to be developed for circumstances that complicate construction dewatering.

For example, if watertight shoring is proposed but is not sufficiently watertight due to imperfections in construction, an alternative dewatering or discharge plan may need to be devised. However, the nature of the dewatering requirements in such a scenario would not be well-known until the time-of.

More likely, there may be a circumstance in which the receiving structure (e.g. municipal sewer) is overrun due to wet weather flows, and therefore the discharge outlet for dewatering is no longer available. During detailed design when dewatering rates are confirmed and discharge locations are selected, the design engineer should consider contingency plans in consultation with the system operator (e.g. Region of Peel or City of Mississauga, as applicable).

In the unlikely event that the dewatering activities result in drawdown of the water table such that ground settlement is a concern, contingency plans should be in place to reduce dewatering rates or change dewatering approaches to mitigate settlement.

8. SUMMARY OF FINDINGS

A planning-level hydrogeological assessment has been conducted to support the selection of the preferred solution for the capacity improvements within the central Mississauga wastewater system. The following is a summary of findings:

- The proposed project is expected to involve construction of 13 shafts to permit the installation of approximately 7 km of sewer by trenchless methods. The crossing of Etobicoke Creek near Sherway Drive is expected to be completed by open cut.
- The Sites are mainly located in the area between Burnhamthorpe Road and the Queensway, and between Hurontario Street and Etobicoke Creek.
- The project area lies within two physiographic regions:
  - Sites 15C and 17C in the South Slope (drumlinized till plains landform)
  - Remaining Sites in the Iroquois Plain (sand plains landform)
- Surficial geology varies across the area, but is mainly dominated by dense, fine-textured deposits such as glacial tills. Four Sites have been identified to be located where overburden aquifers are present:
  - Sites 03A, 06A, 09C, and 17C.
- The bedrock at each of the Sites is that of the Georgian Bay Formation, which is predominantly shale and generally considered to have poor hydraulic characteristics (i.e. aquitard) though this is dependent upon local fractures and weathering.
- Groundwater flow directions tend generally toward Lake Ontario in the southeast, whereas local groundwater flow patterns may be more toward nearby watercourses (e.g. Etobicoke Creek, Cooksville Creek).
- Vertical hydraulic gradients are generally downward for each Site (i.e. “recharge” conditions), though discharge conditions may be present at the following Sites where excavations extend below the water level of the adjacent creek:
  - Sites 01B and 02A (Etobicoke Creek)
  - Site 11A (Cooksville Creek)
- Access to the municipal water supply is ubiquitous: there are no expected users of groundwater in the area.
- Three Sites have been identified to have potential groundwater contamination, whether due to activities of historical on-Site activities or activities off-Site.
  - Site 06A: present-day gas station located 70 m cross-gradient
  - Site 15C: groundwater contamination (e.g. BTEX, hydrocarbons) at this Site has been documented in prior environmental reports

    - Site 17C: gas station formerly located at a Site down-gradient across Burnhamthorpe.
- Construction dewatering is expected to be required to some degree for each of the Sites due to the depth of the excavations proposed, whether of not watertight shoring is provided.
- Dewatering rates are likely to be less than 400,000 L/d per Site, so an EASR approval is likely the most applicable. Sump dewatering is likely to be feasible for most of the Sites, though wellpoint or well dewatering may be preferred where watertight shoring is not provided despite the presence of saturated aquifer materials (i.e. Sites 03A, 06A, 09C, and 17C).
- Areas of influence of construction dewatering are expected to be:
    - Less than 100 m where shaft excavations extend through aquifer materials (Sites 03A, 06A, 09C, and 17C)
    - Less than 20 m where shaft excavations extend mainly through aquitard materials (most other Sites)
    - In bedrock materials, the area of influence will likely also be small (<20 m) but in exceptional cases where transmissivity is high, areas of influence may be very large (>100 m).
    - Where watertight shoring is provided for the full depth of excavation, area of influence will be negligible.
- Circumstances in which a Permit to Take Water would be required instead of an EASR would be:
    - Where construction scheduling requires three or more shafts without watertight shoring to be dewatered at once.
    - Where watertight shoring is not penetrated into bedrock and where the bedrock is of sufficiently high hydraulic conductivity.
- Approval is expected to be required to access an appropriate receiving structure for the construction dewatering discharge. This may be the City of Mississauga (storm sewers), the Region of Peel (sanitary sewers) or the Conservation Authority (the TRCA at Sites 01B, 02A; the CVC at Site 11A).
- With respect to Source Protection, several of the Sites have been identified to be within certain vulnerable areas, such as Intake Protection Zones (IPZ-2 and IPZ-3), Event-Based Areas (along Etobicoke Creek), Significant Groundwater Recharge Areas (mainly in green spaces along the Queensway) and Highly Vulnerable Aquifers (throughout the area). However, no “Significant” drinking water threat activities have been identified that would require the preparation of a Risk Management Plan. Source Protection requirements are not expected to pose obstacles to the completion of the project as proposed in the conceptual layout.
- A brief overview of considerations for mitigation, monitoring and contingency plans has been provided. These are mainly applicable to the potential dewatering activities that may be associated with the construction of the project.
- Due to the shallow cover of the sewer pipe at the Etobicoke Creek crossing, it is expected that additional protections will be required to guard against pipe damage due to scour or other hydrological/fluvial phenomena.

The proposed shaft Sites and pipe installation methods do not appear to present significant concerns or risks from a hydrogeological perspective.

9. RECOMMENDATIONS

The following recommendations are provided with respect to the selection of the preferred solution and future work for the Central Mississauga Wastewater Capacity Improvements project:

- Watertight shoring (e.g. secant pile walls) to the full depth of excavation is preferred for each of the Sites to minimize dewatering requirements.
- Watertight shoring is recommended especially at Sites where:
    - There is potential for contaminated groundwater to be present on-Site or to migrate onto Site during construction dewatering (i.e. Sites 06A, 15C, and 17C).
    - Shafts are expected to extend into aquifer materials (i.e. 03A, 06A, 09C, 17C).
- At detailed design, hydrogeological investigations should be completed to:
    - Confirm on-Site groundwater quality

    - Confirm the hydraulic properties of the subsurface materials, especially those that will be exposed in excavations not provided with watertight shoring, to determine dewatering rates, appropriate dewatering methodologies, and necessary approvals.
    - Confirm requirements and develop a detailed plan for monitoring and mitigation associated with construction dewatering activities.
- To minimize potential dewatering requirements, the length of the open-cut excavation for the crossing of Etobicoke Creek should be minimized. Hydraulic characterization of the bedrock material would be most important at this location to ensure that sufficient dewatering can be provided if watertight shoring will not ultimately be used.
- At minimum, it is recommended that a construction dewatering approval in the form of registration to the Environmental Activity and Sector Registry (EASR) be obtained for this project. Detailed design may indicate that Site-specific conditions, construction scheduling or other circumstances will necessitate a Permit to Take Water.
- Approval to release discharge water from construction dewatering activities shall be obtained from the appropriate authorities (e.g. TRCA, CVC, Region of Peel, or City of Mississauga).
- Construction sites should be laid out with the expectation that some construction dewatering will be required and that appropriate discharge treatment (at minimum sedimentation or filtration to remove total suspended solids) will be required.

All of which is respectfully submitted,

GM BLUEPLAN ENGINEERING LIMITED

Per:

LICENSED PROFESSIONAL ENGINEER
M. R. LONG
100228503
3 Dec 2020
PROVINCE OF ONTARIO

Matthew Long, M.Eng., P.Eng.

10. STATEMENT OF LIMITATIONS

The information in this report is intended for the sole use of the Region of Peel. GM BluePlan Engineering Limited accepts no liability for use of this information by third parties. Any decisions made by third parties on the basis of information provided in this report are made at the sole risk of the third parties.

GM BluePlan Engineering Limited cannot guarantee the accuracy or reliability of information provided by others. GM BluePlan Engineering Limited does not accept liability for unknown, unidentified, undisclosed, or unforeseen surface or sub-surface conditions that may be later identified.

The conclusions pertaining to the condition of soils and/or groundwater identified at the site are based on the review of available documents that have been prepared by government agencies and other third parties. GM BluePlan Engineering Limited cannot guarantee the condition of soil and/or groundwater that may be encountered at the site in locations that were not specifically investigated as part of this investigation.

11. REFERENCES

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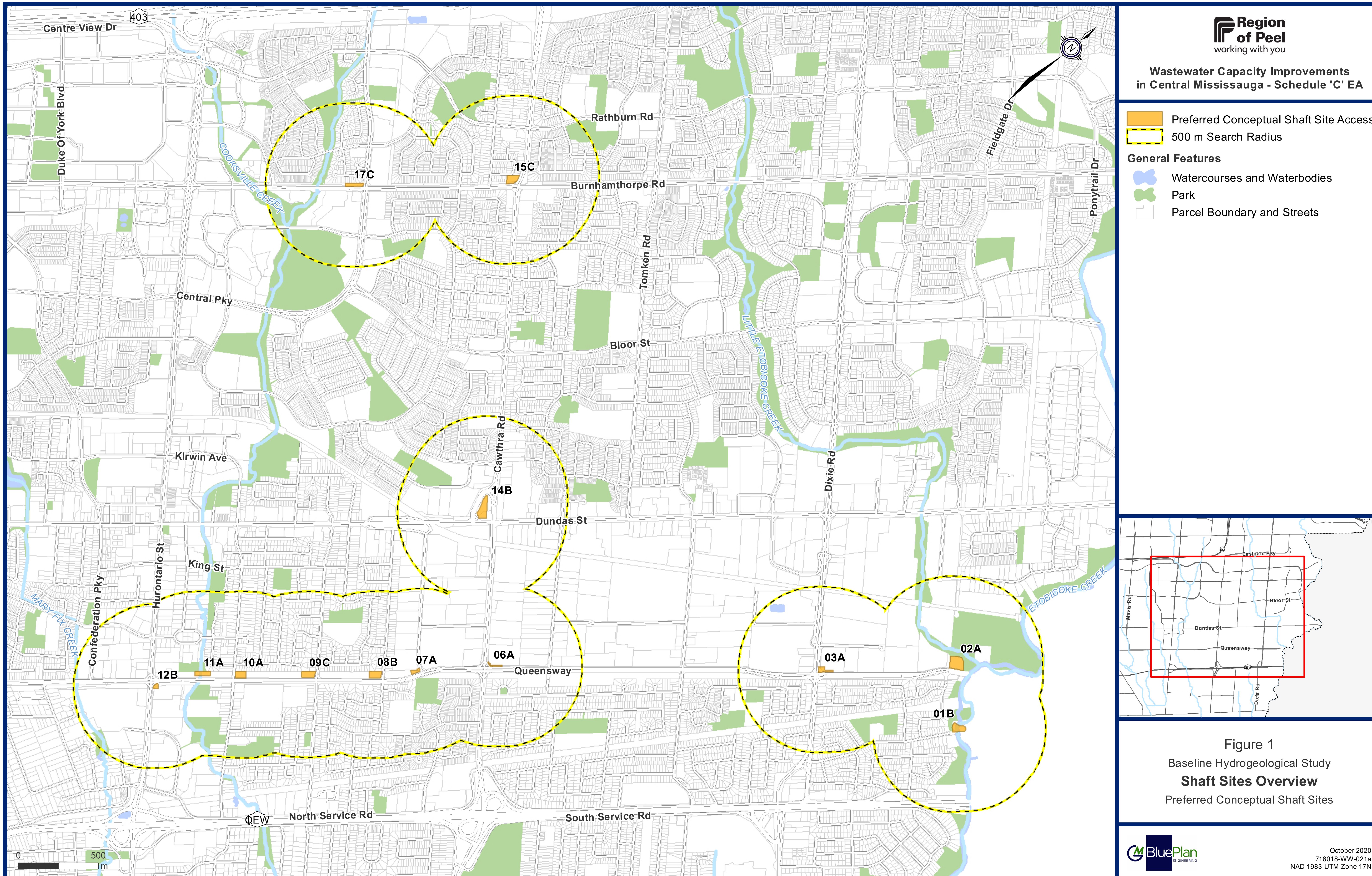
FIGURES


Region of Peel
working with you
Wastewater Capacity Improvements in Central Mississauga - Schedule 'C' EA
Preferred Conceptual Shaft Site Access
500 m Search Radius
General Features
Watercourses and Waterbodies
Park
Parcel Boundary and Streets
Figure 1
Baseline Hydrogeological Study
Shaft Sites Overview
Preferred Conceptual Shaft Sites
BluePlan ENGINEERING
October 2020
718018-WW-021a
NAD 1983 UTM Zone 17N
Centre View Dr
403
Duke Of York Blvd
Cooksville Creek
Rathburn Rd
Burnhamthorpe Rd
17C
15C
Tomken Rd
Fieldgate Dr
Ponytrail Dr
Central Pky
Bloor St
Little Etobicoke Creek
Kirwin Ave
Cawthra Rd
14B
Dundas St
Dixie Rd
King St
Hurontario St
Confederation Pky
Mary Fix Creek
Etobicoke Creek
12B
11A
10A
09C
08B
07A
06A
Queensway
03A
02A
01B
QEW
North Service Rd
South Service Rd
0
500
m
Eastgate Pky
Mavis Rd
Bloor St
Dundas St
Queensway
Dixie Rd

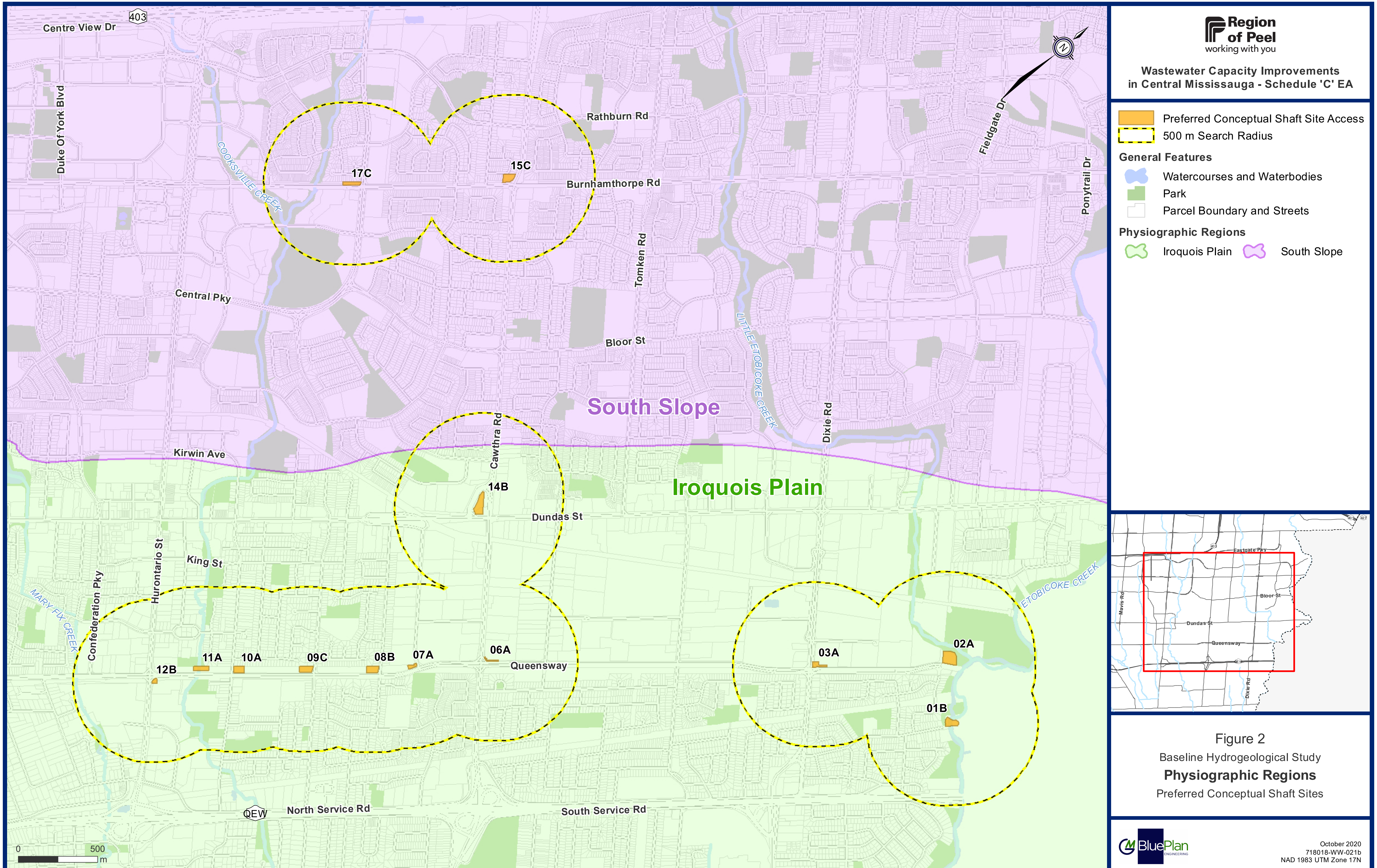


Figure 2
Baseline Hydrogeological Study
Physiographic Regions
Preferred Conceptual Shaft Sites

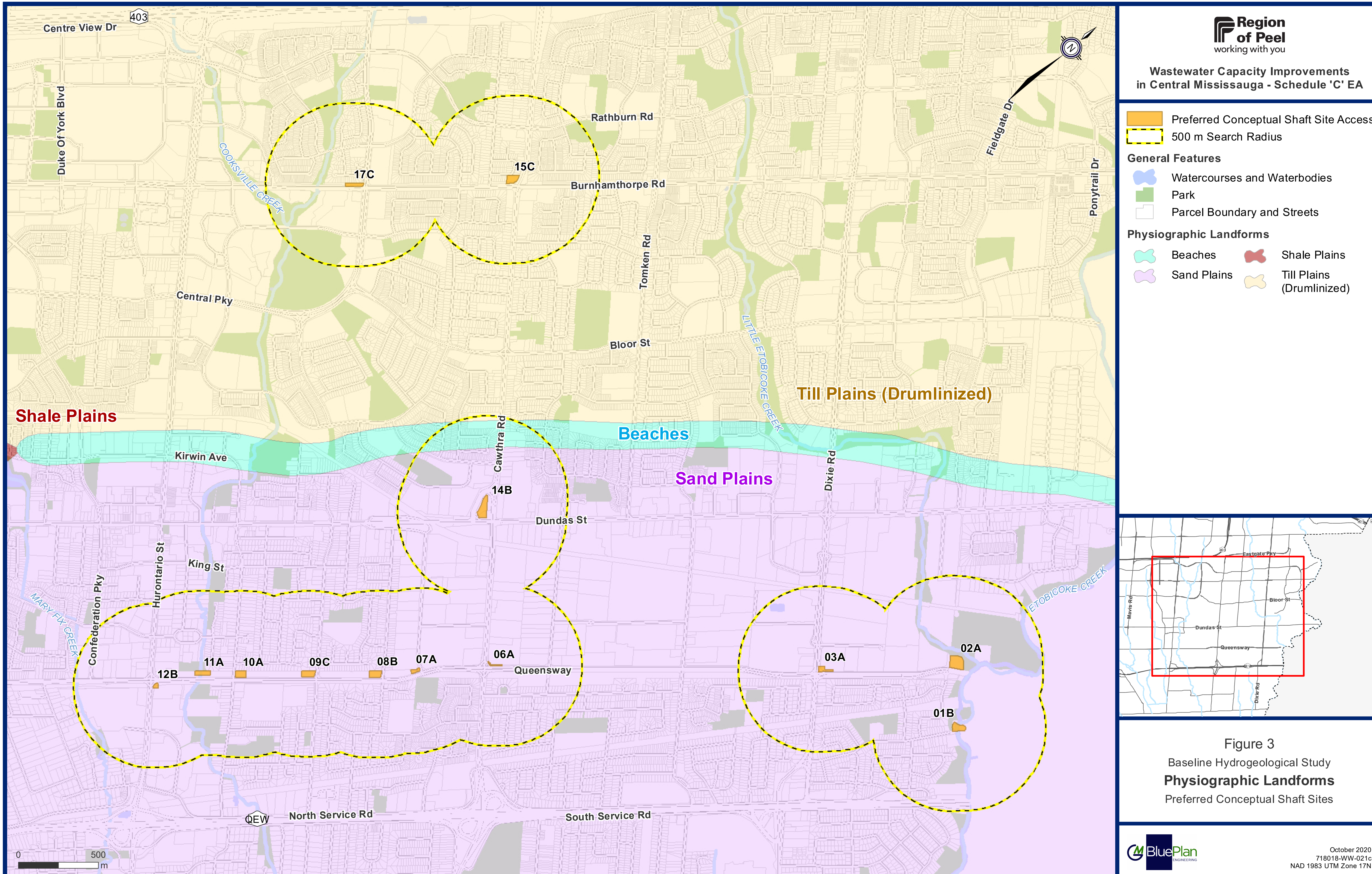
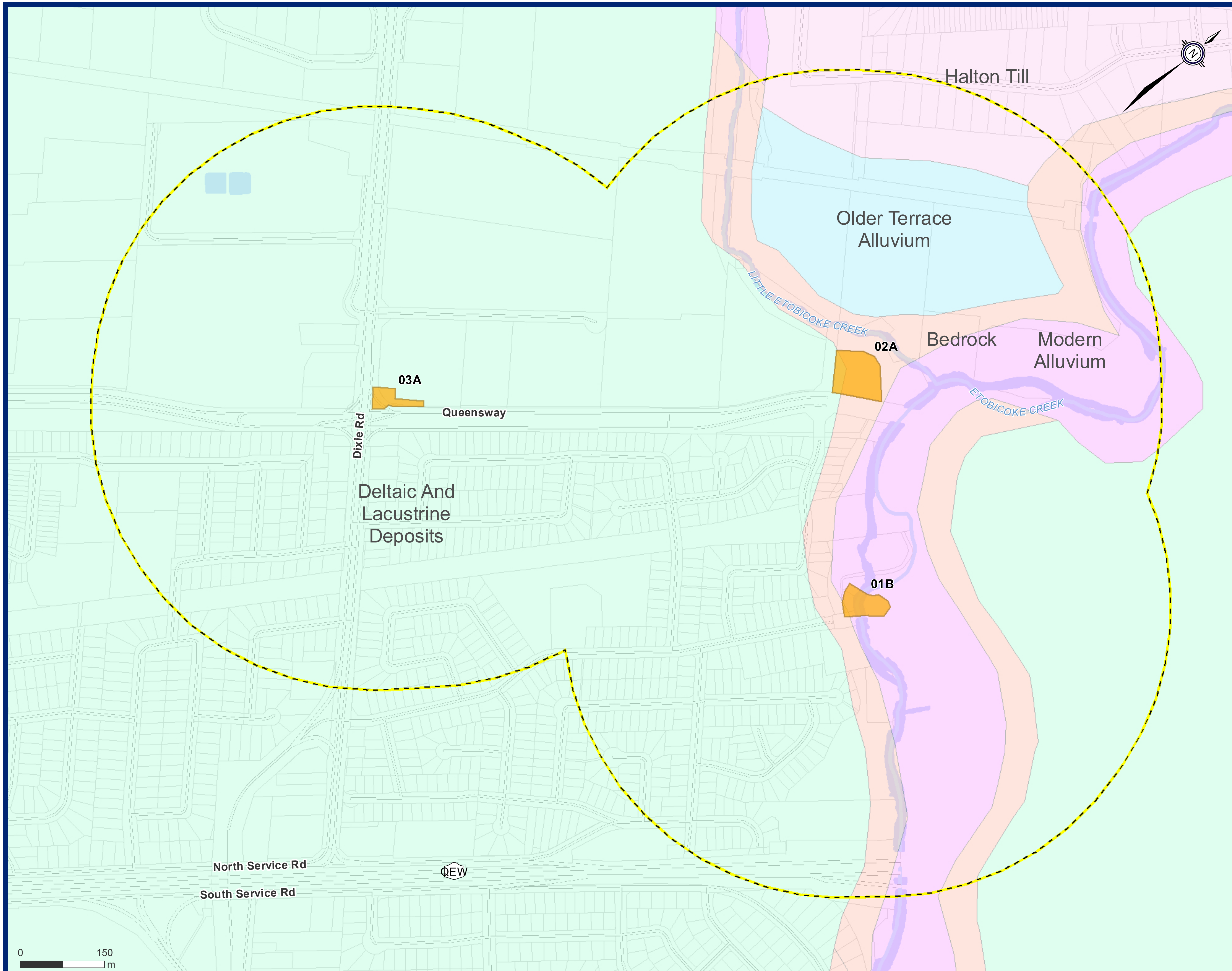


Figure 3
Baseline Hydrogeological Study
Physiographic Landforms
Preferred Conceptual Shaft Sites



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Wastewater Capacity Improvements in Central Mississauga - Schedule 'C' EA

Preferred Conceptual Shaft Site Access
500 m Search Radius

General Features

Watercourses and Waterbodies
Parcel Boundary and Streets

Surficial Geology

Bedrock
Deltaic And Lacustrine Deposits
Halton Till
Modern Alluvium
Older Terrace Alluvium

Figure 4a
Baseline Hydrogeological Study
Surficial Geology
Preferred Conceptual Shaft Sites
(1B, 2A, 3A)

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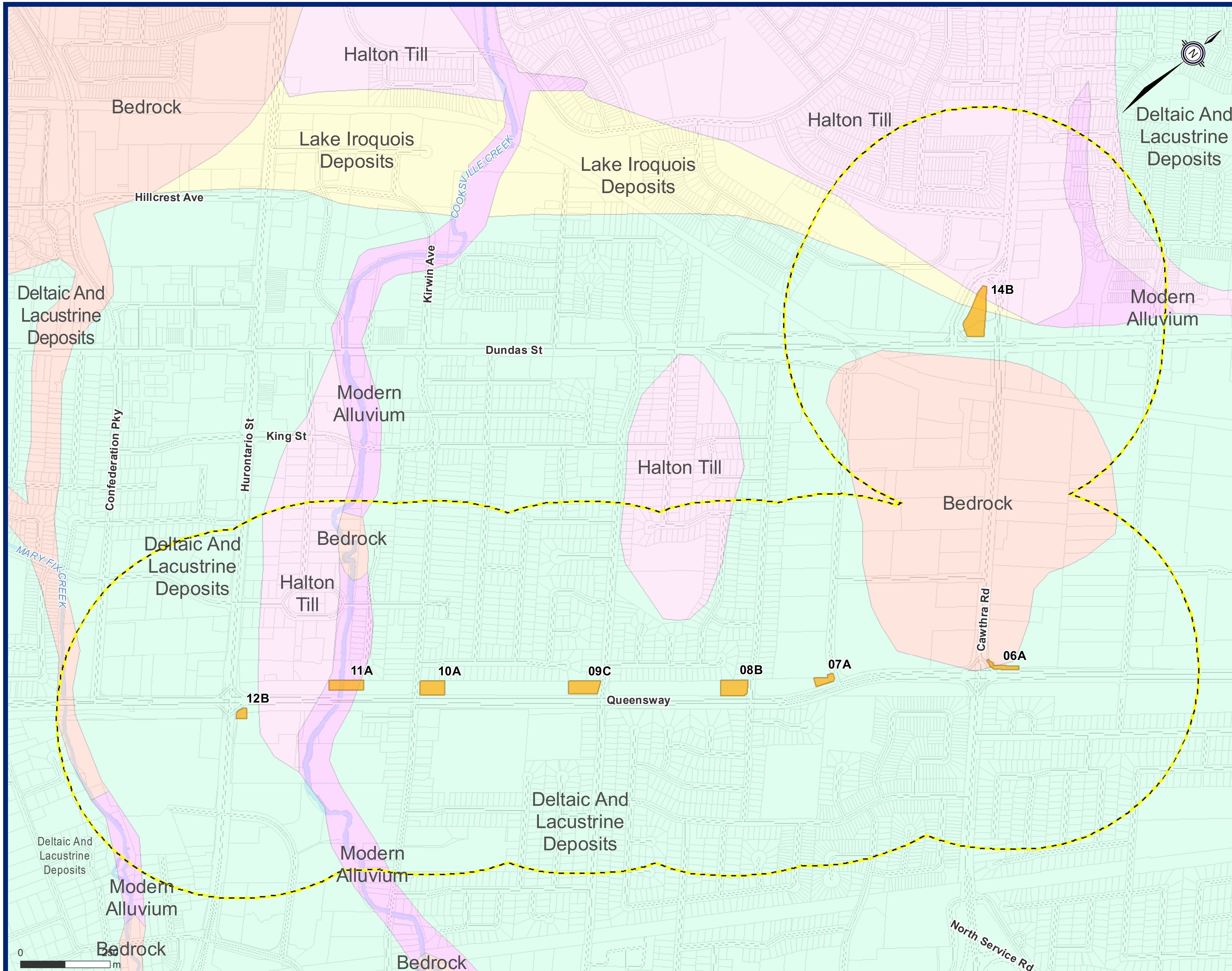
NAD 1983 UTM Zone 17N



Region of Peel
working with you

Wastewater Capacity Improvements in Central Mississauga - Schedule 'C' EA

- Preferred Conceptual Shaft Site Access
- 500 m Search Radius

General Features

- Watercourses and Waterbodies
- Parcel Boundary and Streets

Surficial Geology

- Bedrock
- Deltaic And Lacustrine Deposits
- Halton Till
- Lake Iroquois Deposits
- Modern Alluvium

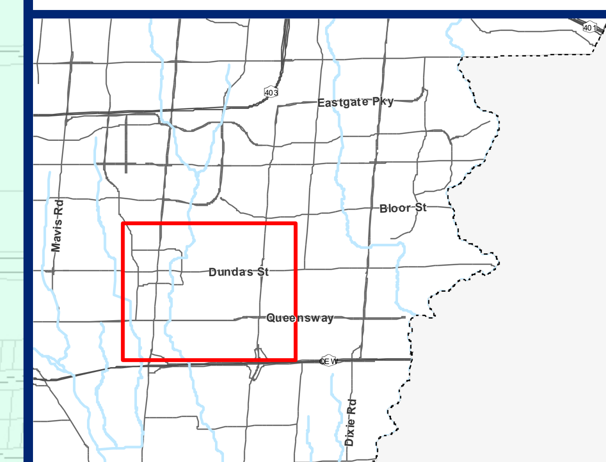


Figure 4b
Baseline Hydrogeological Study
Surficial Geology
Preferred Conceptual Shaft Sites
(6A, 7A, 8B, 9C, 10A, 11A, 12B, 14B)

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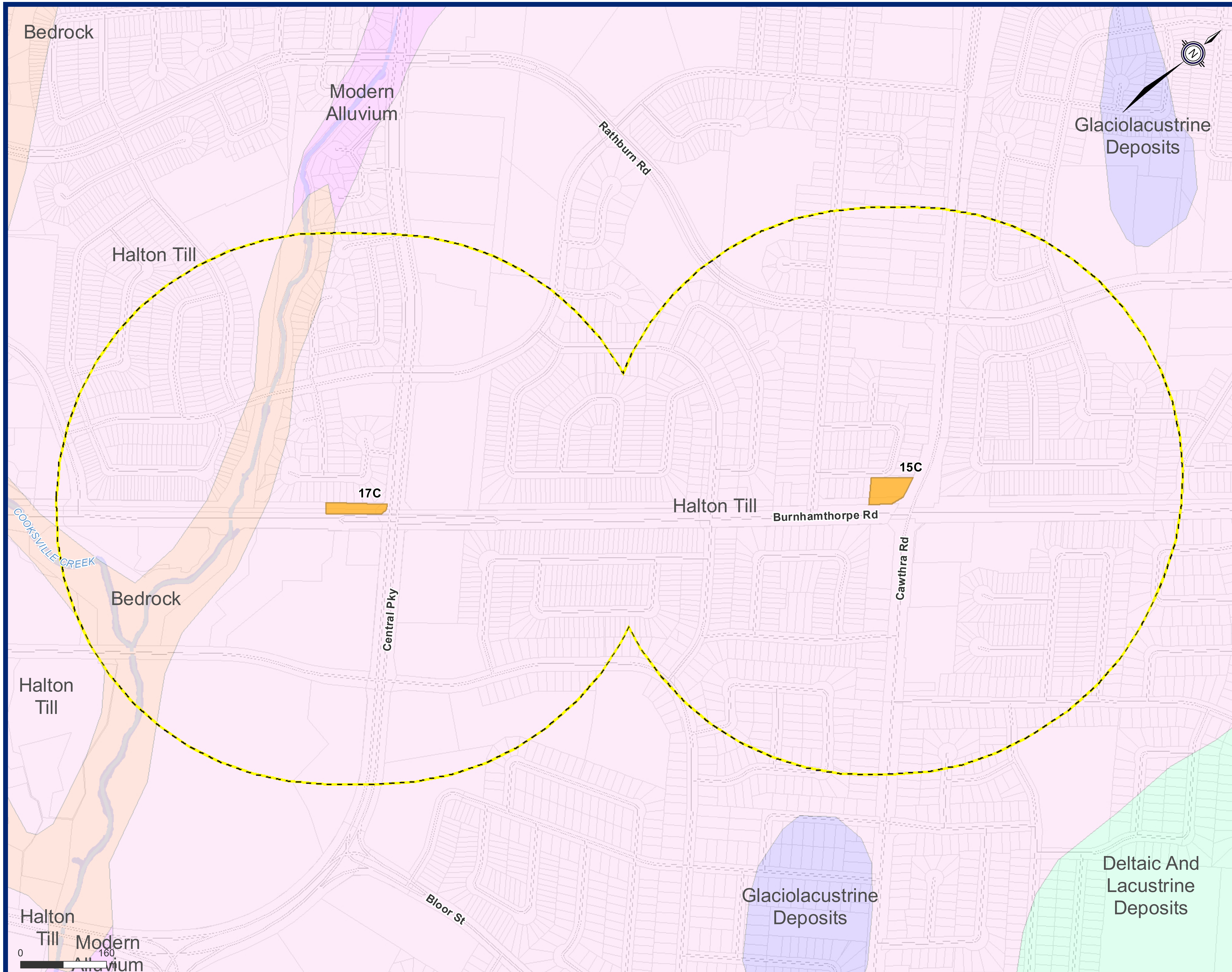
NAD 1983 UTM Zone 17N



Preferred Conceptual Shaft Site Access
500 m Search Radius

General Features

Watercourses and Waterbodies
Parcel Boundary and Streets

Surficial Geology

Bedrock
Deltaic And Lacustrine Deposits
Glaciolacustrine Deposits
Halton Till
Modern Alluvium

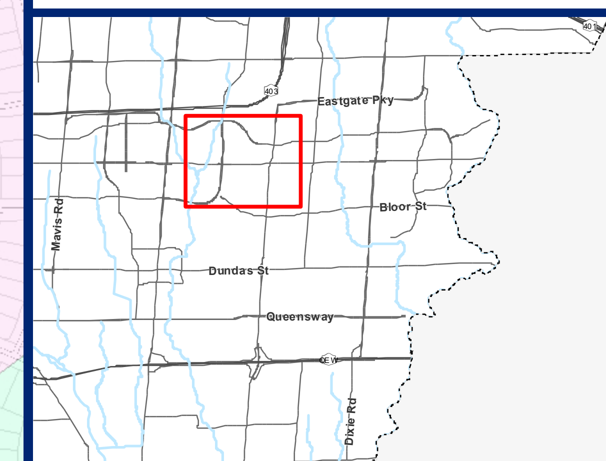


Figure 4c
Baseline Hydrogeological Study
Surficial Geology
Preferred Conceptual Shaft Sites
(15C, 17C)

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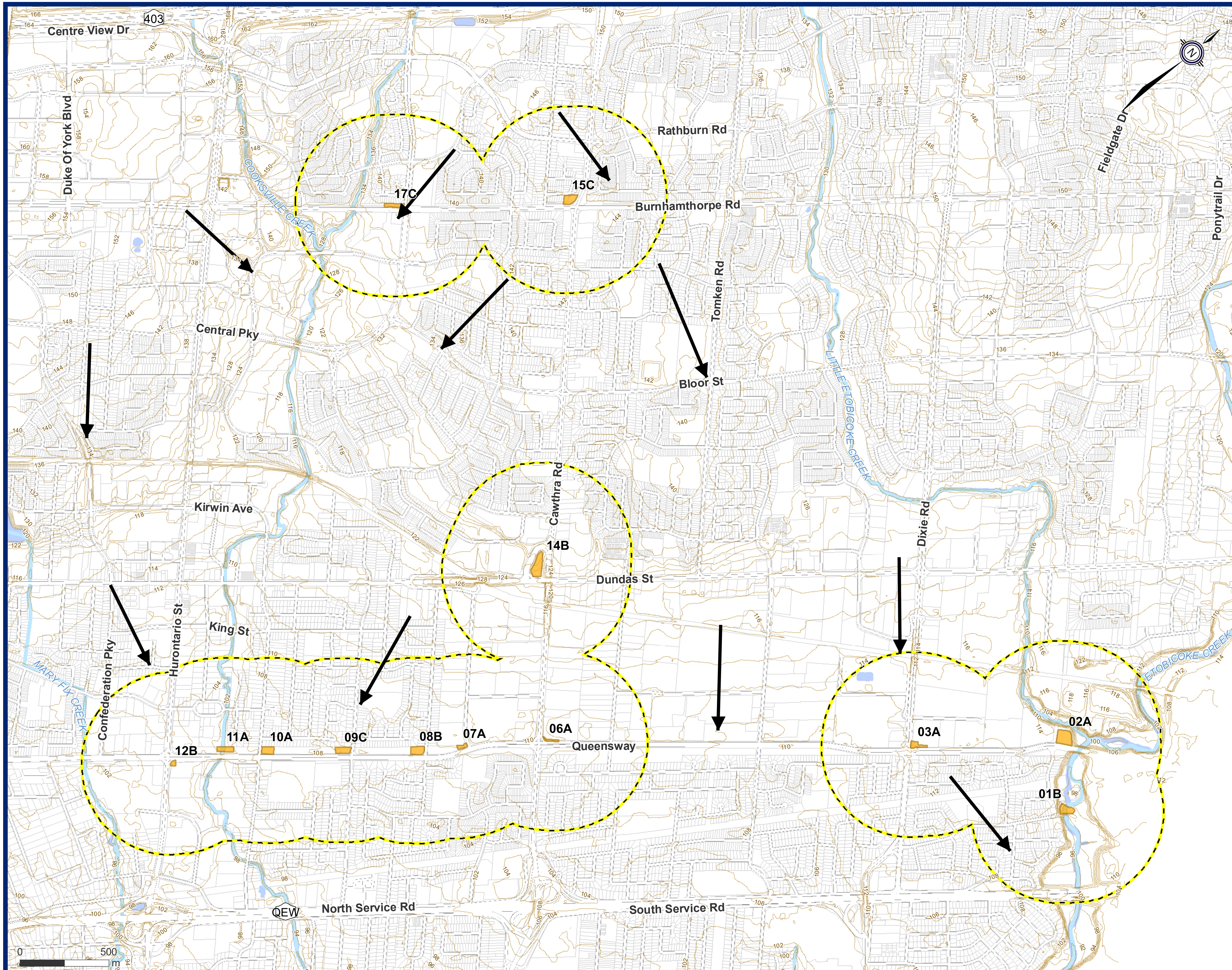
NAD 1983 UTM Zone 17N



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Wastewater Capacity Improvements in Central Mississauga - Schedule 'C' EA

Preferred Conceptual Shaft Site Access
500 m Search Radius

General Features

Groundwater Flow Directions
Contours (1m)
Watercourses and Waterbodies
Parcel Boundary and Streets

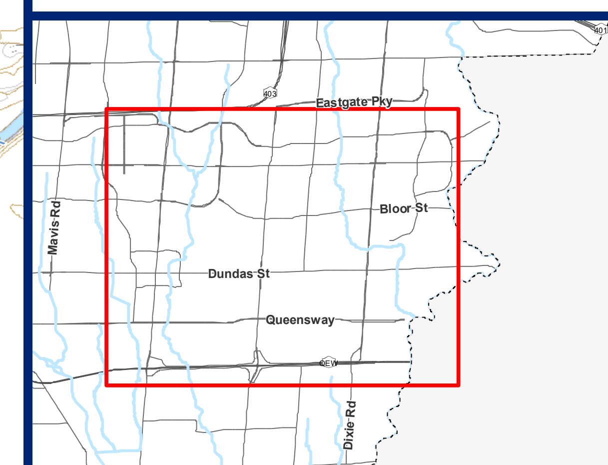

Figure 5
Baseline Hydrogeological Study
Groundwater Flow Directions
Preferred Conceptual Shaft Sites

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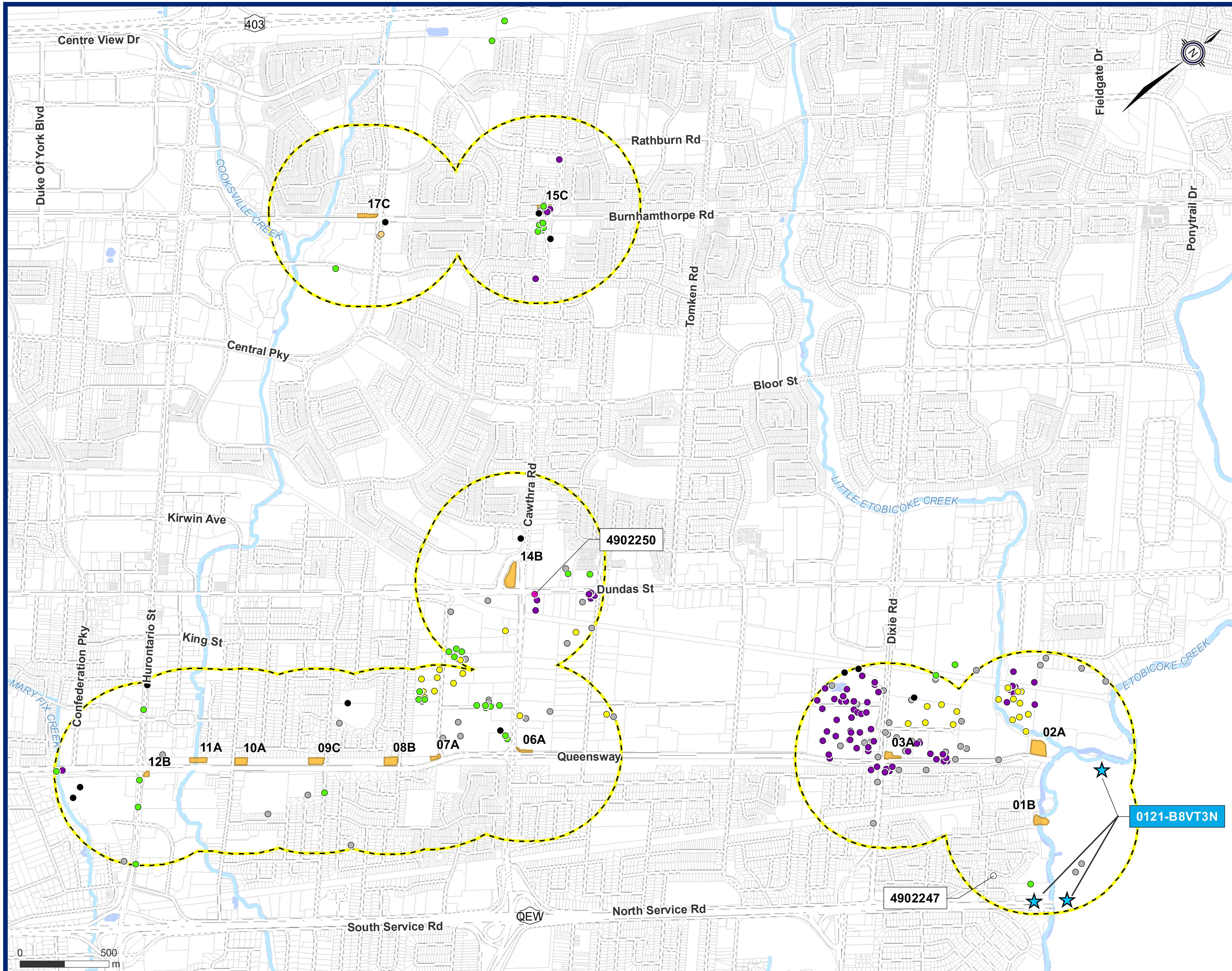
NAD 1983 UTM Zone 17N



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Wastewater Capacity Improvements in Central Mississauga - Schedule 'C' EA

Preferred Conceptual Shaft Site Access
500 m Search Radius

General Features

Watercourses and Waterbodies
Parcel Boundary and Streets

Well Record Types

- Dewatering
- Domestic
- Industrial
- Monitoring
- Monitoring and Test Hole
- Test Hole
- Not Used
- Unknown

Permits to Take Water

Construction Dewatering

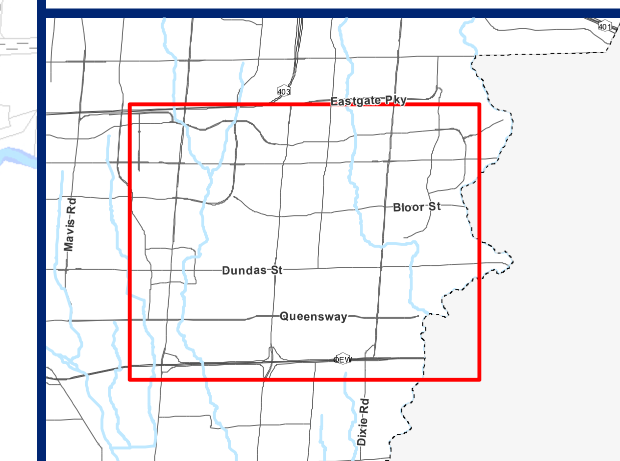

Figure 6
Baseline Hydrogeological Study
Water Well Records and Permit to Take Water
Preferred Conceptual Shaft Sites

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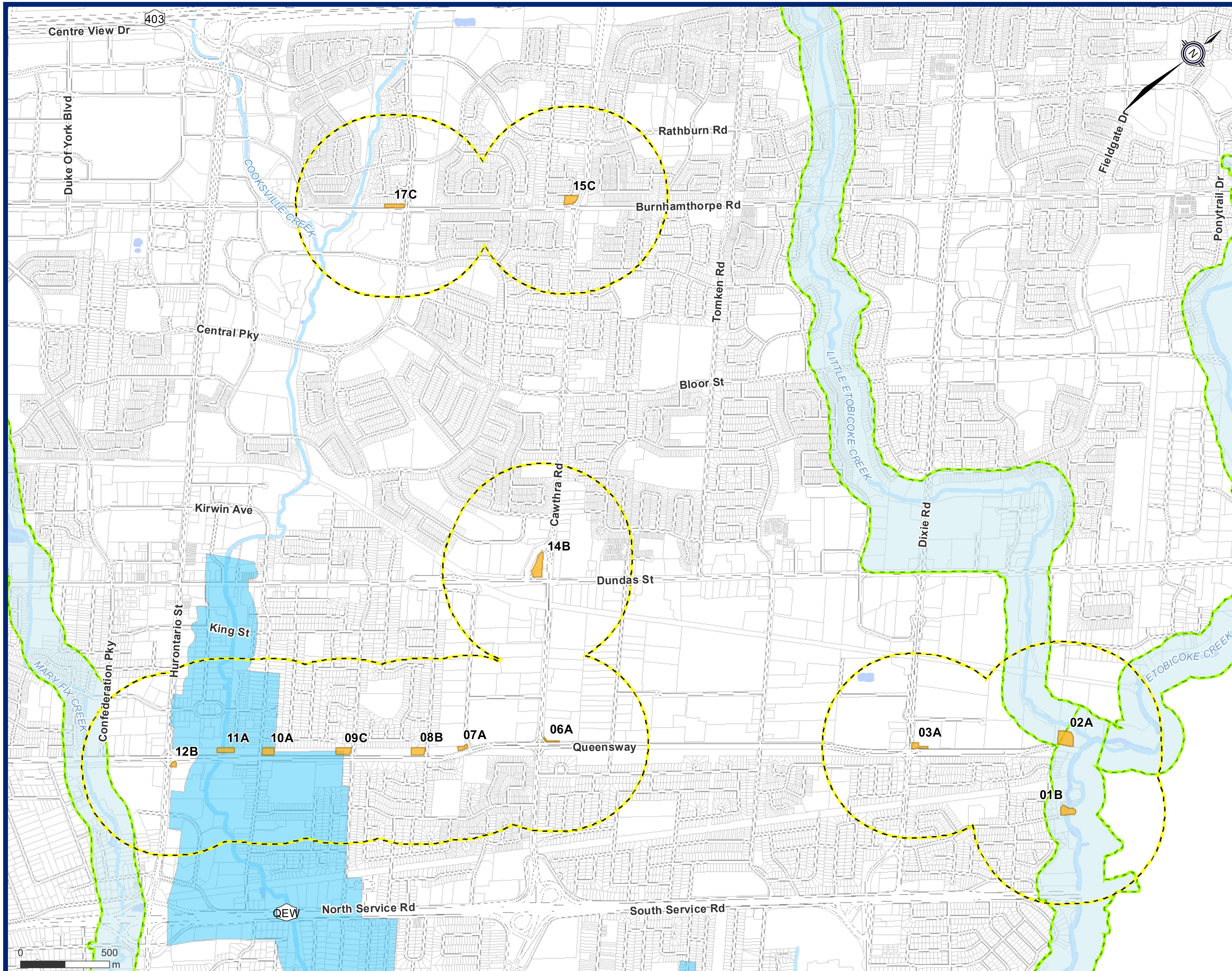
NAD 1983 UTM Zone 17N



Region of Peel
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Wastewater Capacity Improvements in Central Mississauga - Schedule 'C' EA

Preferred Conceptual Shaft Site Access
500 m Search Radius

General Features

Watercourses and Waterbodies
Parcel Boundary and Streets

Source Water Protection

Event-Based Areas
Intake Protection Zone 1
Intake Protection Zone 2
Intake Protection Zone 3

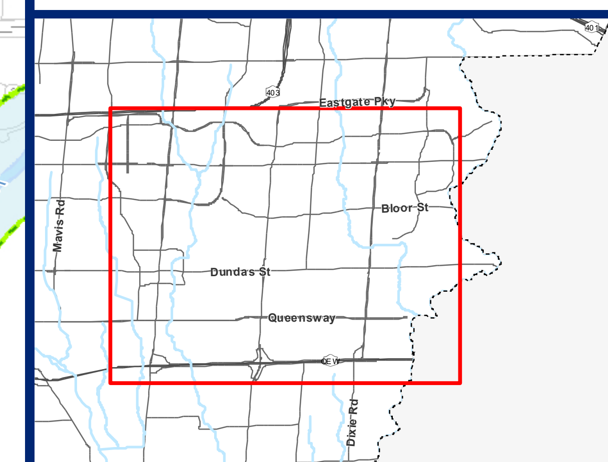

Figure 7a

Baseline Hydrogeological Study

Source Protection: Event-Based Areas and Intake Protection Zones

Preferred Conceptual Shaft Sites

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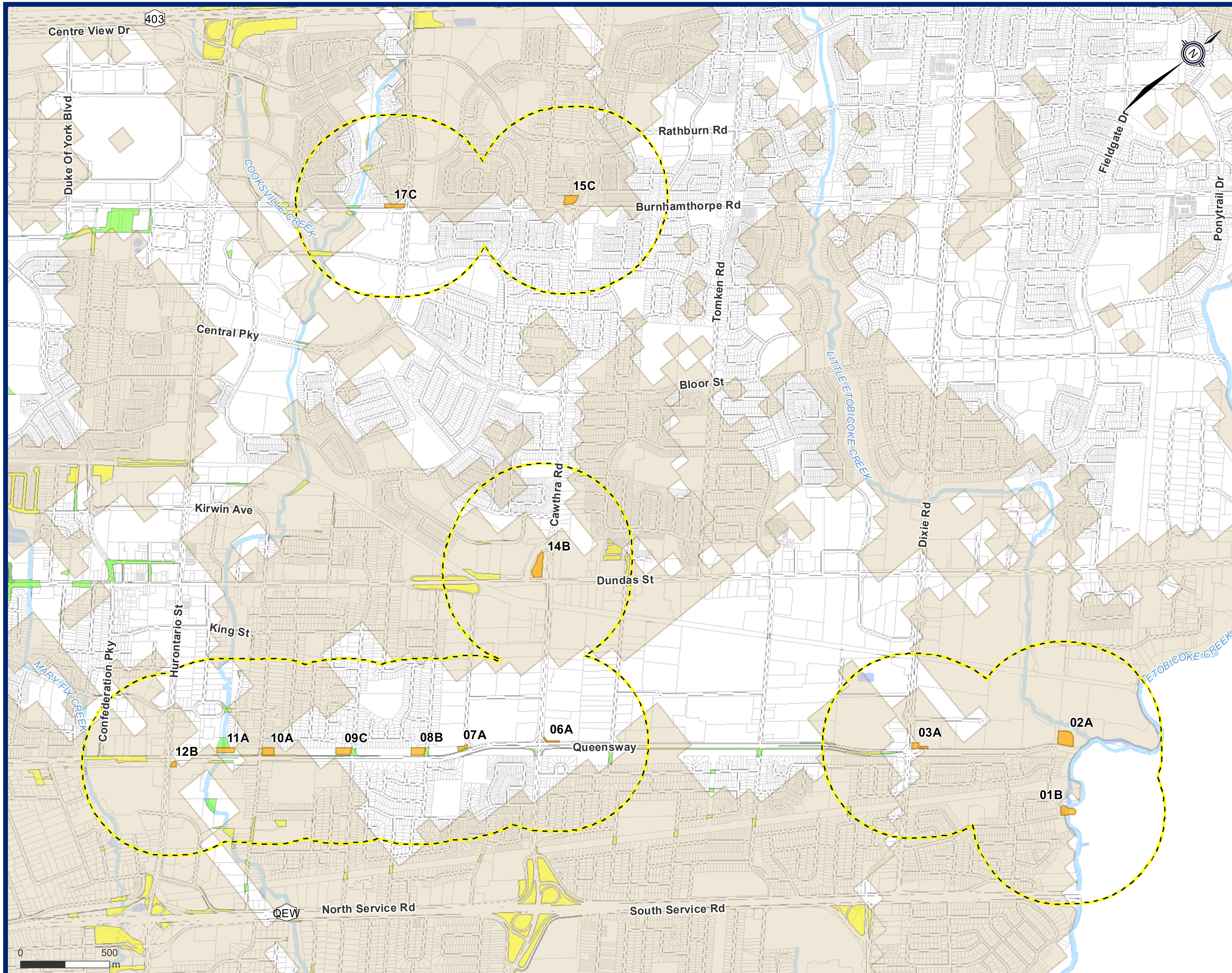
NAD 1983 UTM Zone 17N



Region of Peel
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Wastewater Capacity Improvements in Central Mississauga - Schedule 'C' EA

Preferred Conceptual Shaft Site Access
500 m Search Radius

General Features

Watercourses and Waterbodies
Parcel Boundary and Streets

Source Water Protection

Highly Vulnerable Aquifers

Significant Groundwater Recharge Areas

0
2
4
6

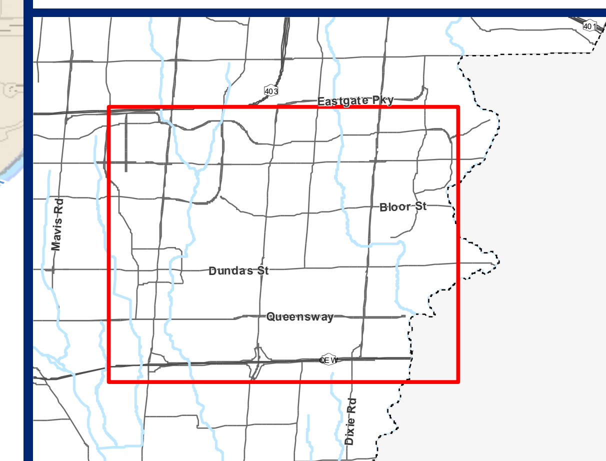

Figure 7b

Baseline Hydrogeological Study

Source Protection: Significant Groundwater Recharge Areas and Highly Vulnerable Aquifers

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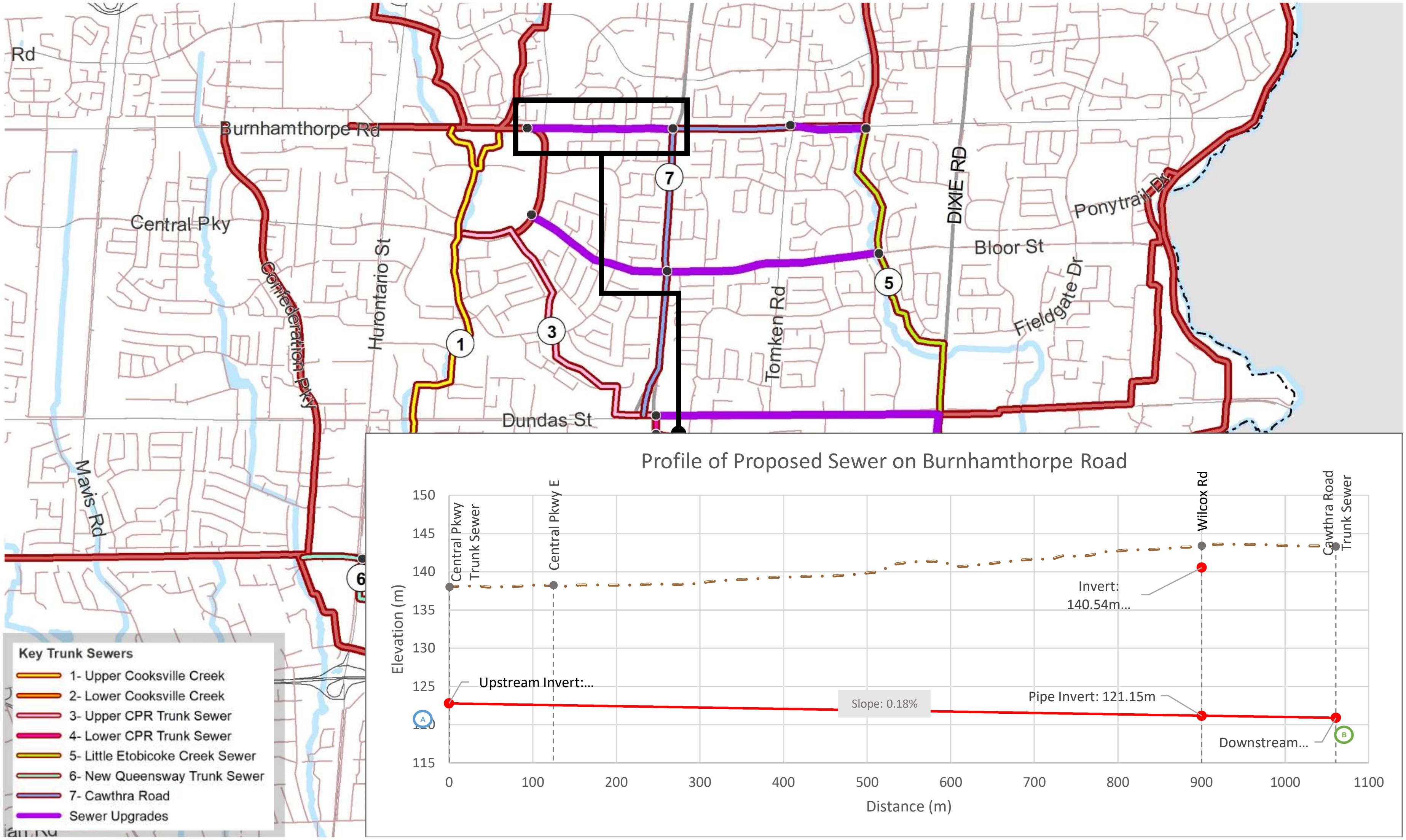
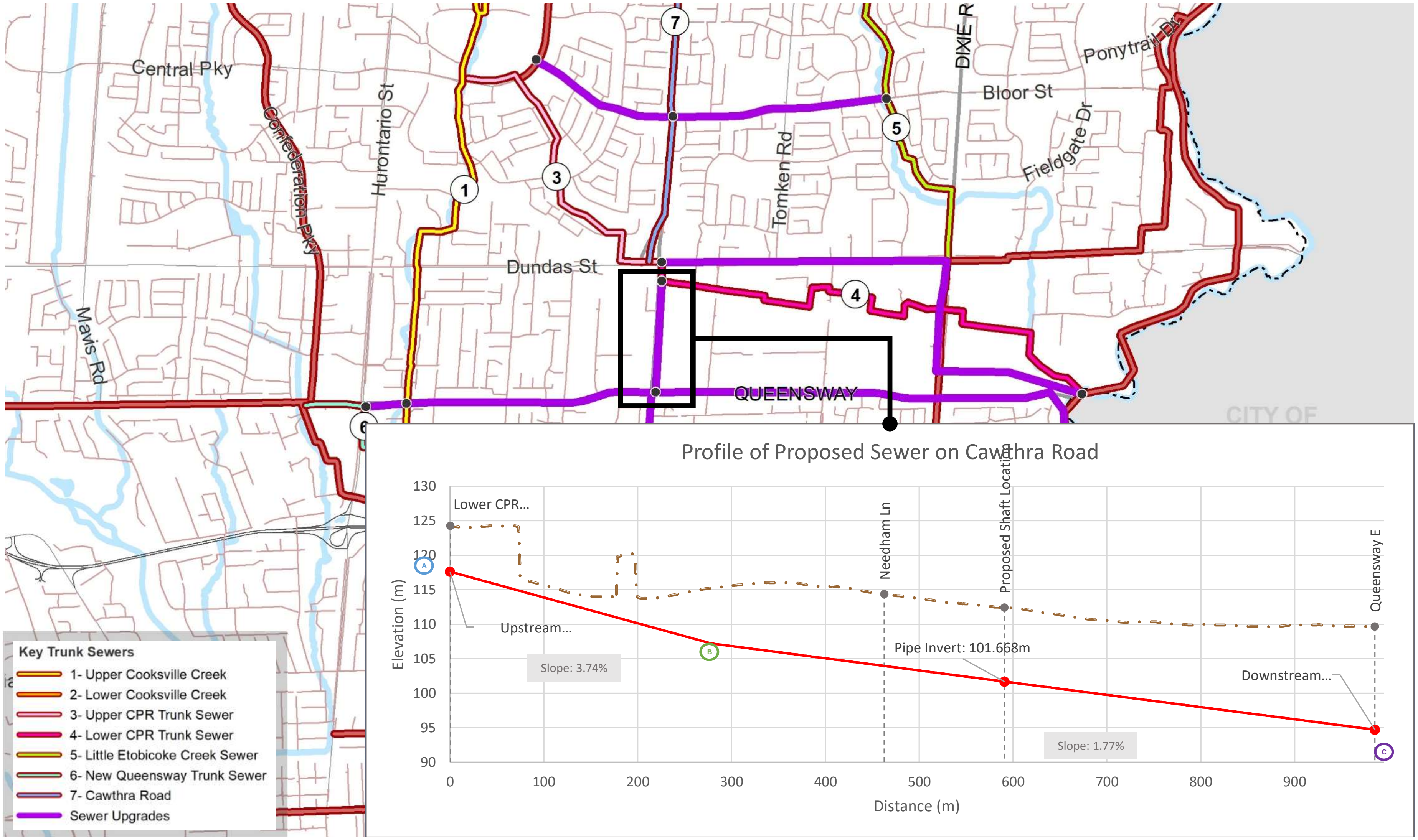
October 2020
718018-WW-021i
NAD 1983 UTM Zone 17N

APPENDIX A:
PROPOSED SEWER INSTALLATION PROFILES

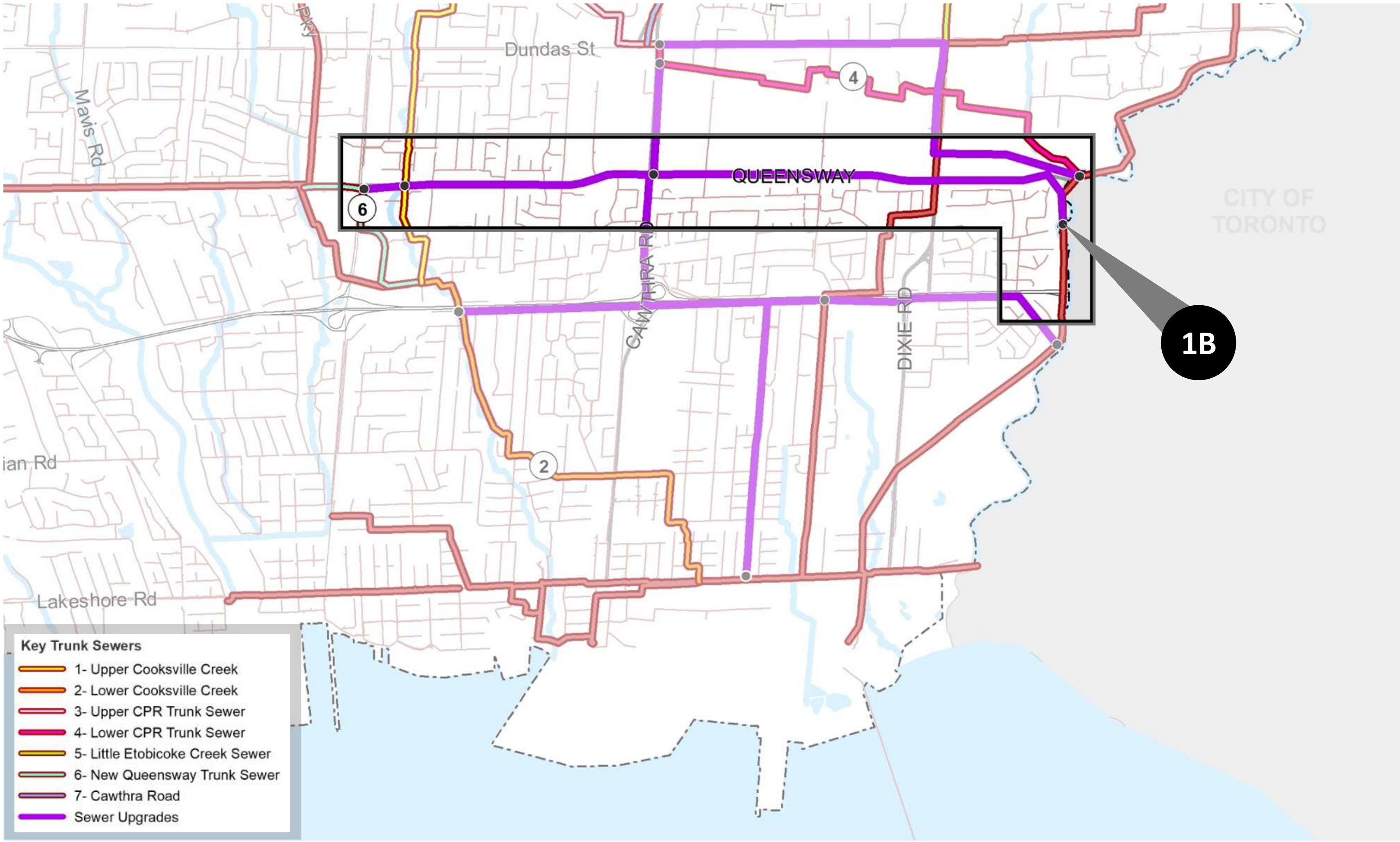
Central Mississauga Proposed Sewer Upgrades Profiles



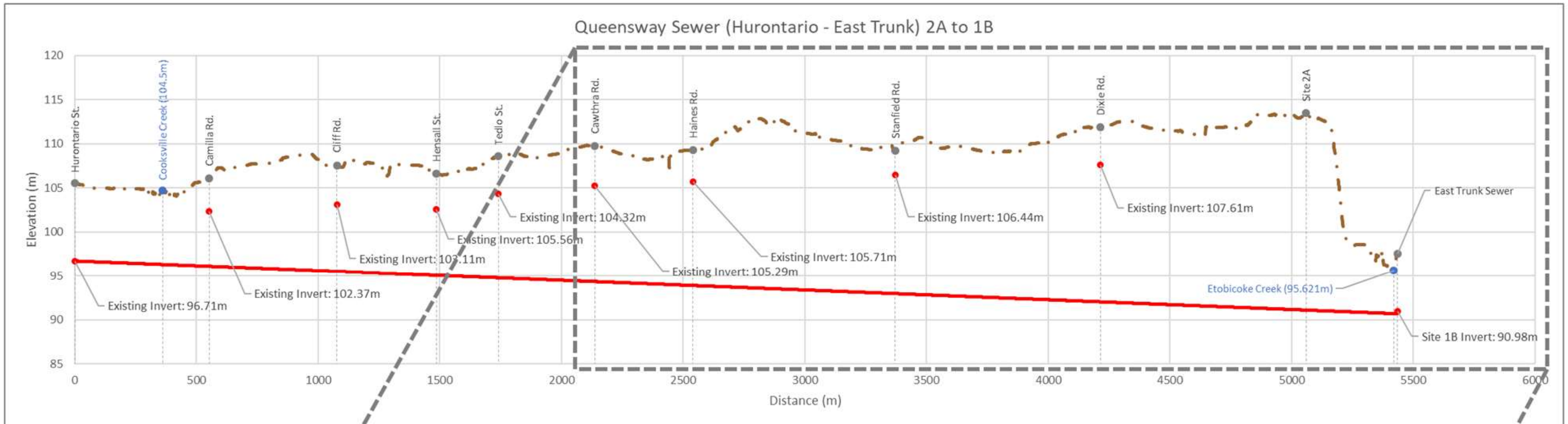
Central Mississauga Proposed Sewer Upgrades Profiles



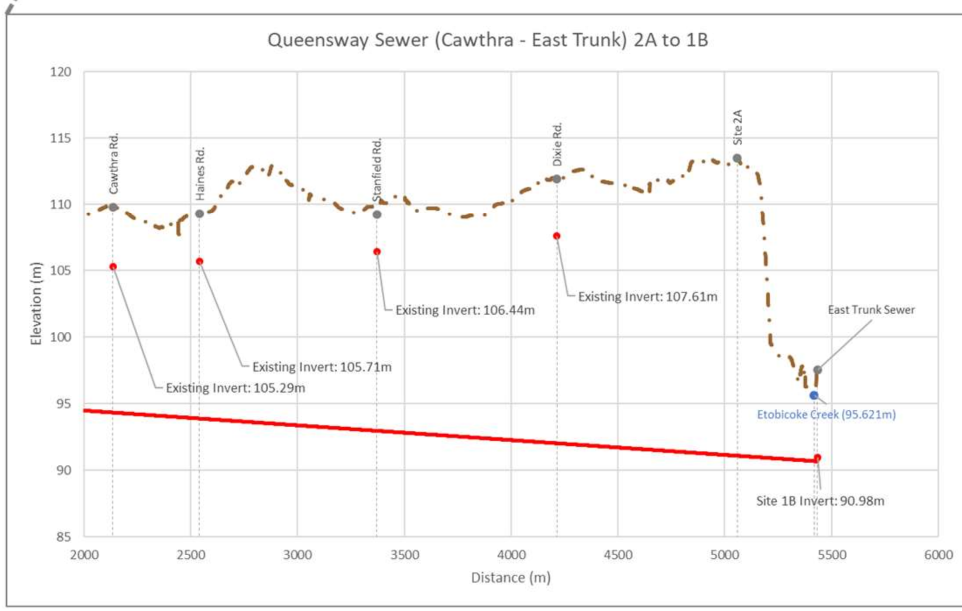
Queensway Sewer – Hurontario to East Trunk Sewer Shaft Options



Queensway Sewer – Hurontario to Shaft 2A to 1B

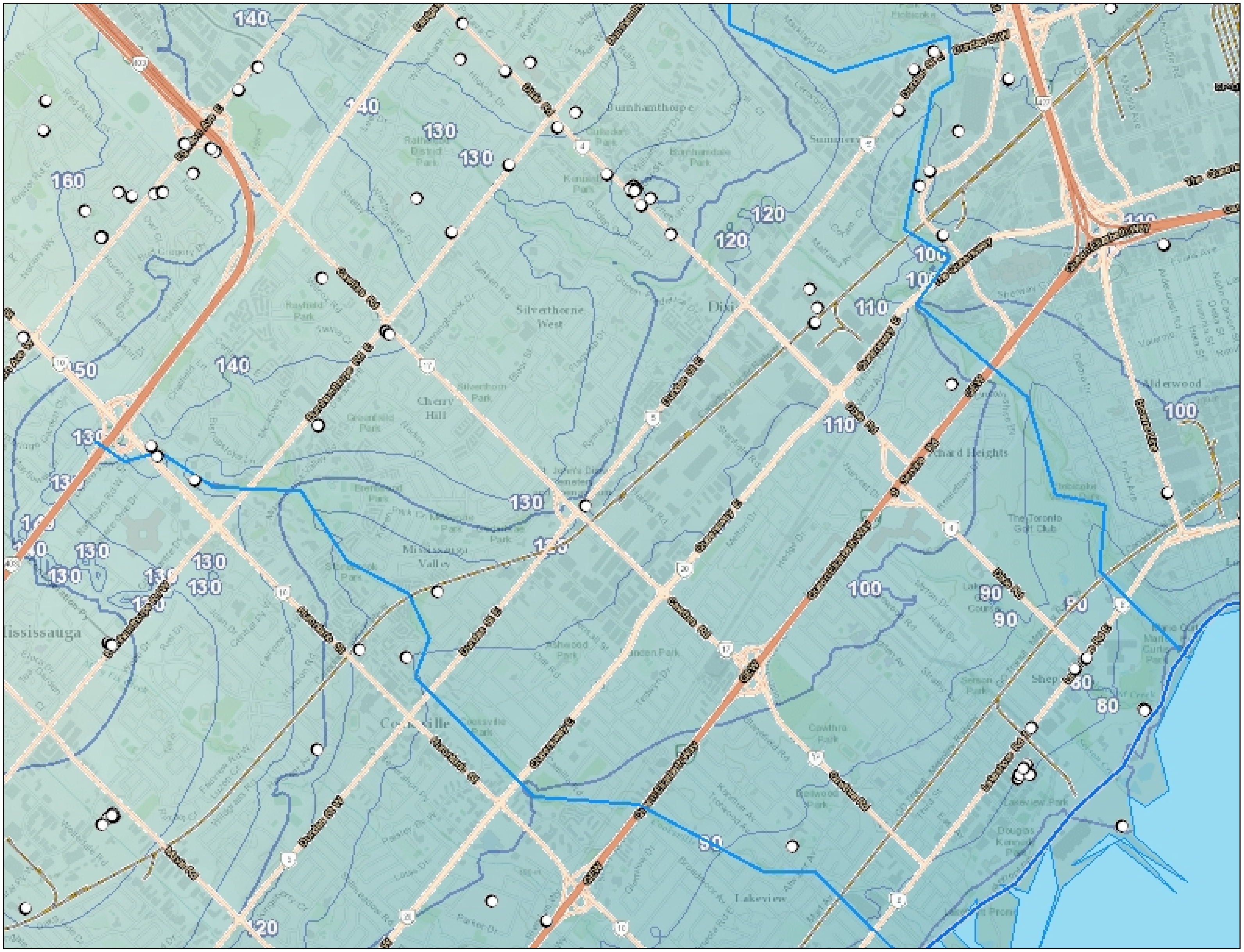


Slope 0.105%



APPENDIX B:
GROUNDWATER CONTOUR PLOT

Average Water Table (mASL)- Overall



Legend

- CAMC Boundary
- Oak Ridges Moraine Boundary
- Shallow Water Table Wells (<20m
- Water Bodies
- Streams - 100m - Strahler gt3

Water Table (mASL)

High : 530.229

Low : 45.0948

3,238.1 0 1,619.07 3,238.1 Metres

1: 63,743

Map Compiled by the Oak Ridges Moraine Groundwater Program.101 Exchange Avenue, Vaughan, Ontario, M3N 1S4

Region of Peel working with you

SOURCE: ORMGP 2020; MNRF 2020;

PROJECTION: WGS_1984_Web_Mercator_Auxiliary_Sphere

DATE PRINTED: September 30, 2020

APPENDIX C1:
STRATIGRAPHIC CROSS-SECTIONS FROM PEEL WATER MANAGEMENT MODEL – SITES 01B THROUGH 12B

Cross Section Locations - Queensway E (3/3)

Legend

- CAMC Boundary
- Oak Ridges Moraine Boundary

Region of Peel working with you

458.6 | 0 | 229.31 | 458.6 Metres

1: 9,028

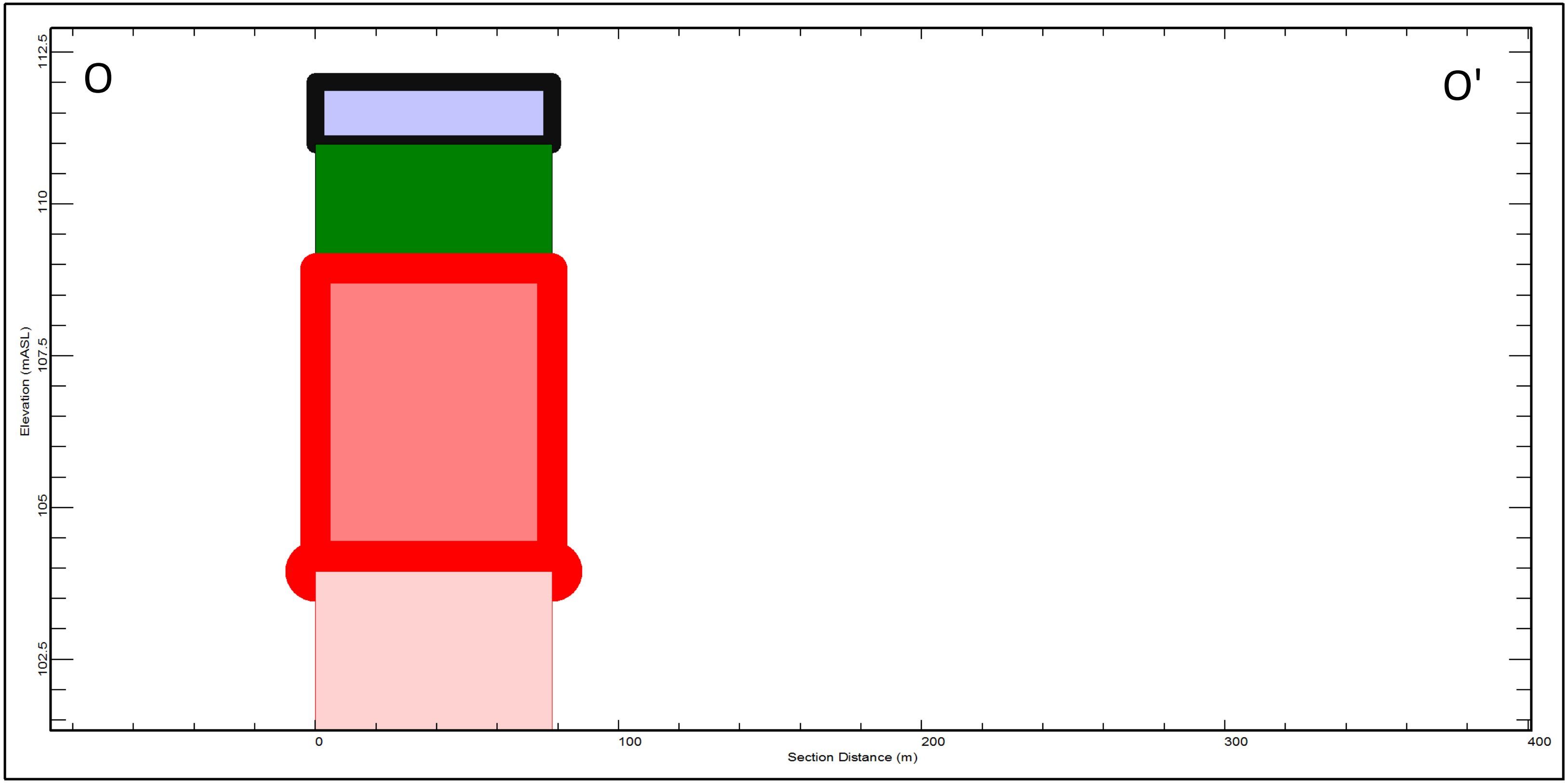
Map Compiled by the Oak Ridges Moraine Groundwater Program.101 Exchange Avenue, Vaughan, Ontario, M3N 1S4

This map is for information purposes only and the Oak Ridges Moraine Groundwater Program takes no responsibility for, nor guarantees, the accuracy of all the information contained within the map.

SOURCE: ORMGP 2020; MNRF 2020;

PROJECTION: WGS_1984_Web_Mercator_Auxiliary_Sphere

DATE PRINTED: September 28, 2020



Legend:
- Named places
- Post glacial deposits
- Halton Till
- Upper ORAC sand
- ORAC Silt
- Lower ORAC sand
- Upper Newmarket Till
- Thorncliffe Formation
- Sunnybrook Drift (or equivalent)
- Weathered Bedrock
- Upper Bedrock
- Amabel/Goat Island
- Reynales
- Whirlpool
- Queenston
- Georgian Bay Fm.

0 40 80

Units: UTM NAD83 Zone 17
Section Distance in metres
Vertical elevation in mASL
Vertical Exaggeration: 20x
Borehole Offset Projection: 100 m

Data Sources:
Produced with information provided by the Ministry of Natural Resources,

Drawing prepared by Earthfx 9/30/2020

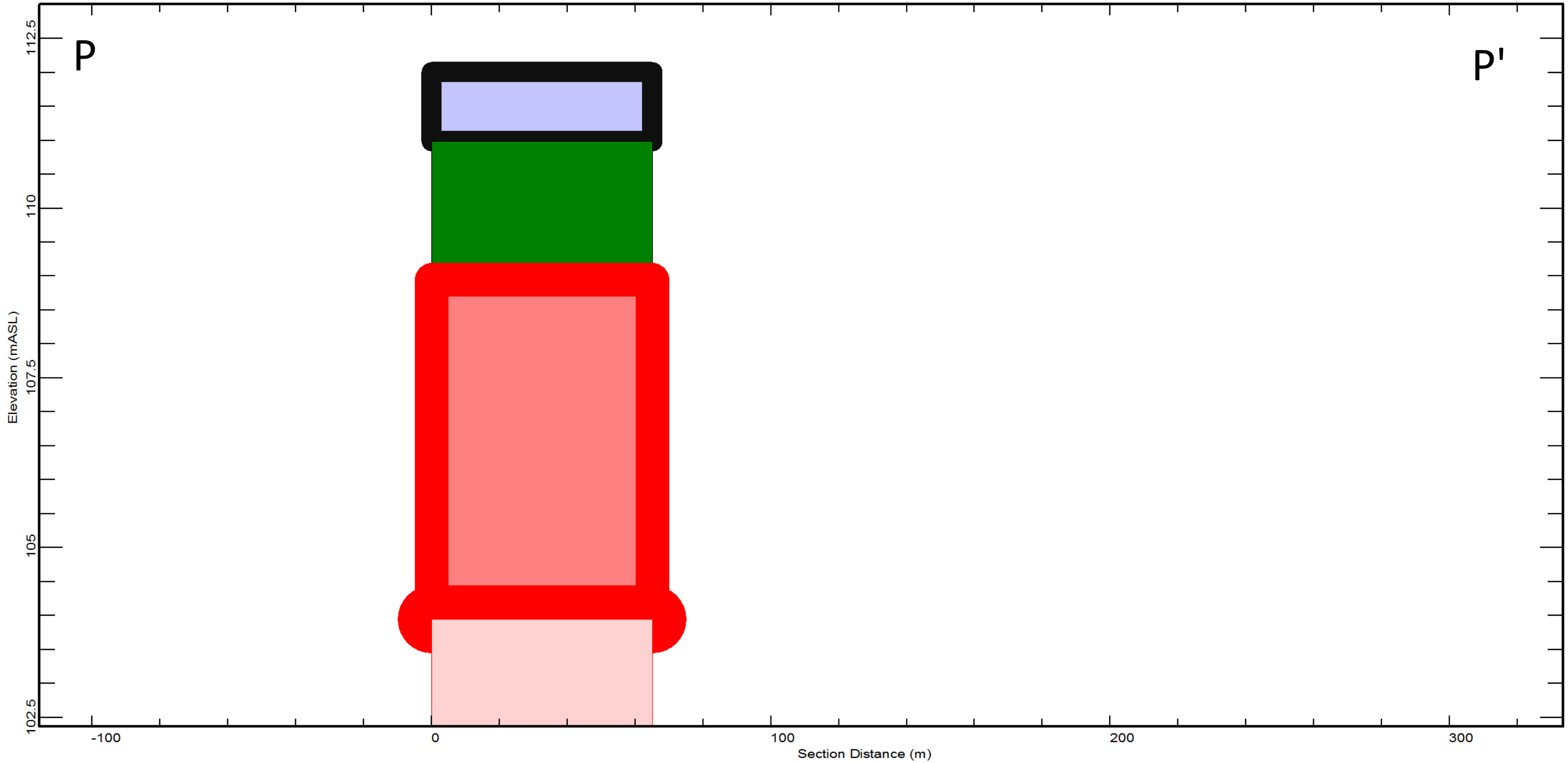
Region of Peel
working with you

Peel Region Water Management Model 2019

Earthfx Incorporated

Cross Section

Queensway E



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0 40 80

Units: UTM NAD83 Zone 17
Section Distance in metres
Vertical elevation in mASL
Vertical Exaggeration: 20x
Borehole Offset Projection: 100 m

Data Sources:
Produced with information provided by the Ministry of Natural Resources,

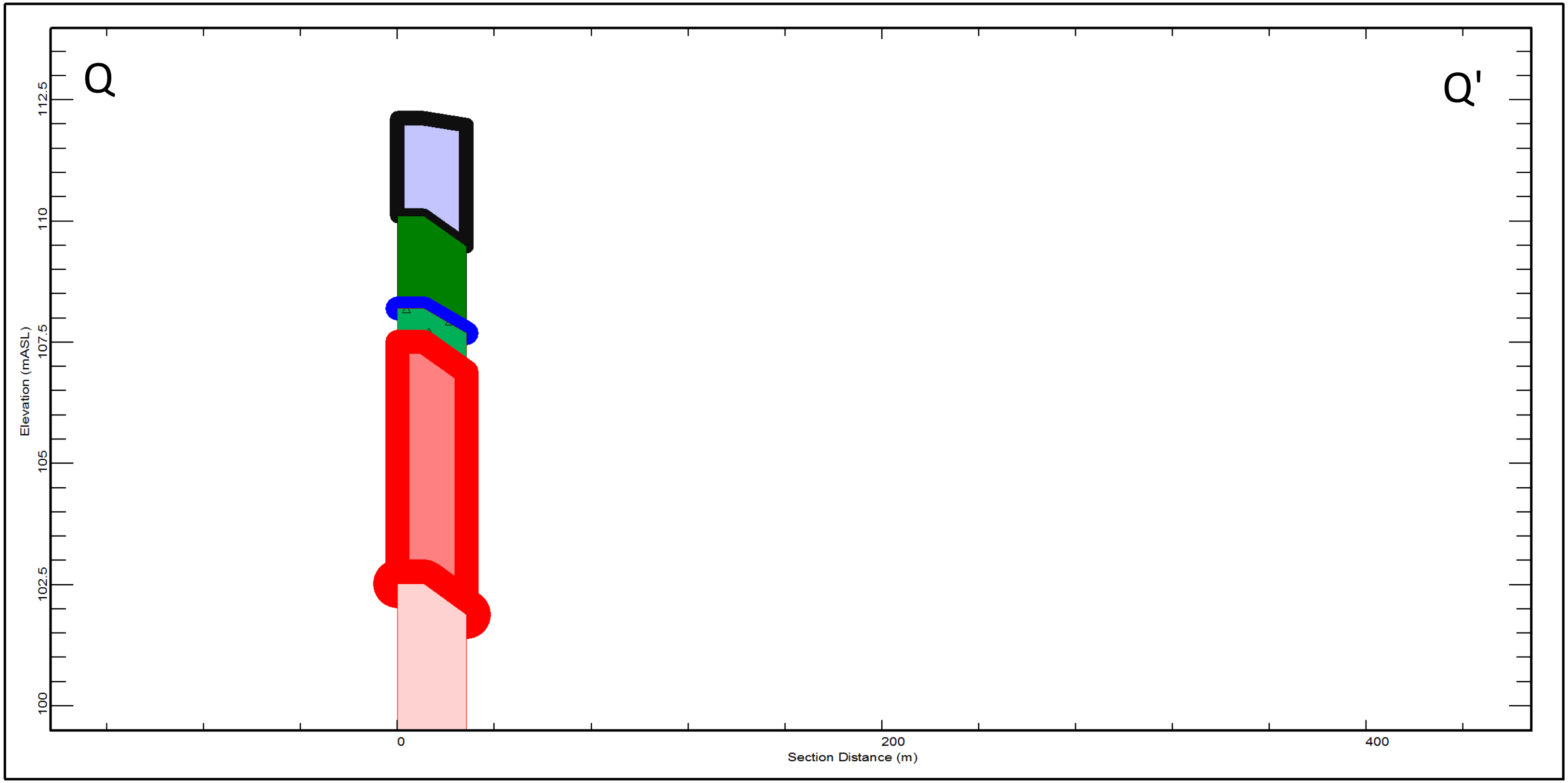
Drawing prepared by Earthfx 9/30/2020

Region of Peel
working with you

Peel Region Water Management Model 2019

Earthfx Incorporated

Cross Section
Queensway E



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0 40 80

Units: UTM NAD83 Zone 17
Section Distance in metres
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Vertical Exaggeration: 20x
Borehole Offset Projection: 100 m

Data Sources:
Produced with information provided by the Ministry of Natural Resources,

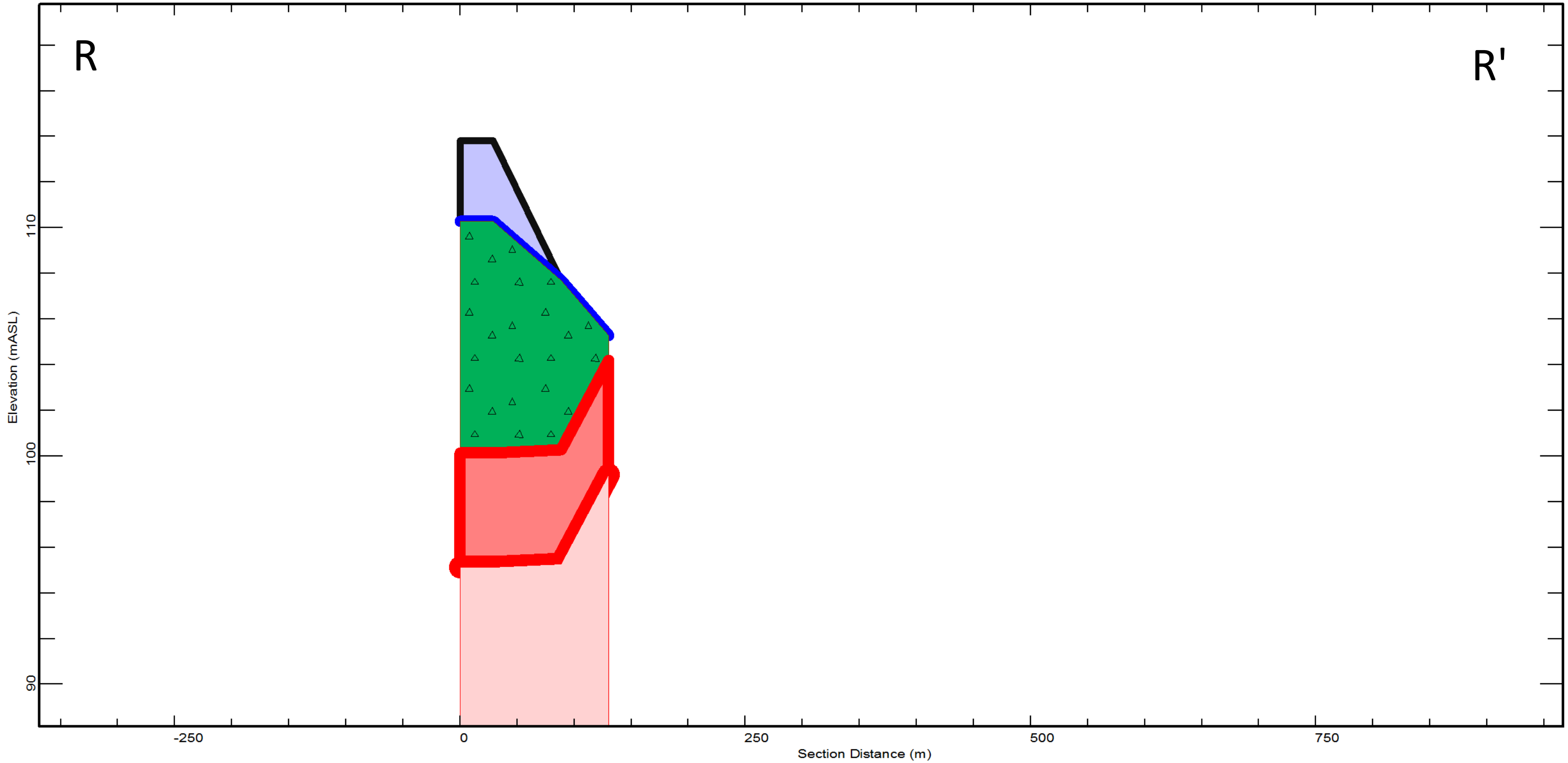
Drawing prepared by Earthfx 9/30/2020

Region of Peel working with you

Peel Region Water Management Model 2019

Earthfx Incorporated

Cross Section
Queensway E



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- Reynales
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- Queenston
- Georgian Bay Fm.

0 100 200

Units: UTM NAD83 Zone 17
Section Distance in metres
Vertical elevation in mASL
Vertical Exaggeration: 20x
Borehole Offset Projection: 100 m

Data Sources:
Produced with information provided by the Ministry of Natural Resources,

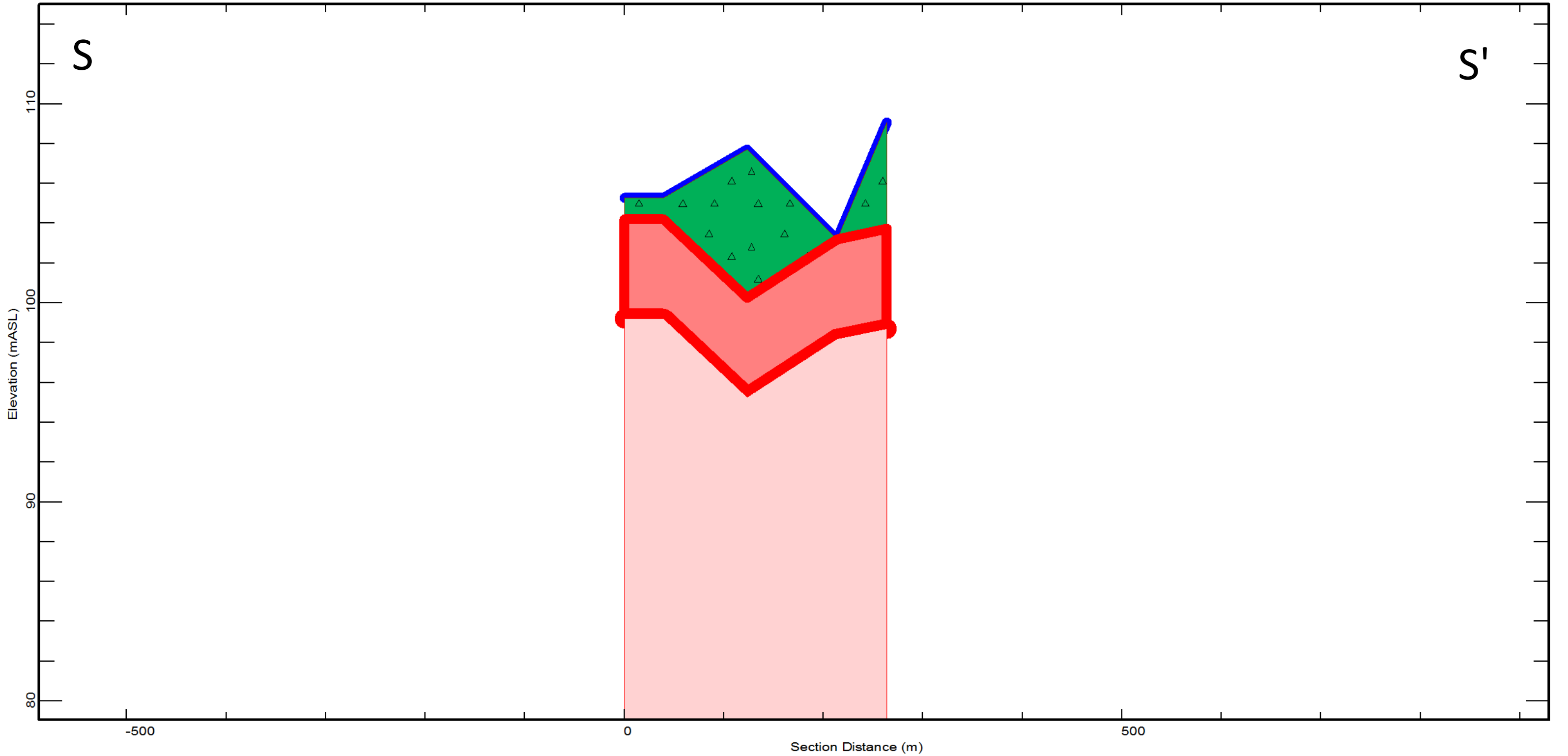
Drawing prepared by Earthfx 9/30/2020

Region of Peel working with you

Peel Region Water Management Model 2019

Earthfx Incorporated

Cross Section
Queensway E



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- Georgian Bay Fm.

0 100 200

Units: UTM NAD83 Zone 17
Section Distance in metres
Vertical elevation in mASL
Vertical Exaggeration: 20x
Borehole Offset Projection: 100 m

Data Sources:
Produced with information provided by the Ministry of Natural Resources,

Drawing prepared by Earthfx 9/30/2020

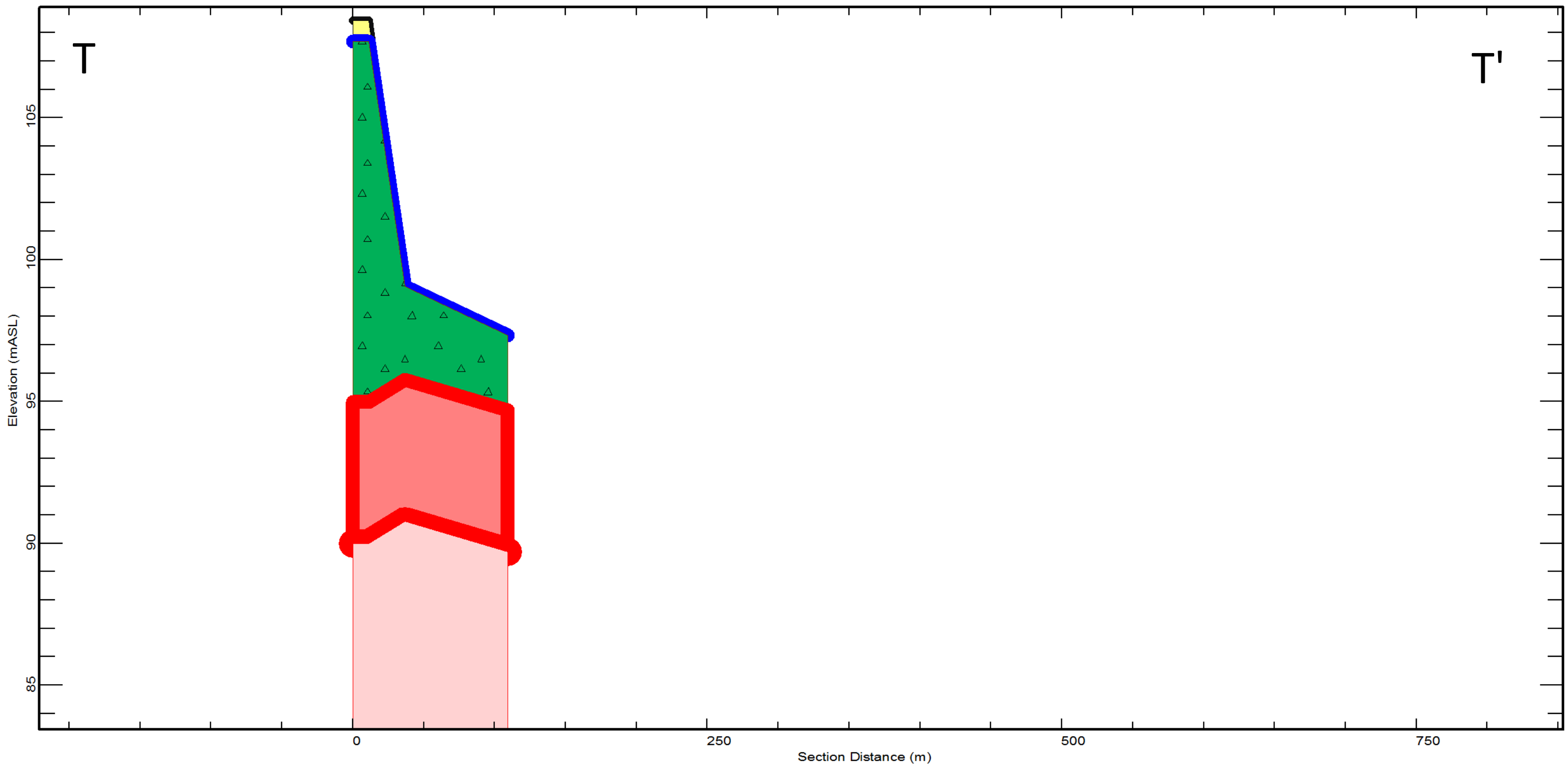
Region of Peel working with you

Peel Region Water Management Model 2019

Earthfx Incorporated

Cross Section

Queensway E



Legend:

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- Reynales
- Whirlpool
- Queenston
- Georgian Bay Fm.

0 100 200

Units: UTM NAD83 Zone 17
Section Distance in metres
Vertical elevation in mASL
Vertical Exaggeration: 20x
Borehole Offset Projection: 100 m

Data Sources:
Produced with information provided by the Ministry of Natural Resources,

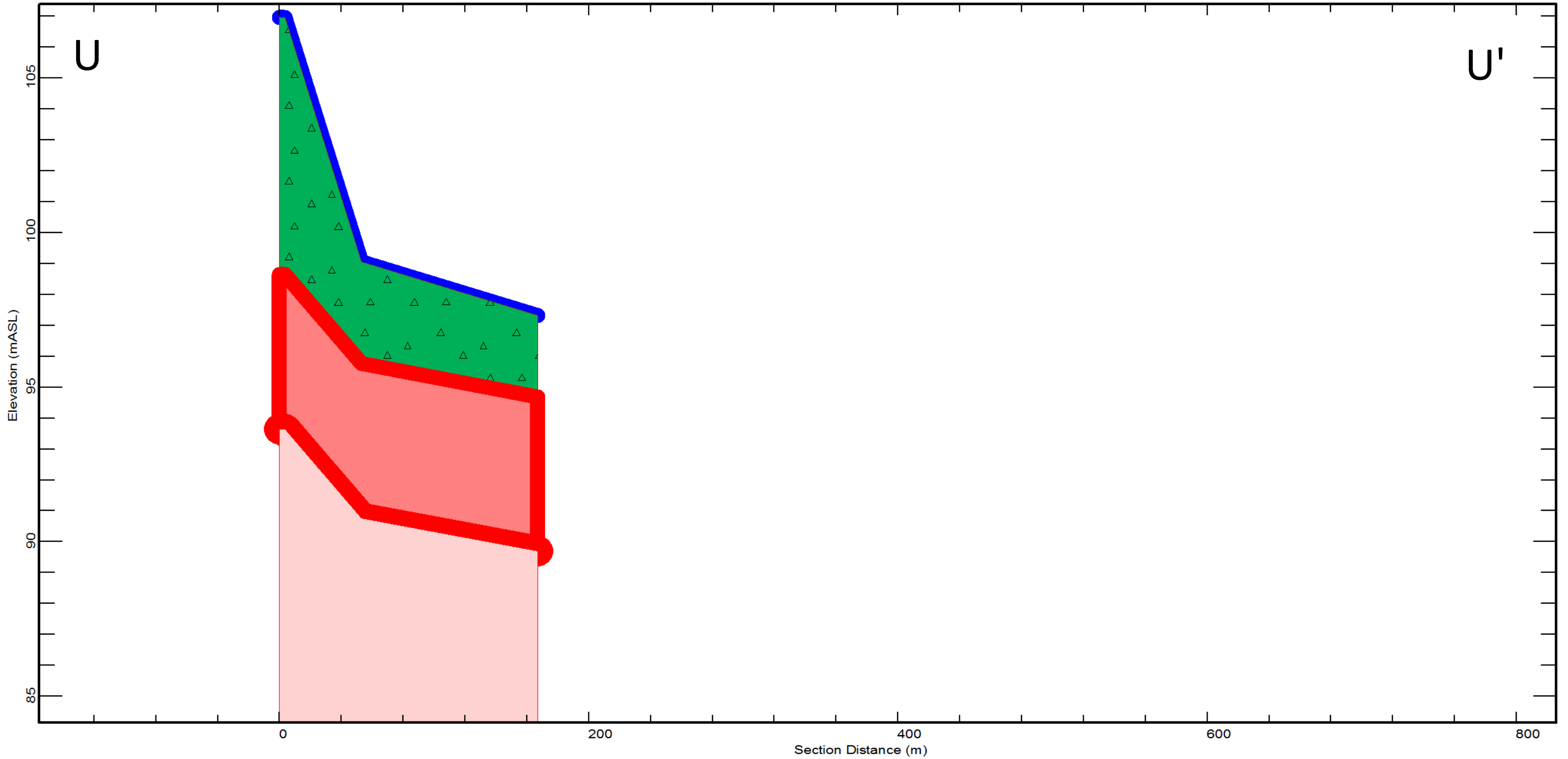
Drawing prepared by Earthfx 9/30/2020

Region of Peel working with you

Peel Region Water Management Model 2019

Earthfx Incorporated

Cross Section
Queensway E



Legend:
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- Upper Bedrock
- Amabel/Goat Island
- Reynales
- Whirlpool
- Queenston
- Georgian Bay Fm.

0 50 100 150

Units: UTM NAD83 Zone 17
Section Distance in metres
Vertical elevation in mASL
Vertical Exaggeration: 20x
Borehole Offset Projection: 100 m

Data Sources:
Produced with information provided by the Ministry of Natural Resources,

Drawing prepared by Earthfx 9/30/2020

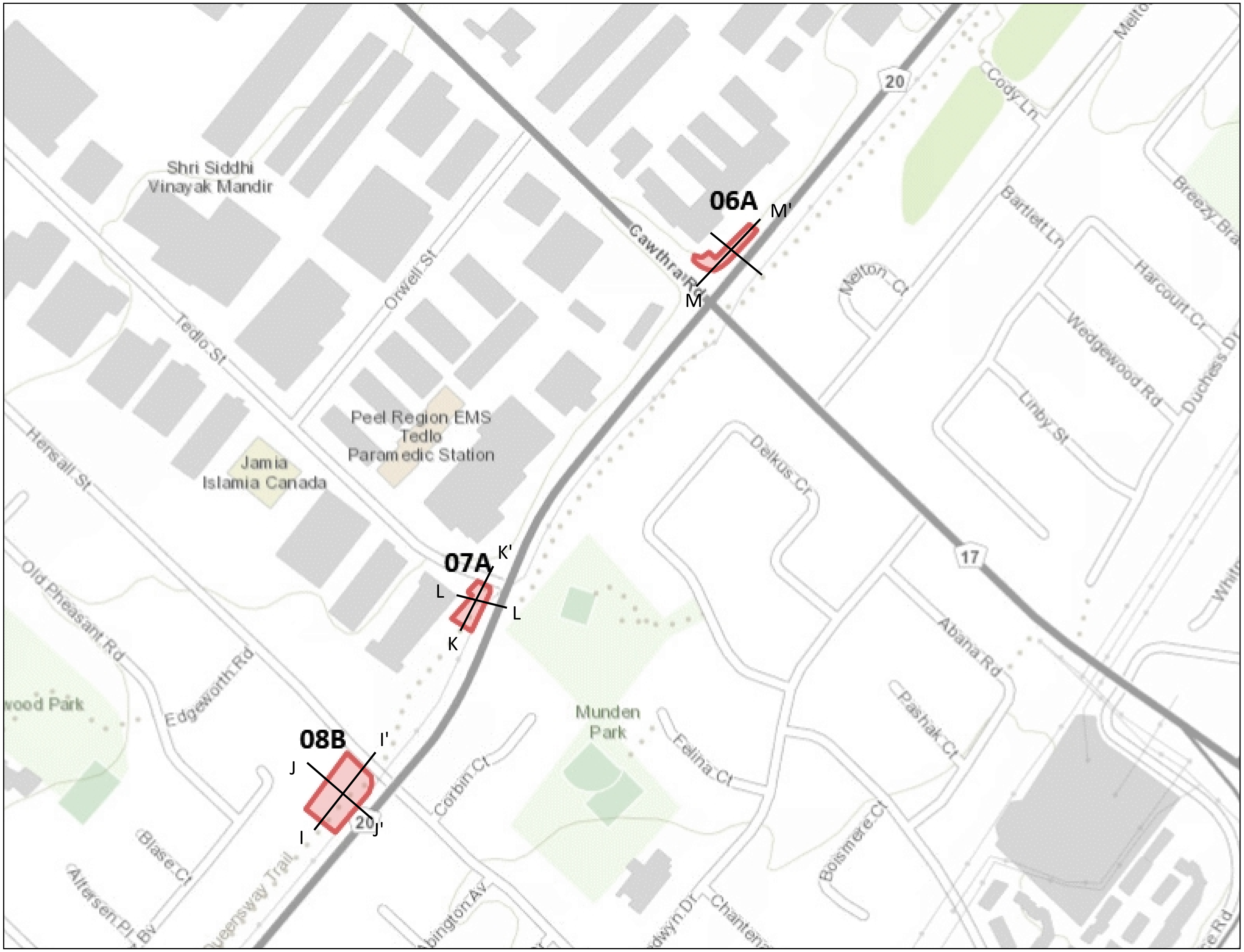
Region of Peel working with you

Peel Region Water Management Model 2019

Earthfx Incorporated

Cross Section
Queensway E

Cross Section Locations - Queensway E (2/3)



Legend

- CAMC Boundary
- Oak Ridges Moraine Boundary

Region of Peel working with you

458.6 | 0 | 229.31 | 458.6 Metres

1: 9,028

Map Compiled by the Oak Ridges Moraine Groundwater Program.101 Exchange Avenue, Vaughan, Ontario, M3N 1S4

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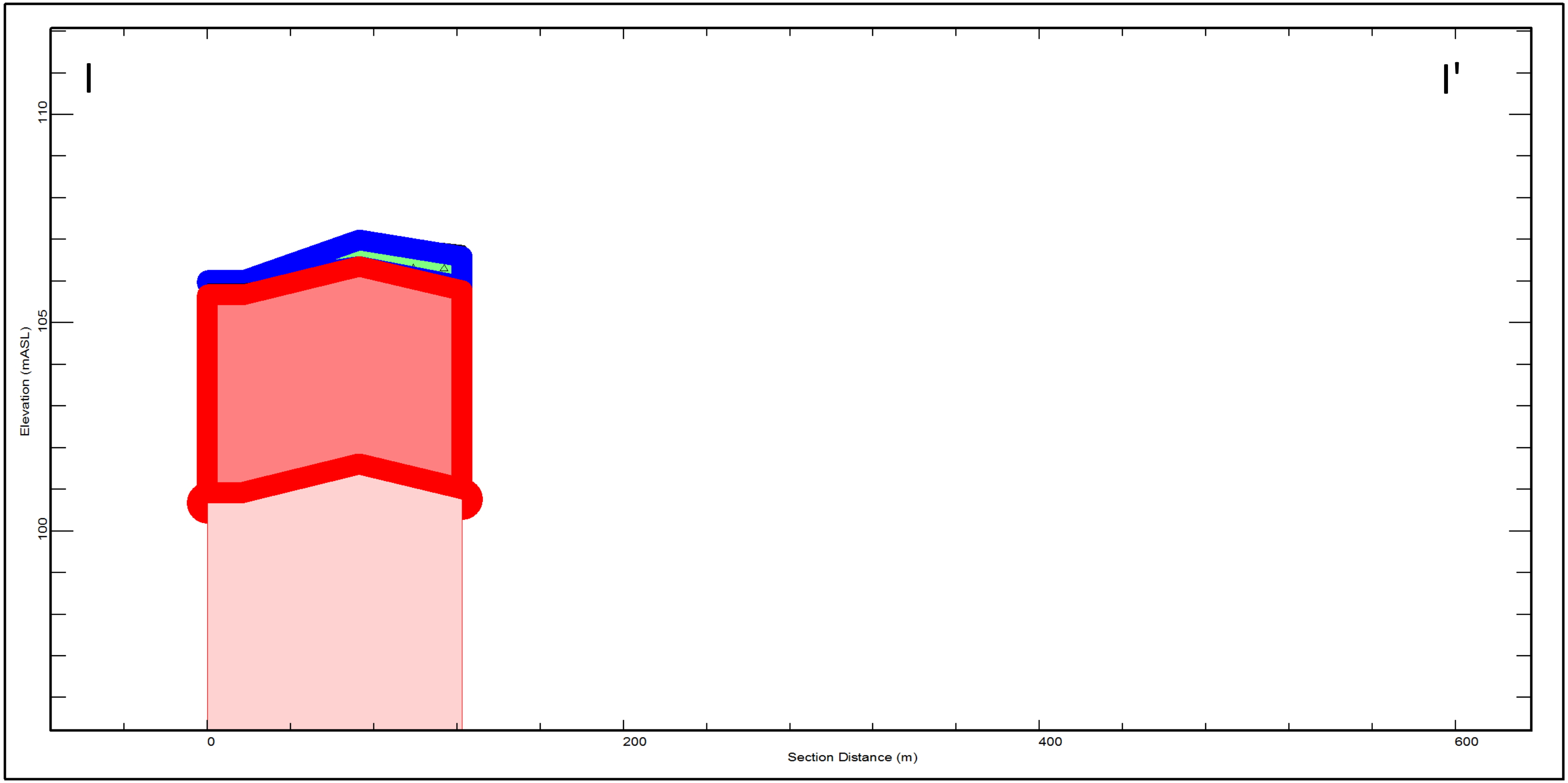
SOURCE: ORMGP 2020; MNRF 2020;

PROJECTION: WGS_1984_Web_Mercator_Auxiliary_Sphere

DATE PRINTED: September 28, 2020



Legend:
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- Post glacial deposits
- Halton Till
- Upper ORAC sand
- ORAC Silt
- Lower ORAC sand
- Upper Newmarket Till
- Thorncliffe Formation
- Sunnybrook Drift (or equivalent)
- Weathered Bedrock
- Upper Bedrock
- Amabel/Goat Island
- Reynales
- Whirlpool
- Queenston
- Georgian Bay Fm.

0 50 100

Units: UTM NAD83 Zone 17
Section Distance in metres
Vertical elevation in mASL
Vertical Exaggeration: 20x
Borehole Offset Projection: 100 m

Data Sources:
Produced with information provided by the Ministry of Natural Resources,

Drawing prepared by Earthfx 9/30/2020

Region of Peel working with you

Peel Region Water Management Model 2019

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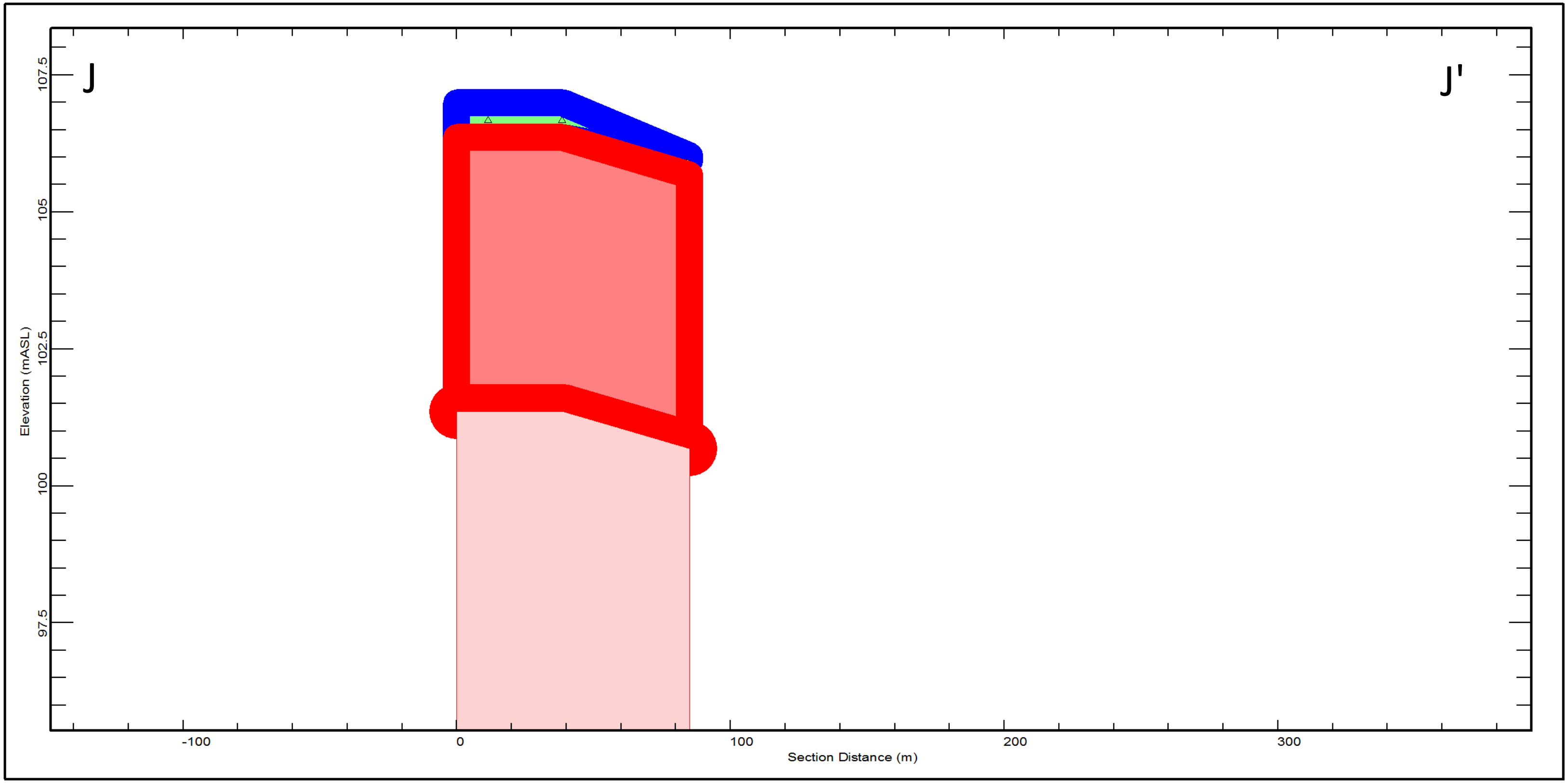
Cross Section

Queensway E



Legend:

- Named places
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- Upper Bedrock
- Amabel/Goat Island
- Reynales
- Whirlpool
- Queenston
- Georgian Bay Fm.

0 40 80

Units: UTM NAD83 Zone 17
Section Distance in metres
Vertical elevation in mASL
Vertical Exaggeration: 20x
Borehole Offset Projection: 100 m

Data Sources:
Produced with information provided by the Ministry of Natural Resources,

Drawing prepared by Earthfx 9/30/2020

Region of Peel
working with you

Peel Region Water Management Model 2019

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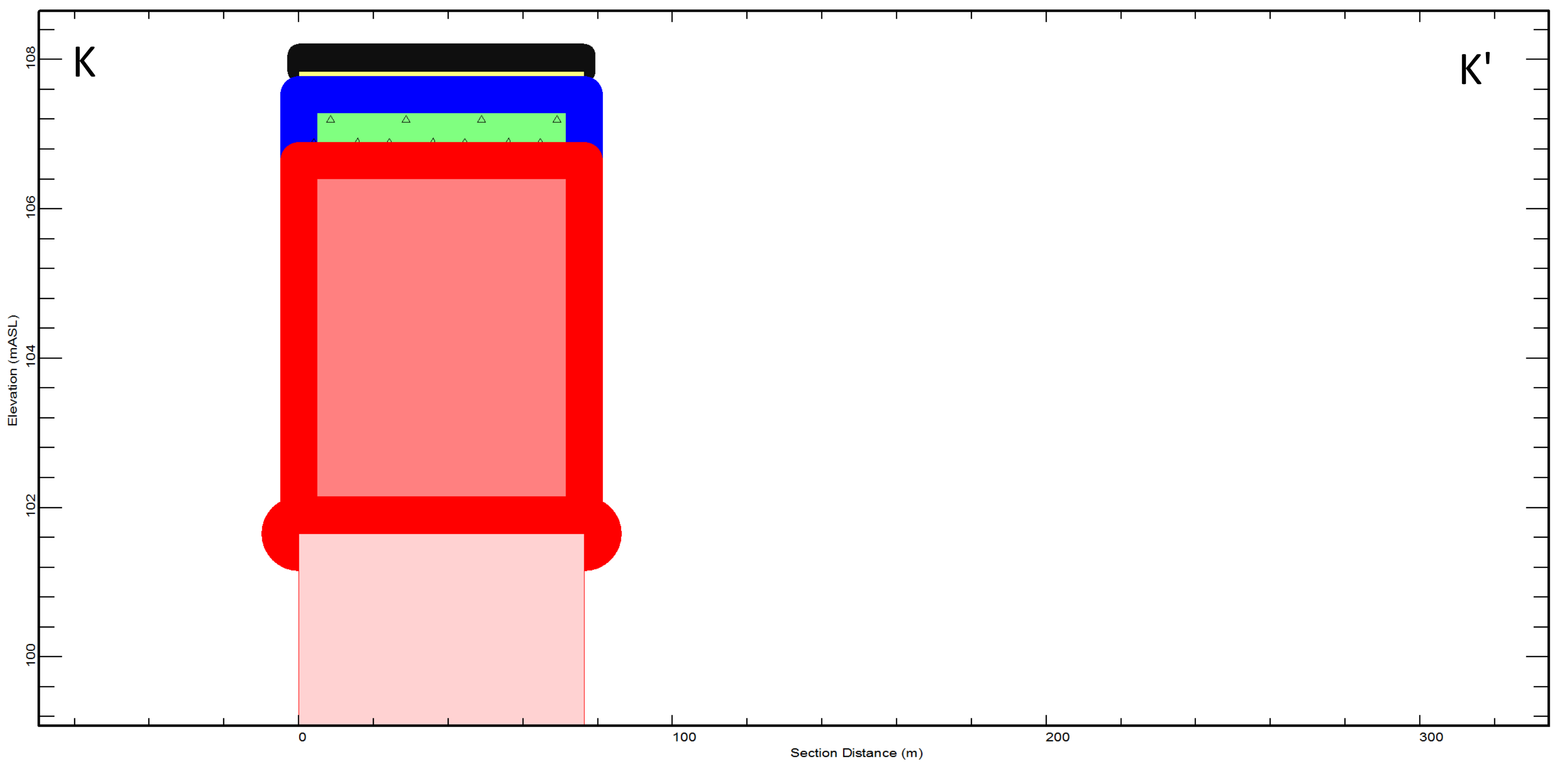
Cross Section
Queensway E



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- Reynales
- Whirlpool
- Queenston
- Georgian Bay Fm.

0 20 40 60

Units: UTM NAD83 Zone 17
Section Distance in metres
Vertical elevation in mASL
Vertical Exaggeration: 20x
Borehole Offset Projection: 100 m

Data Sources:
Produced with information provided by the Ministry of Natural Resources,

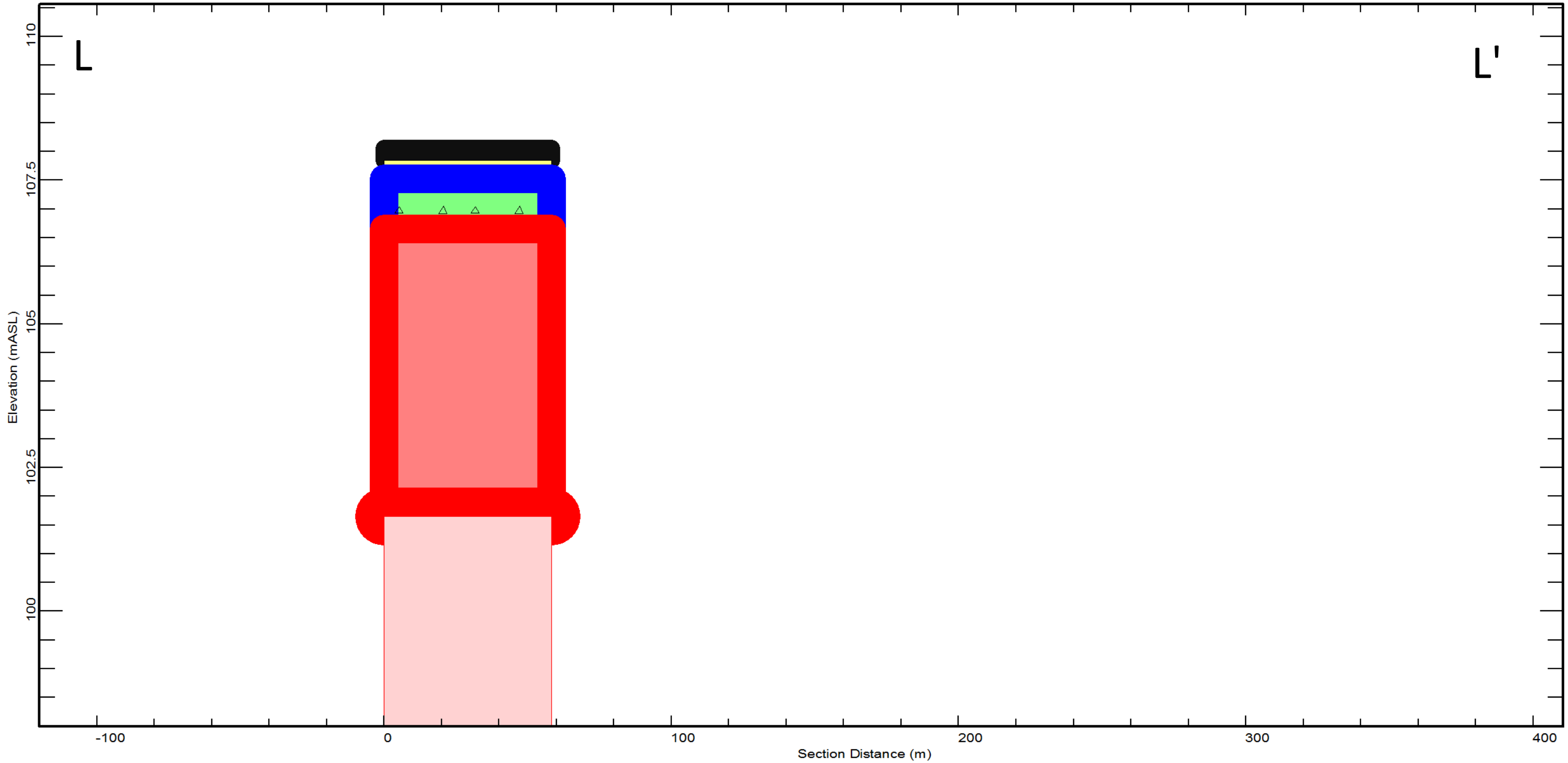
Drawing prepared by Earthfx 9/30/2020

Region of Peel working with you

Peel Region Water Management Model 2019

Earthfx Incorporated

Cross Section
Queensway E



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0 40 80

Units: UTM NAD83 Zone 17
Section Distance in metres
Vertical elevation in mASL
Vertical Exaggeration: 20x
Borehole Offset Projection: 100 m

Data Sources:
Produced with information provided by the Ministry of Natural Resources,

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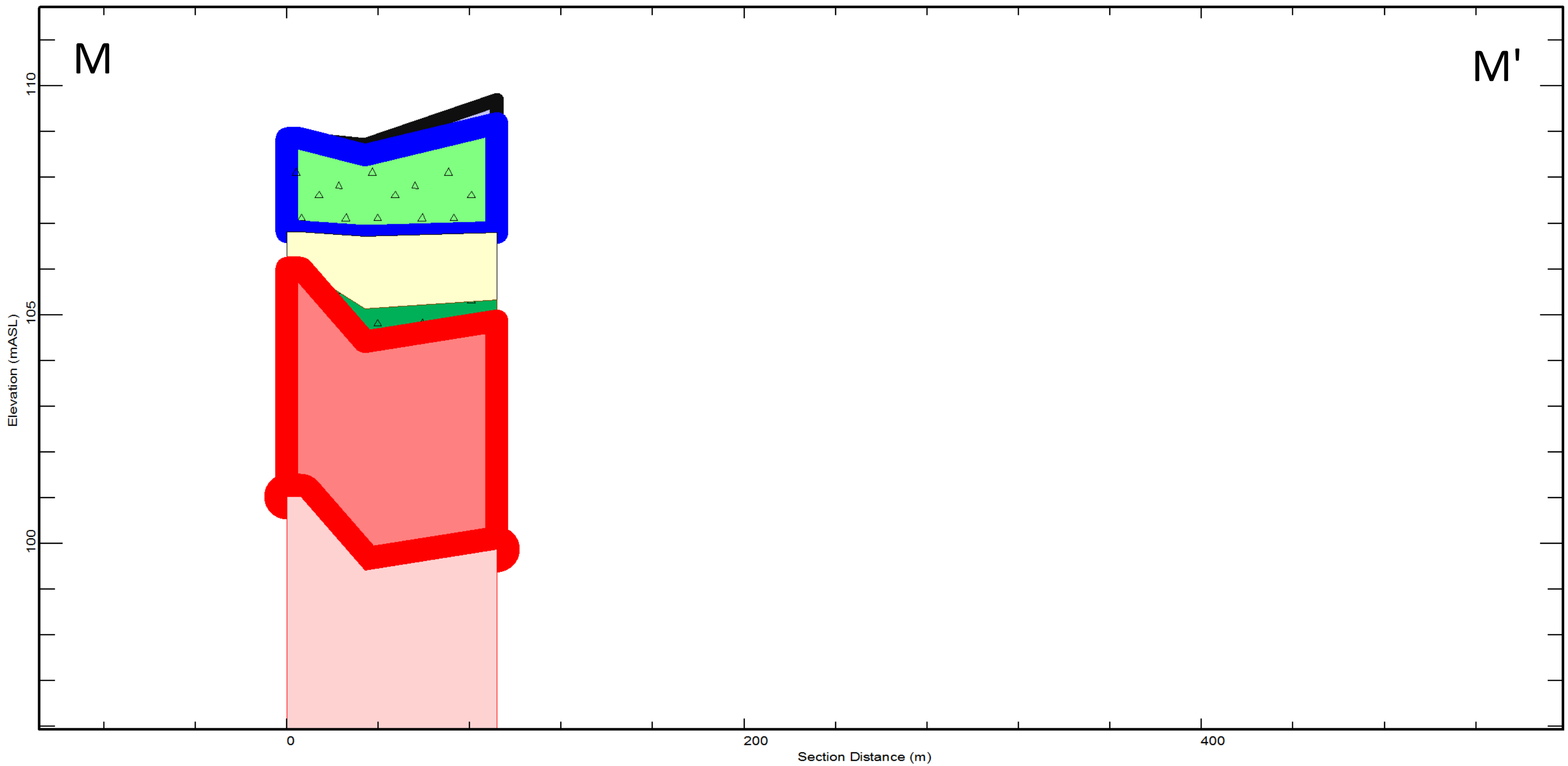
Region of Peel working with you

Peel Region Water Management Model 2019

Earthfx Incorporated

Cross Section
Queensway E



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0 40 80

Units: UTM NAD83 Zone 17
Section Distance in metres
Vertical elevation in mASL
Vertical Exaggeration: 20x
Borehole Offset Projection: 100 m

Data Sources:
Produced with information provided by
the Ministry of Natural Resources,

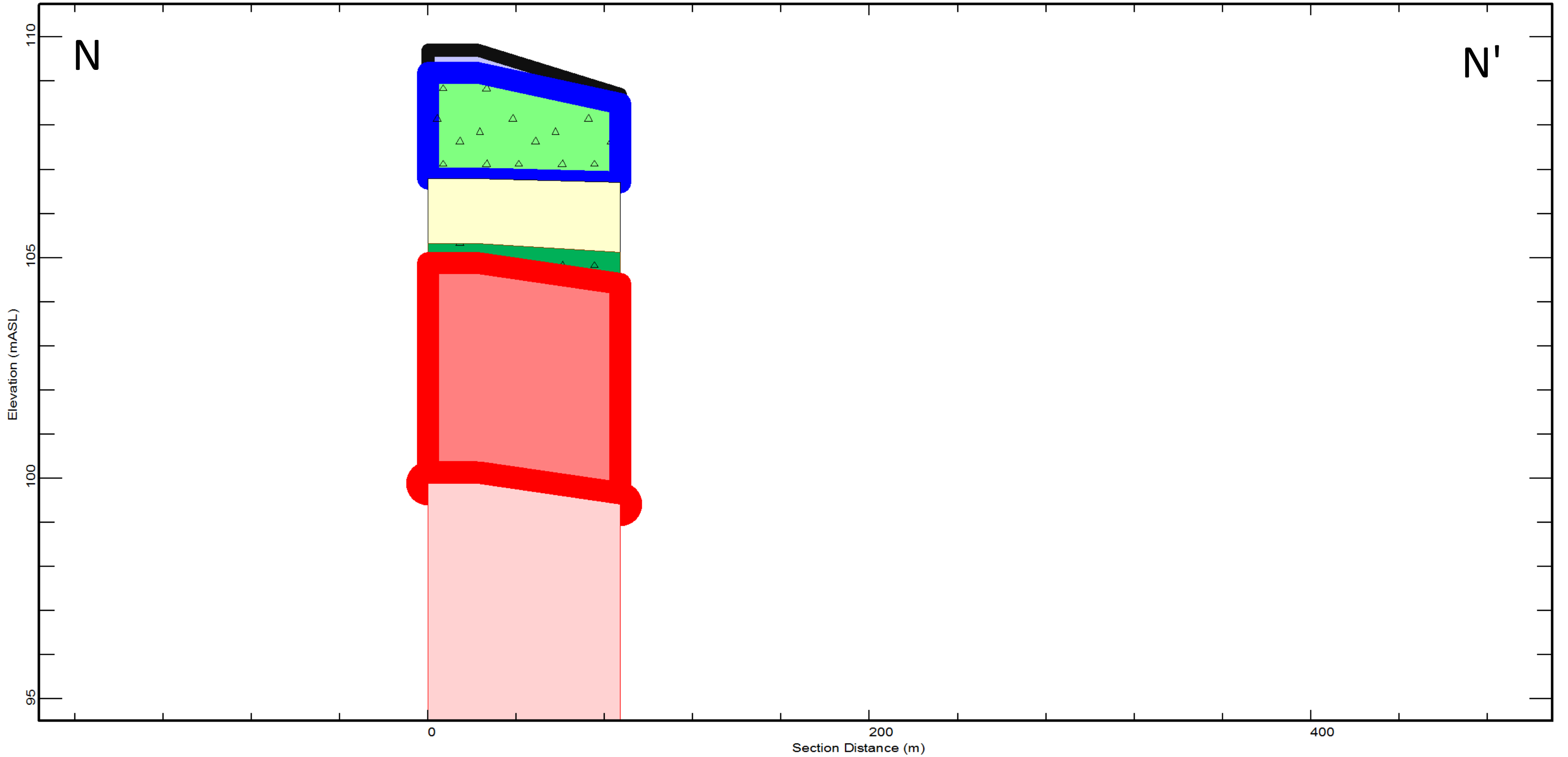
Drawing prepared by Earthfx 9/30/2020

Region of Peel
working with you

Peel Region Water
Management Model 2019

Earthfx Incorporated

Cross Section
Queensway E



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0 40 80

Units: UTM NAD83 Zone 17
Section Distance in metres
Vertical elevation in mASL
Vertical Exaggeration: 20x
Borehole Offset Projection: 100 m

Data Sources:
Produced with information provided by the Ministry of Natural Resources,

Drawing prepared by Earthfx 9/30/2020

Region of Peel
working with you

Peel Region Water Management Model 2019

Earthfx Incorporated

Cross Section
Queensway E

Cross Section Locations - Queensway E (1/3)

Legend

- CAMC Boundary
- Oak Ridges Moraine Boundary

Region of Peel working with you

458.6 0 229.31 458.6 Metres

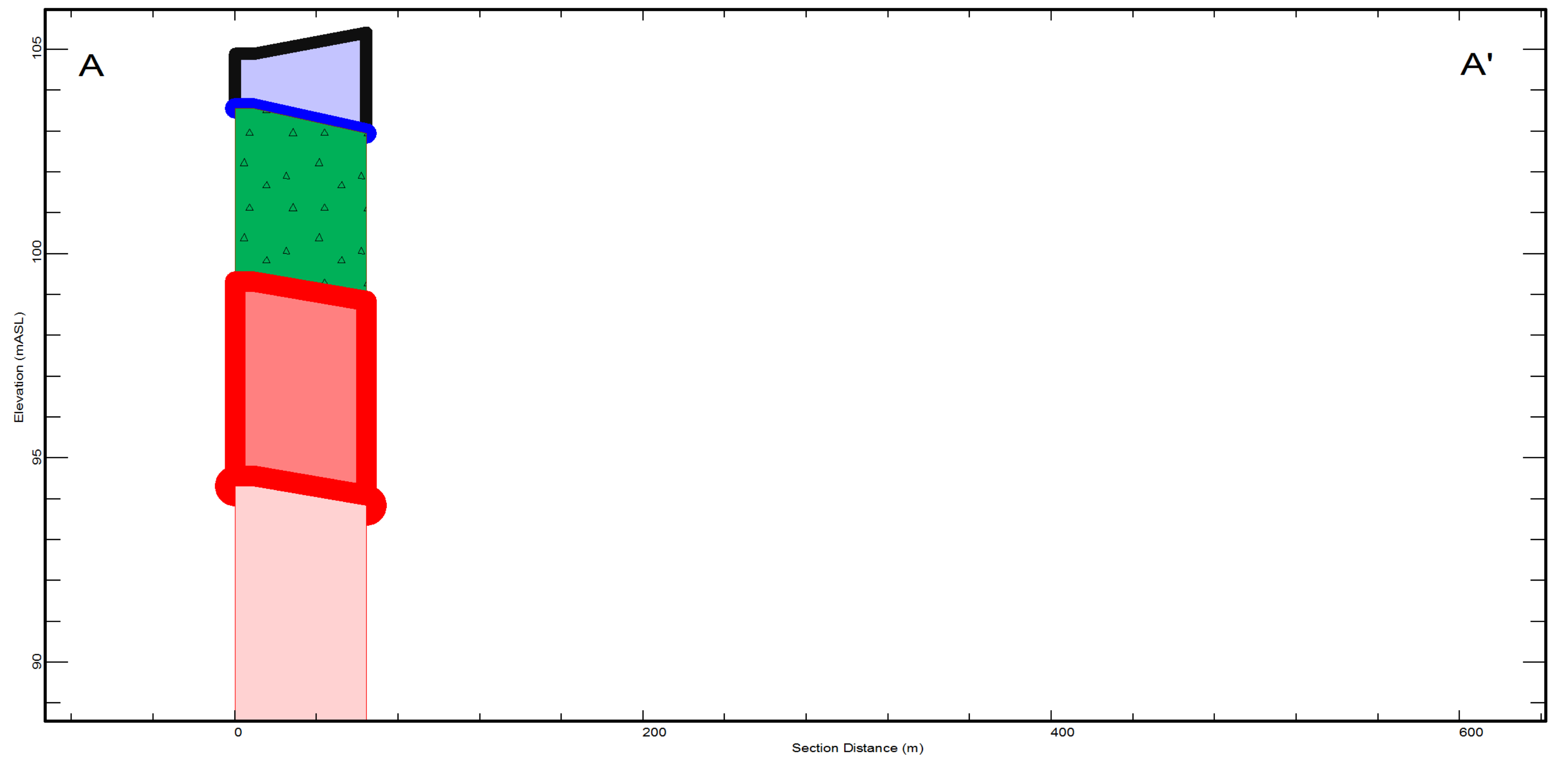
1: 9,028

Map Compiled by the Oak Ridges Moraine Groundwater Program.101 Exchange Avenue, Vaughan, Ontario, M3N 1S4

SOURCE: ORMGP2020; MNRF2020;

PROJECTION: WGS_1984_Web_Mercator_Auxiliary_Sphere

DATE PRINTED: September 28, 2020



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0 50 100

Units: UTM NAD83 Zone 17
Section Distance in metres
Vertical elevation in mASL
Vertical Exaggeration: 20x
Borehole Offset Projection: 100 m

Data Sources:
Produced with information provided by the Ministry of Natural Resources.

Drawing prepared by Earthfx 9/30/2020

Region of Peel working with you

Peel Region Water Management Model 2019

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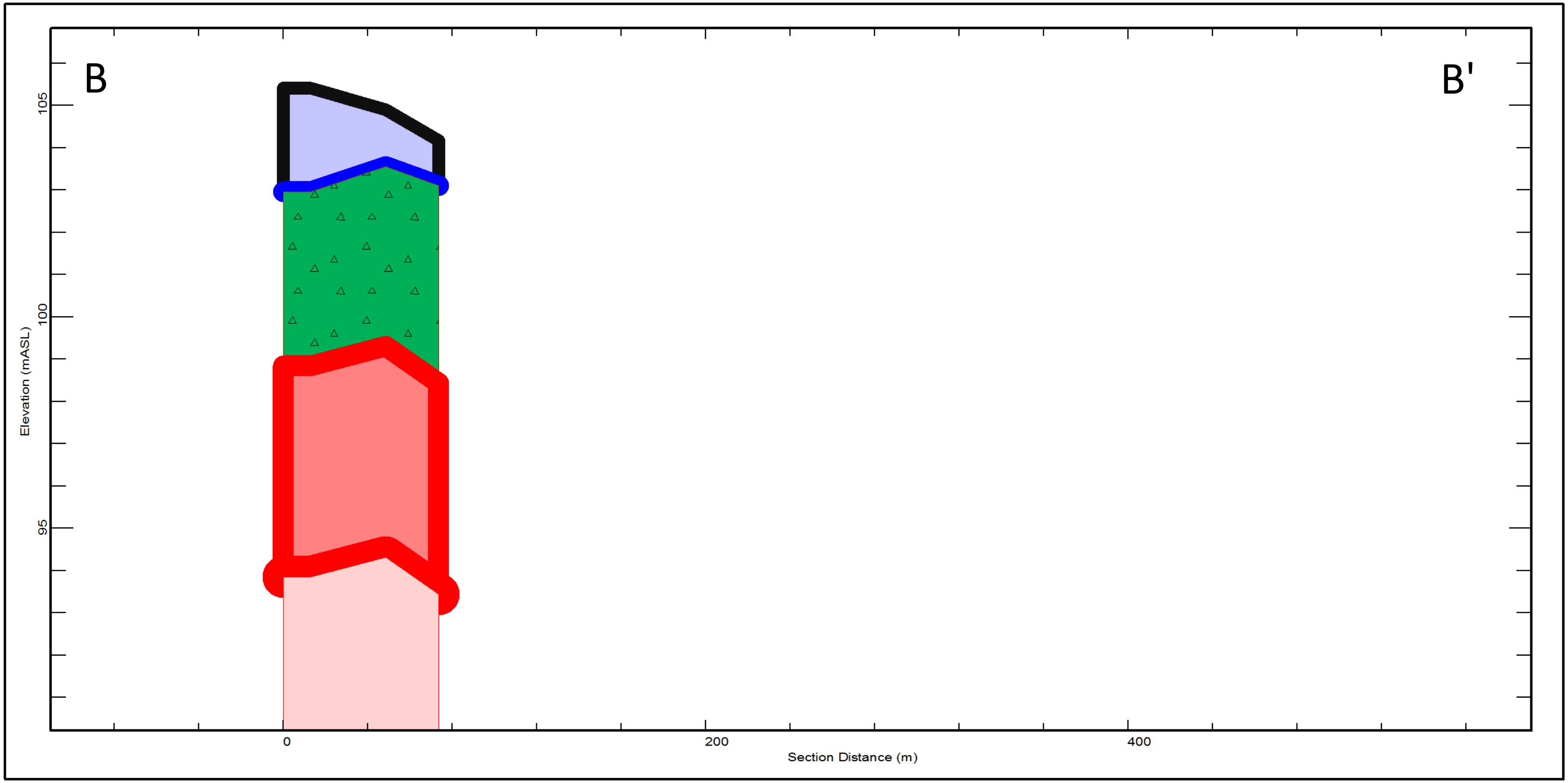
Cross Section
Queensway E



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0 40 80

Units: UTM NAD83 Zone 17
Section Distance in metres
Vertical elevation in mASL
Vertical Exaggeration: 20x
Borehole Offset Projection: 100 m

Data Sources:
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Region of Peel
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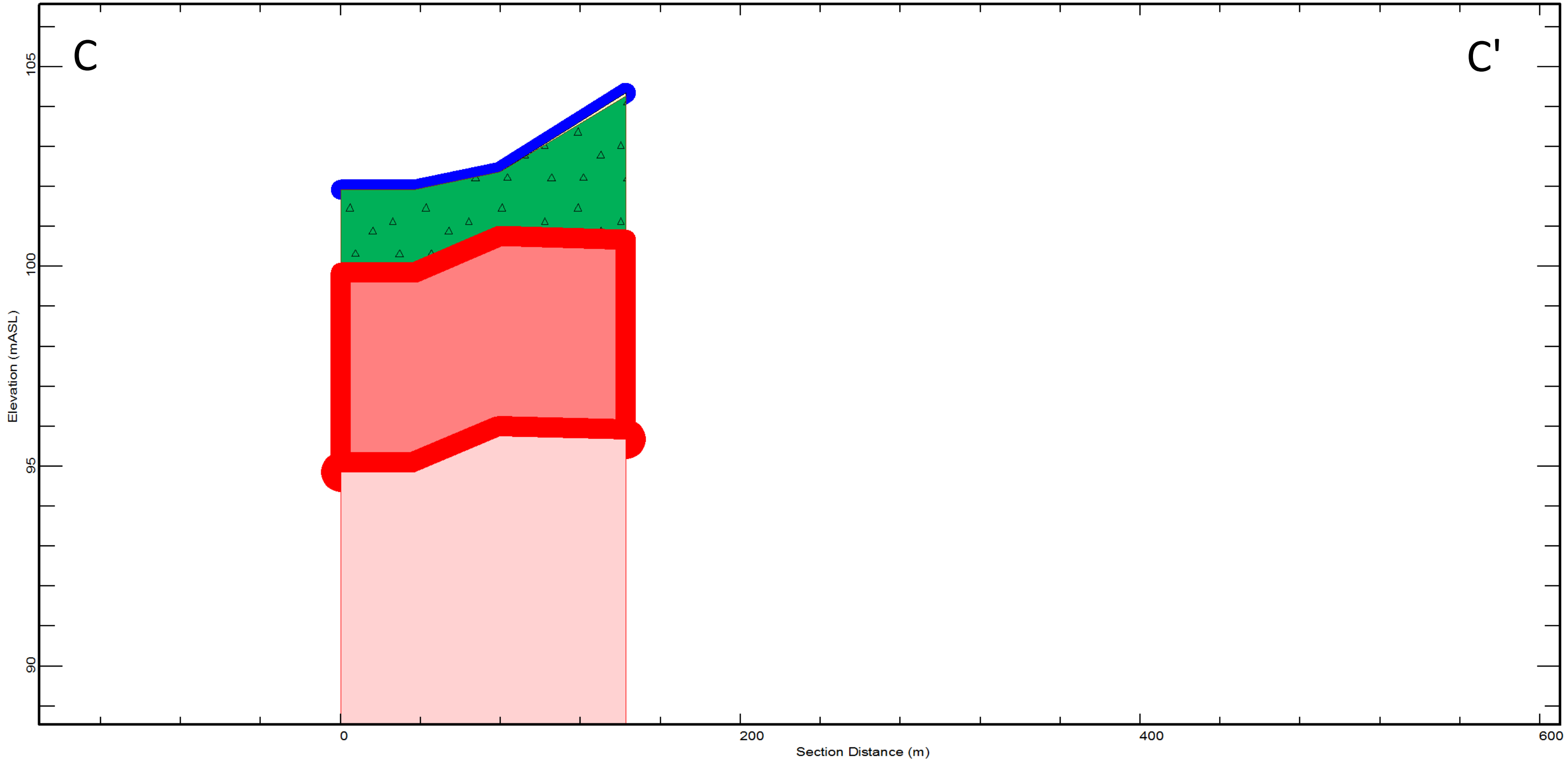
Cross Section
Queensway E



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0 50 100

Units: UTM NAD83 Zone 17
Section Distance in metres
Vertical elevation in mASL
Vertical Exaggeration: 20x
Borehole Offset Projection: 100 m

Data Sources:
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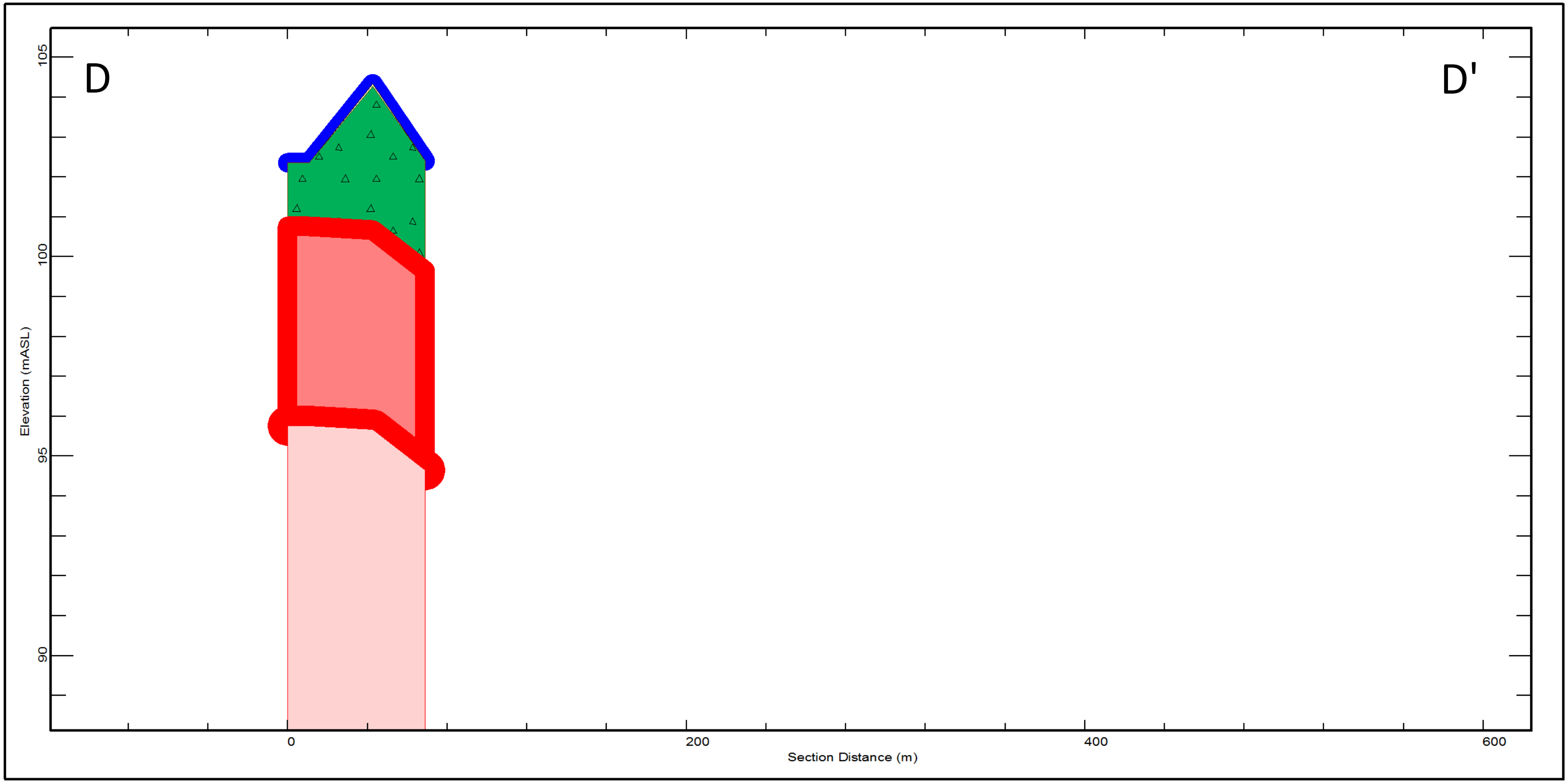
Drawing prepared by Earthfx 9/30/2020

Region of Peel working with you

Peel Region Water Management Model 2019

Earthfx Incorporated

Cross Section
Queensway E



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0 50 100

Units: UTM NAD83 Zone 17
Section Distance in metres
Vertical elevation in mASL
Vertical Exaggeration: 20x
Borehole Offset Projection: 100 m

Data Sources:
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Drawing prepared by Earthfx 9/30/2020

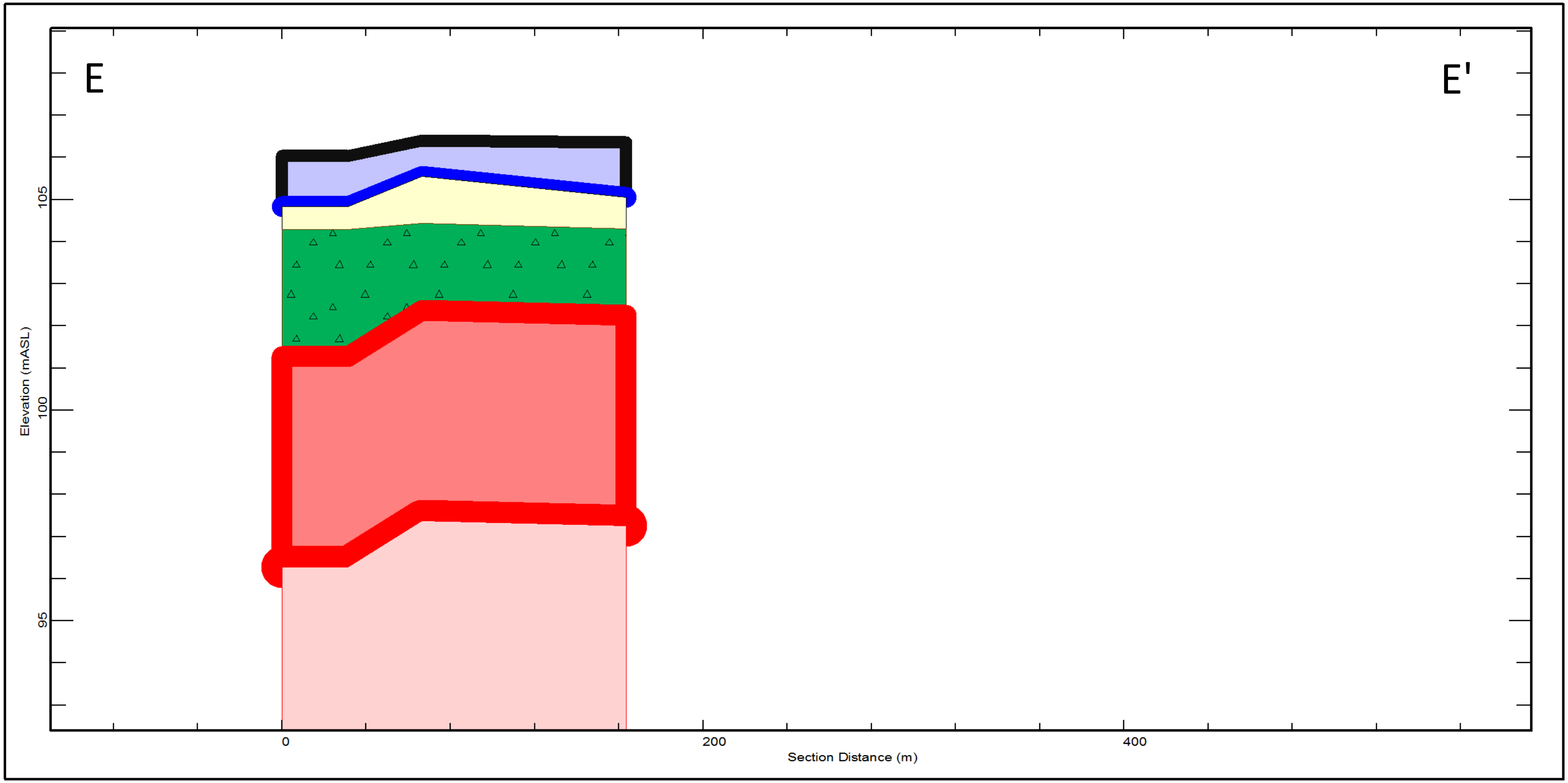
Region of Peel
working with you

Peel Region Water Management Model 2019

Earthfx Incorporated

Cross Section

Queensway E



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0 40 80

Units: UTM NAD83 Zone 17
Section Distance in metres
Vertical elevation in mASL
Vertical Exaggeration: 20x
Borehole Offset Projection: 100 m

Data Sources:
Produced with information provided by the Ministry of Natural Resources,

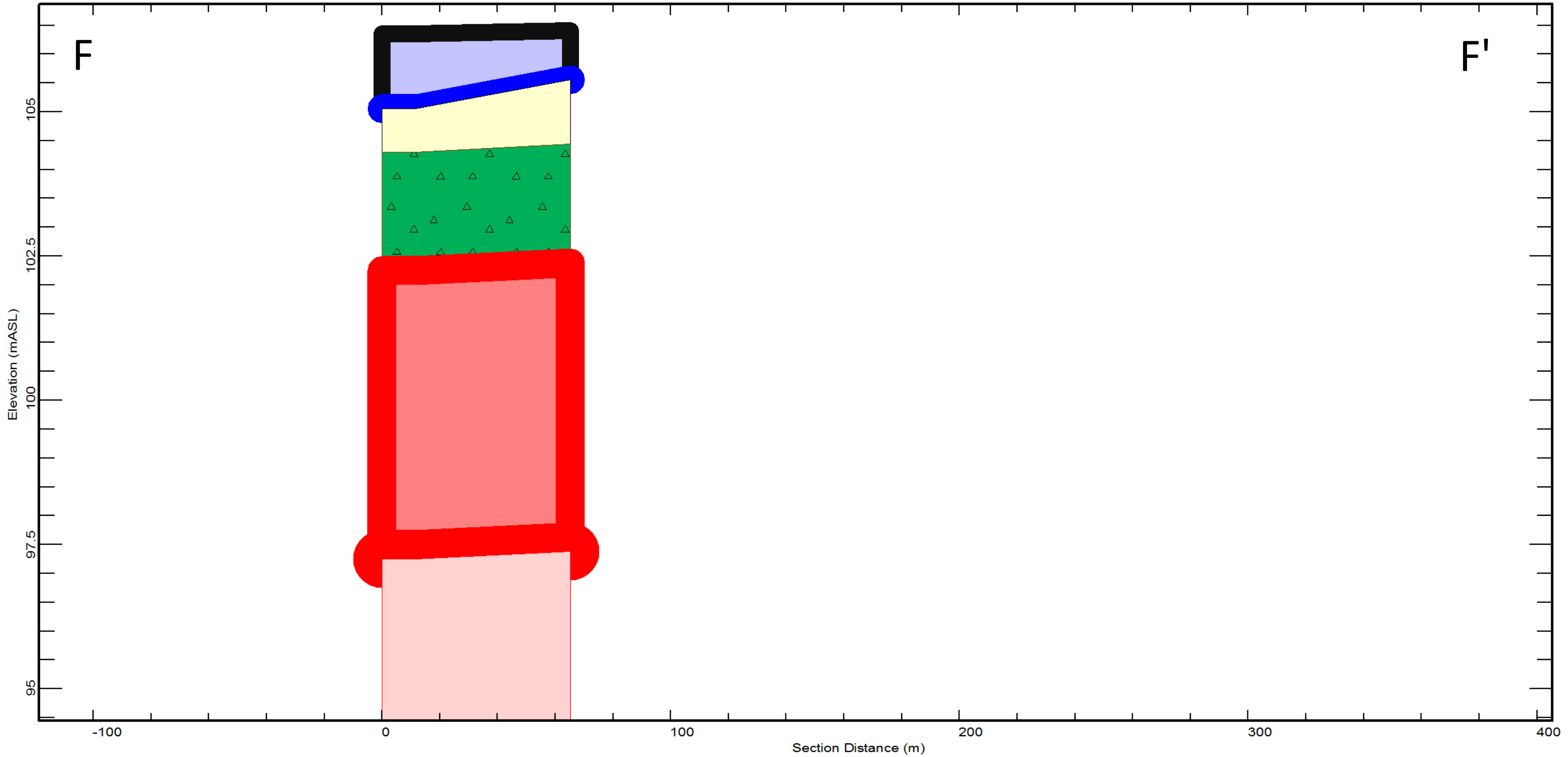
Drawing prepared by Earthfx 9/30/2020

Region of Peel
working with you

Peel Region Water Management Model 2019

Earthfx Incorporated

Cross Section
Queensway E



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0 40 80

Units: UTM NAD83 Zone 17
Section Distance in metres
Vertical elevation in mASL
Vertical Exaggeration: 20x
Borehole Offset Projection: 100 m

Data Sources:
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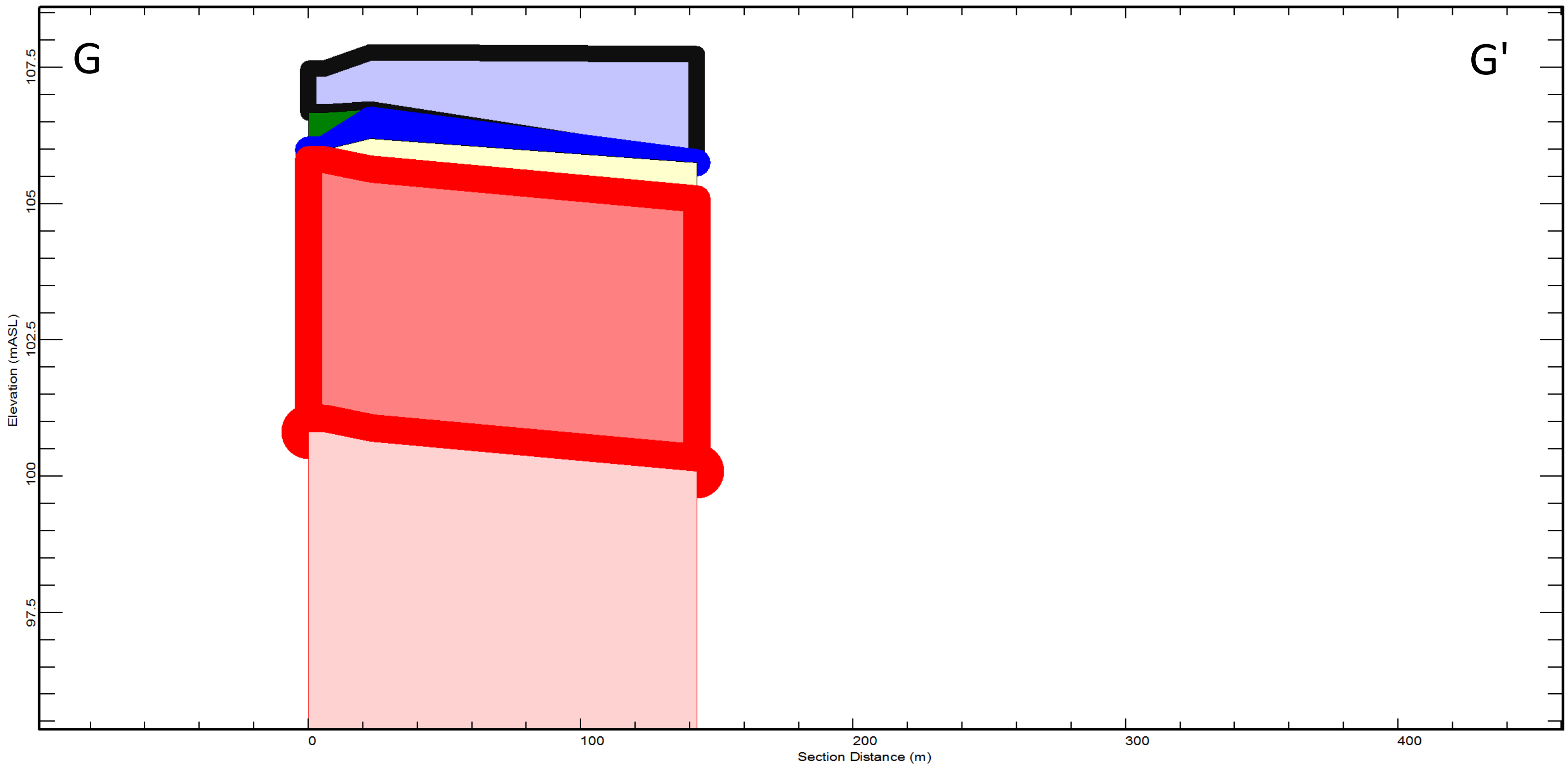
Region of Peel working with you

Peel Region Water Management Model 2019

Earthfx Incorporated

Cross Section
Queensway E



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0 40 80

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Data Sources:
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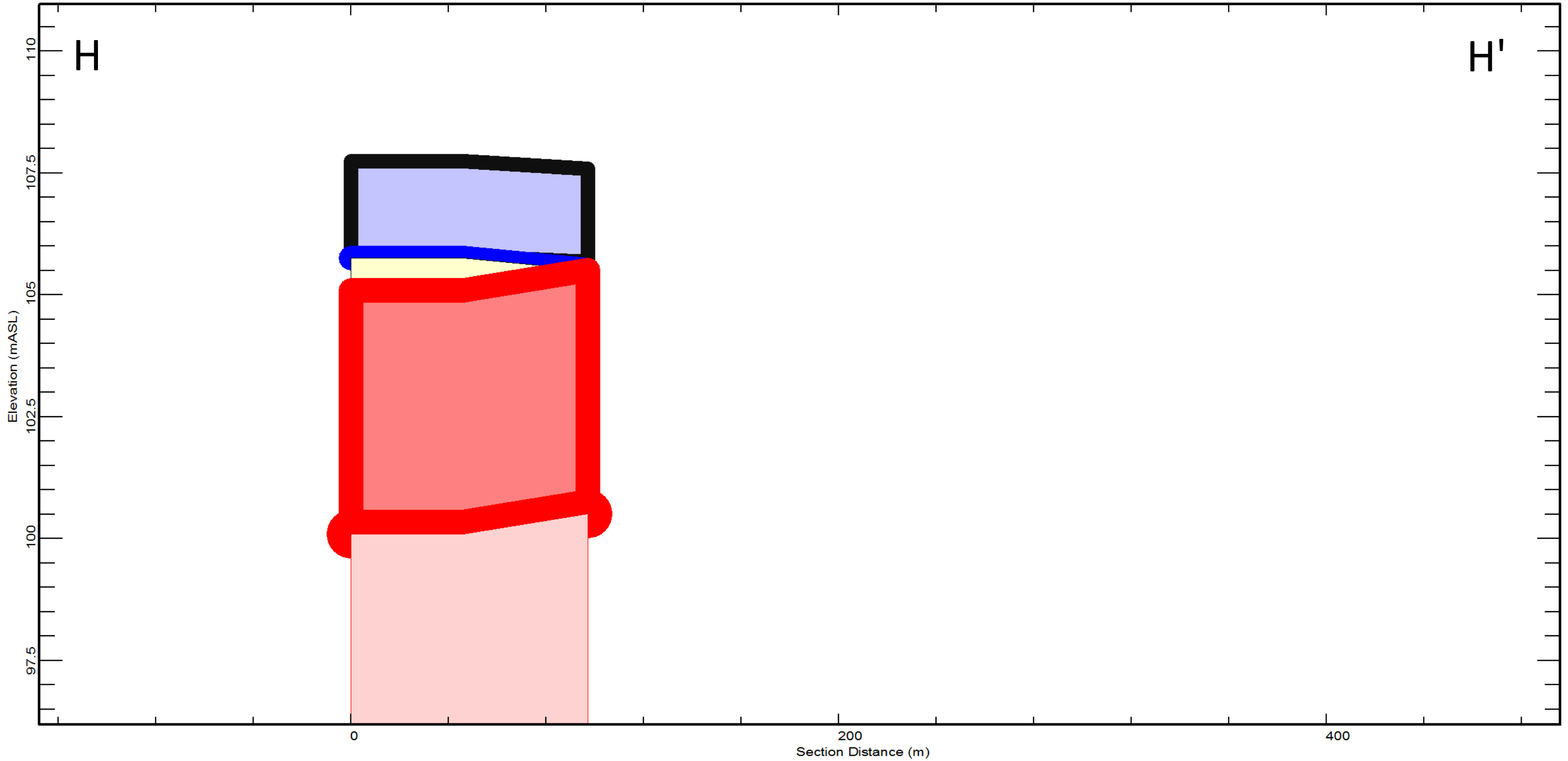
Region of Peel
working with you

Peel Region Water Management Model 2019

Earthfx Incorporated

Cross Section
Queensway E



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0 40 80

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Section Distance in metres
Vertical elevation in mASL
Vertical Exaggeration: 20x
Borehole Offset Projection: 100 m

Data Sources:
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Drawing prepared by Earthfx 9/30/2020

Region of Peel working with you

Peel Region Water Management Model 2019

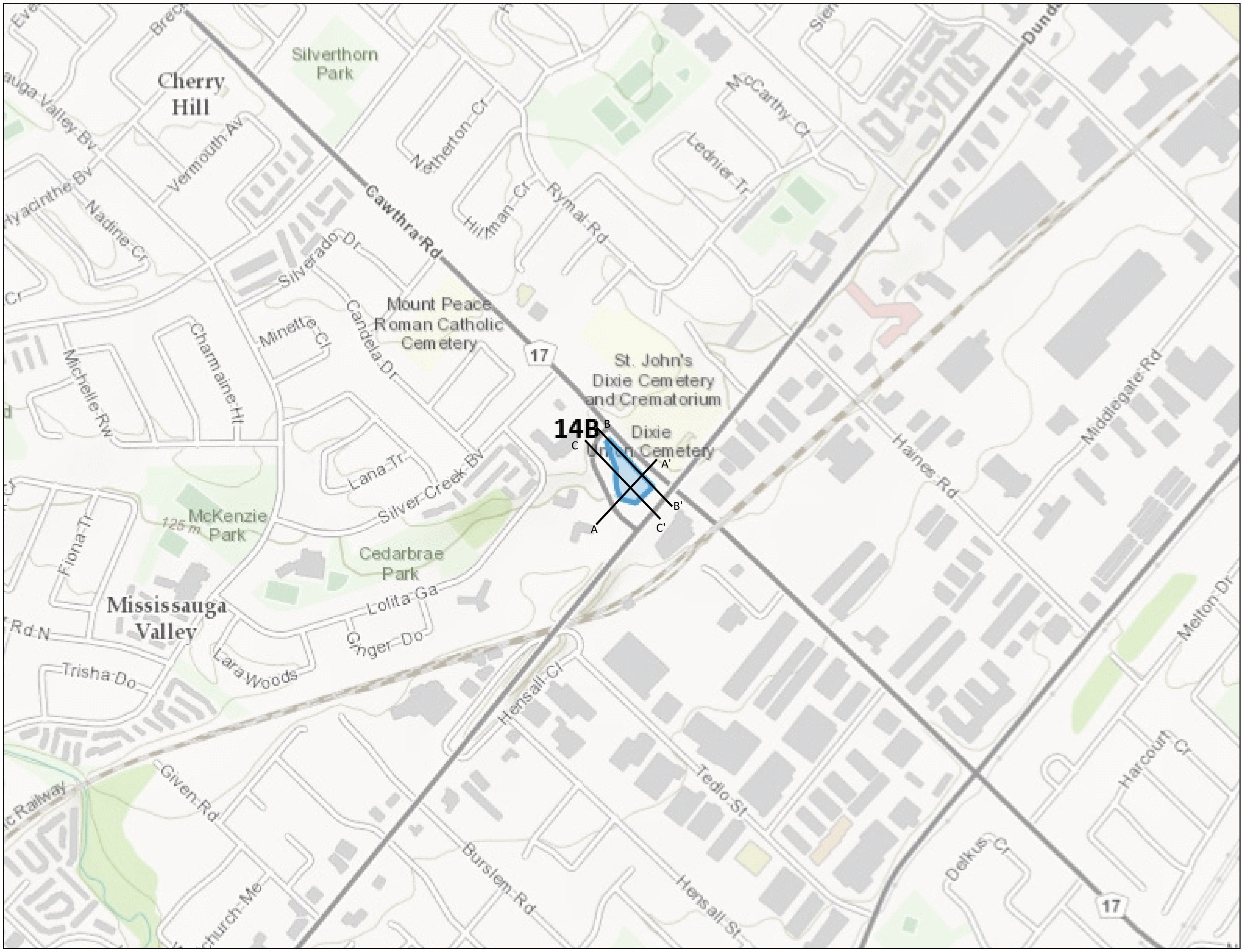
Earthfx Incorporated

Cross Section

Queensway E

APPENDIX C2: STRATIGRAPHIC CROSS-SECTIONS FROM PEEL WATER MANAGEMENT MODEL – SITE 14B

Cross Section Locations - Cawthra Rd (1/1)



Legend

- CAMC Boundary
- Oak Ridges Moraine Boundary

Region of Peel
working with you

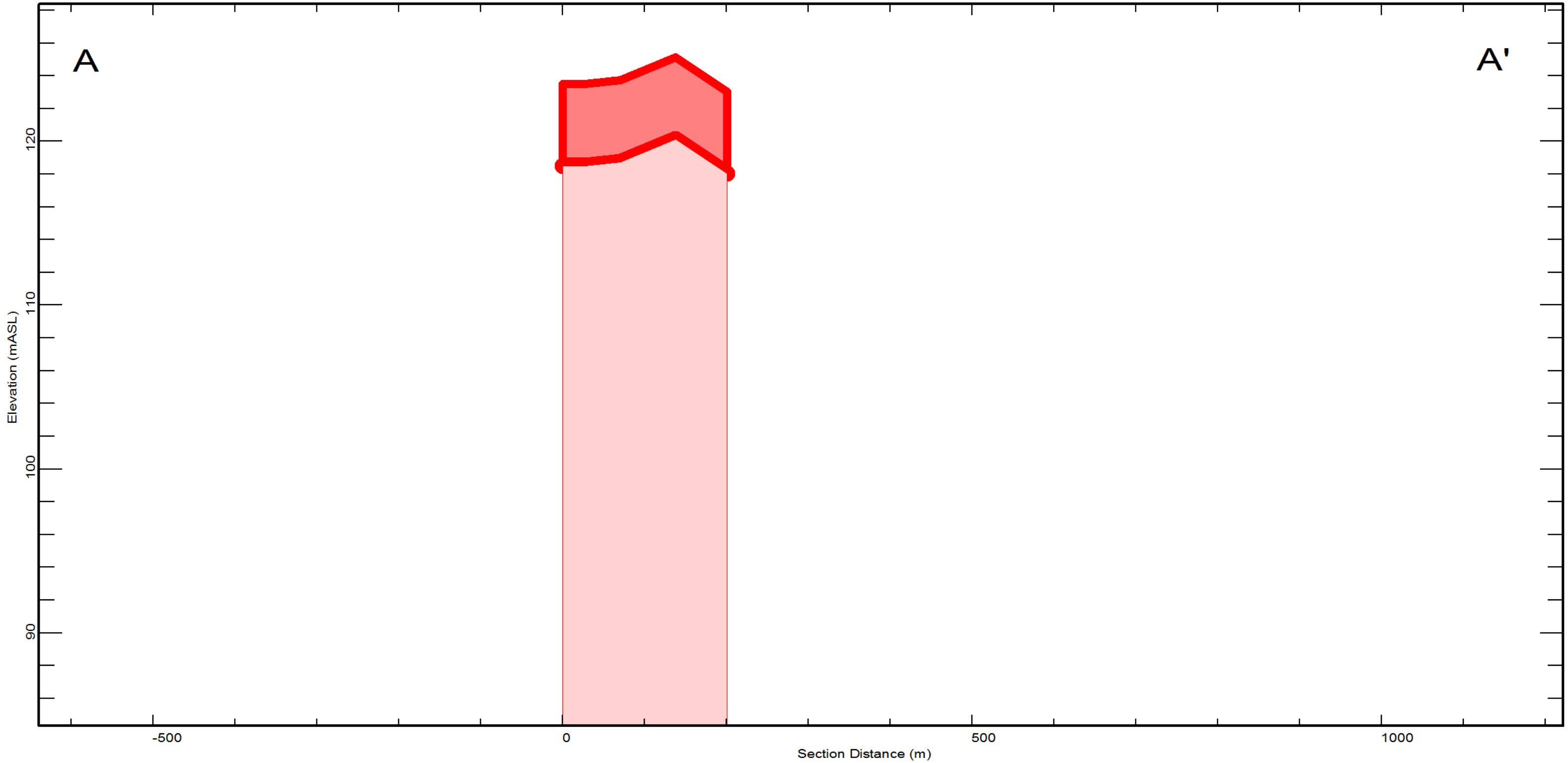
917.2 | 0 | 458.62 | 917.2 Metres

1: 18,056

Map Compiled by the Oak Ridges Moraine Groundwater Program.101 Exchange Avenue, Vaughan, Ontario, M3N 1S4

This map is for information purposes only and the Oak Ridges Moraine Groundwater Program takes no responsibility for, nor guarantees, the accuracy of all the information contained within the map.

SOURCE: ORMGP2020; MNRF2020;
PROJECTION: WGS_1984_Web_Mercator_Auxiliary_Sphere
DATE PRINTED: September 29, 2020



Legend:
Named places
Post glacial deposits
Halton Till
Upper ORAC sand
ORAC Silt
Lower ORAC sand
Upper Newmarket Till
Thorncliffe Formation
Sunnybrook Drift (or equivalent)
Weathered Bedrock
Upper Bedrock
Amabel/Goat Island
Reynales
Whirlpool
Queenston
Georgian Bay Fm.

0 100 200 300

Units: UTM NAD83 Zone 17
Section Distance in metres
Vertical elevation in mASL
Vertical Exaggeration: 20x
Borehole Offset Projection: 100 m

Data Sources:
Produced with information provided by the Ministry of Natural Resources,

Drawing prepared by Earthfx 9/29/2020

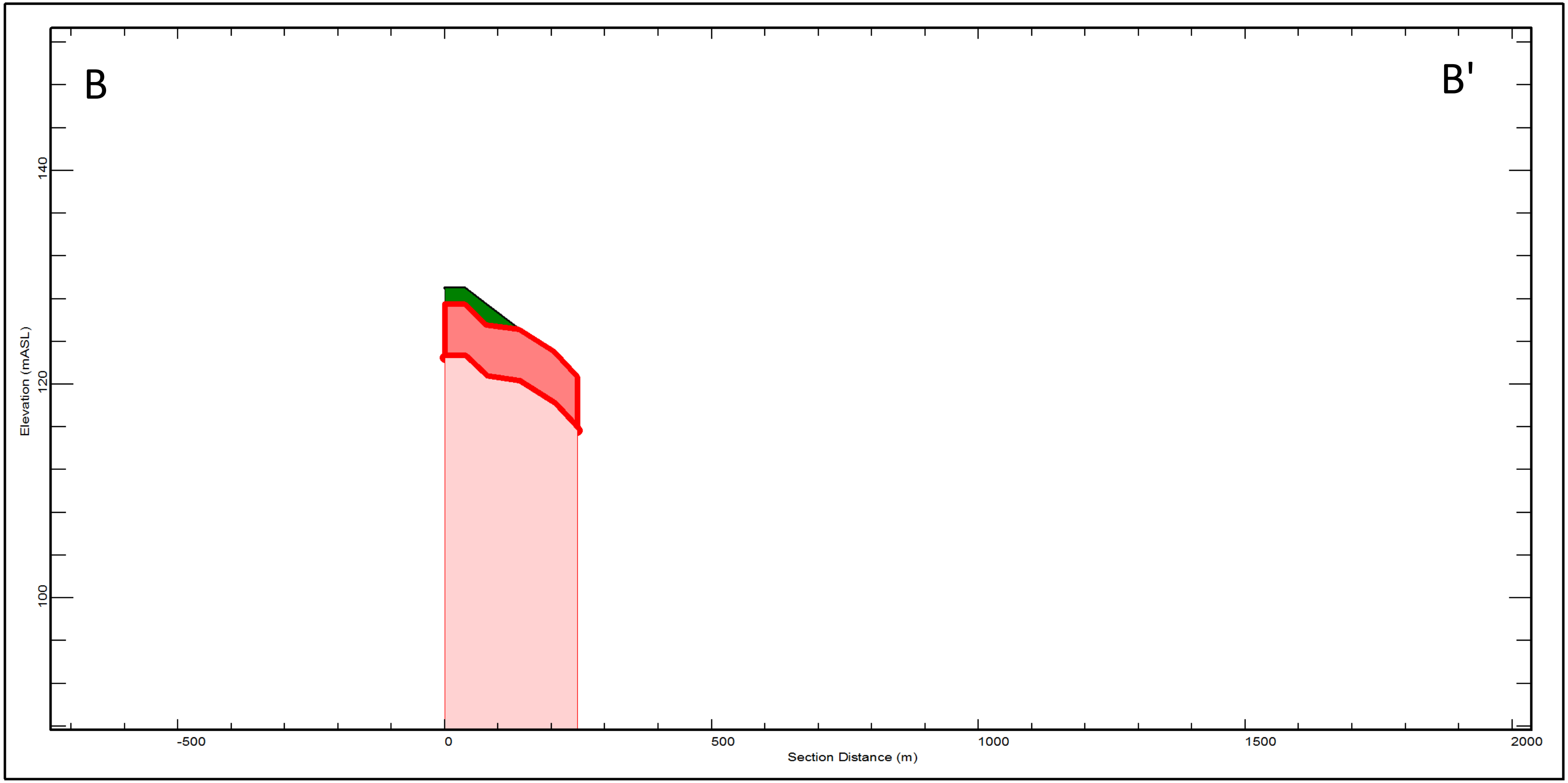
Region of Peel working with you

Peel Region Water Management Model 2019

Earthfx Incorporated

Cross Section

Cawthra Cres



Legend:
- Named places
- Post glacial deposits
- Halton Till
- Upper ORAC sand
- ORAC Silt
- Lower ORAC sand
- Upper Newmarket Till
- Thorncliffe Formation
- Sunnybrook Drift (or equivalent)
- Weathered Bedrock
- Upper Bedrock
- Amabel/Goat Island
- Reynales
- Whirlpool
- Queenston
- Georgian Bay Fm.

0 200 400

Units: UTM NAD83 Zone 17
Section Distance in metres
Vertical elevation in mASL
Vertical Exaggeration: 20x
Borehole Offset Projection: 100 m

Data Sources:
Produced with information provided by the Ministry of Natural Resources.

Drawing prepared by Earthfx 9/29/2020

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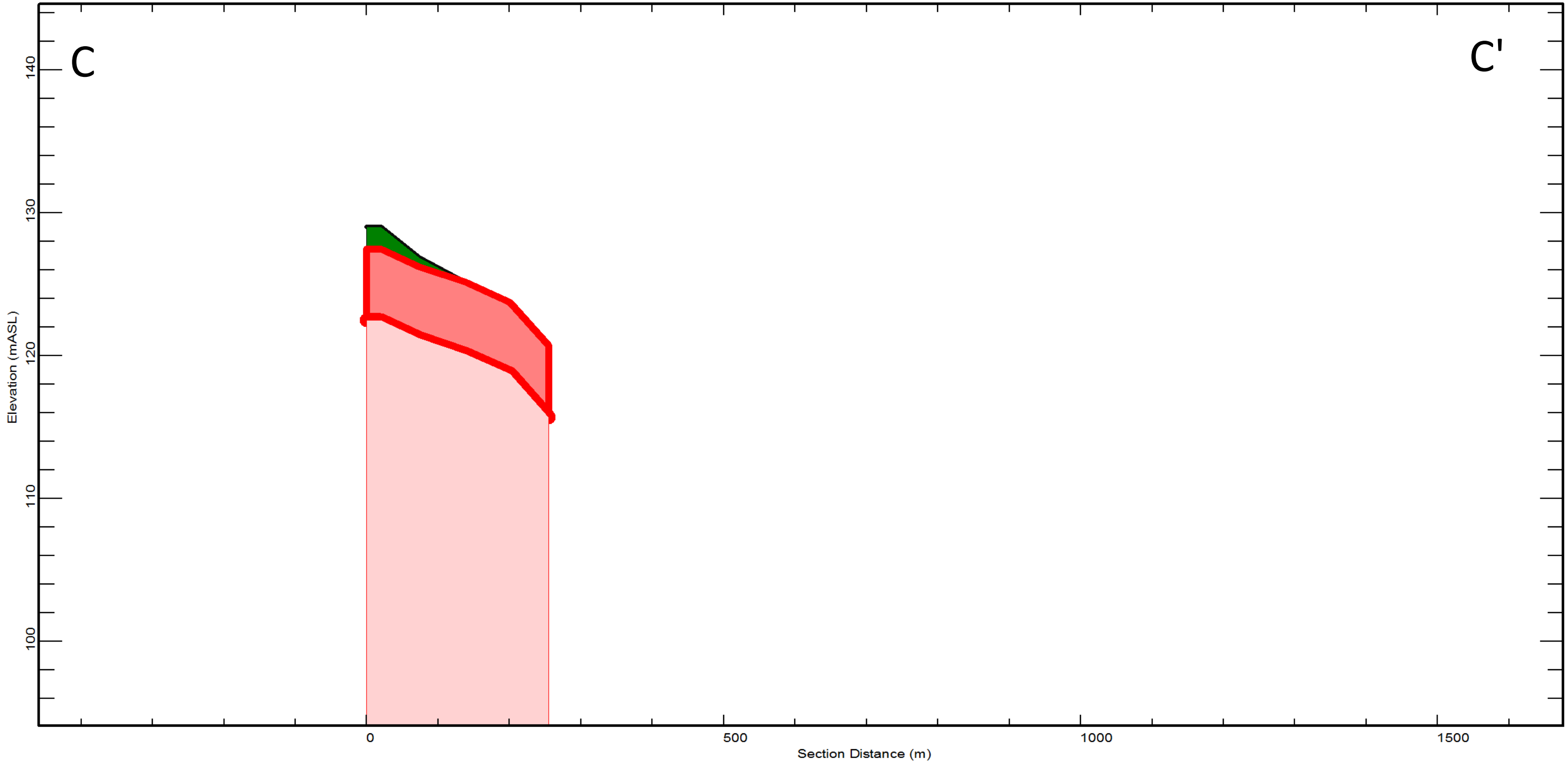
Peel Region Water Management Model 2019

Earthfx Incorporated

Cross Section
Cawthra Cres



Legend:

- Named places
- Post glacial deposits
- Halton Till
- Upper ORAC sand
- ORAC Silt
- Lower ORAC sand
- Upper Newmarket Till
- Thorncliffe Formation
- Sunnybrook Drift (or equivalent)
- Weathered Bedrock
- Upper Bedrock
- Amabel/Goat Island
- Reynales
- Whirlpool
- Queenston
- Georgian Bay Fm.

0 200 400

Units: UTM NAD83 Zone 17
Section Distance in metres
Vertical elevation in mASL
Vertical Exaggeration: 20x
Borehole Offset Projection: 100 m

Data Sources:
Produced with information provided by the Ministry of Natural Resources,

Drawing prepared by Earthfx 9/29/2020

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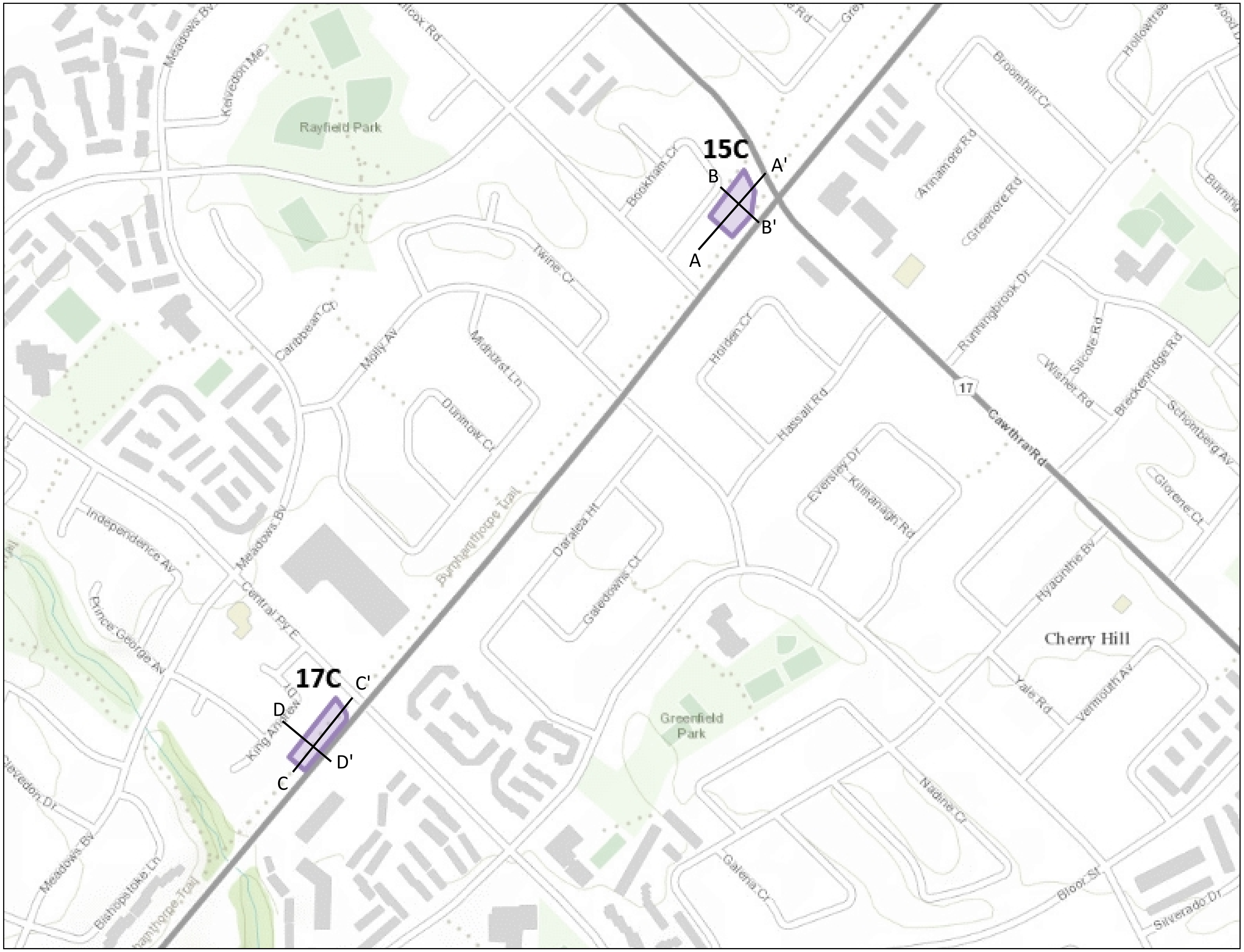
Cross Section
Cawthra Cres

APPENDIX C3:
STRATIGRAPHIC CROSS-SECTIONS FROM PEEL WATER MANAGEMENT MODEL – SITES 15C AND 17C

Cross Section Locations - Burnhamthorpe Trail (1/1)



Legend

- CAMC Boundary
- Oak Ridges Moraine Boundary

604.9 | 0 | 302.46 | 604.9 Metres

1: 11,908

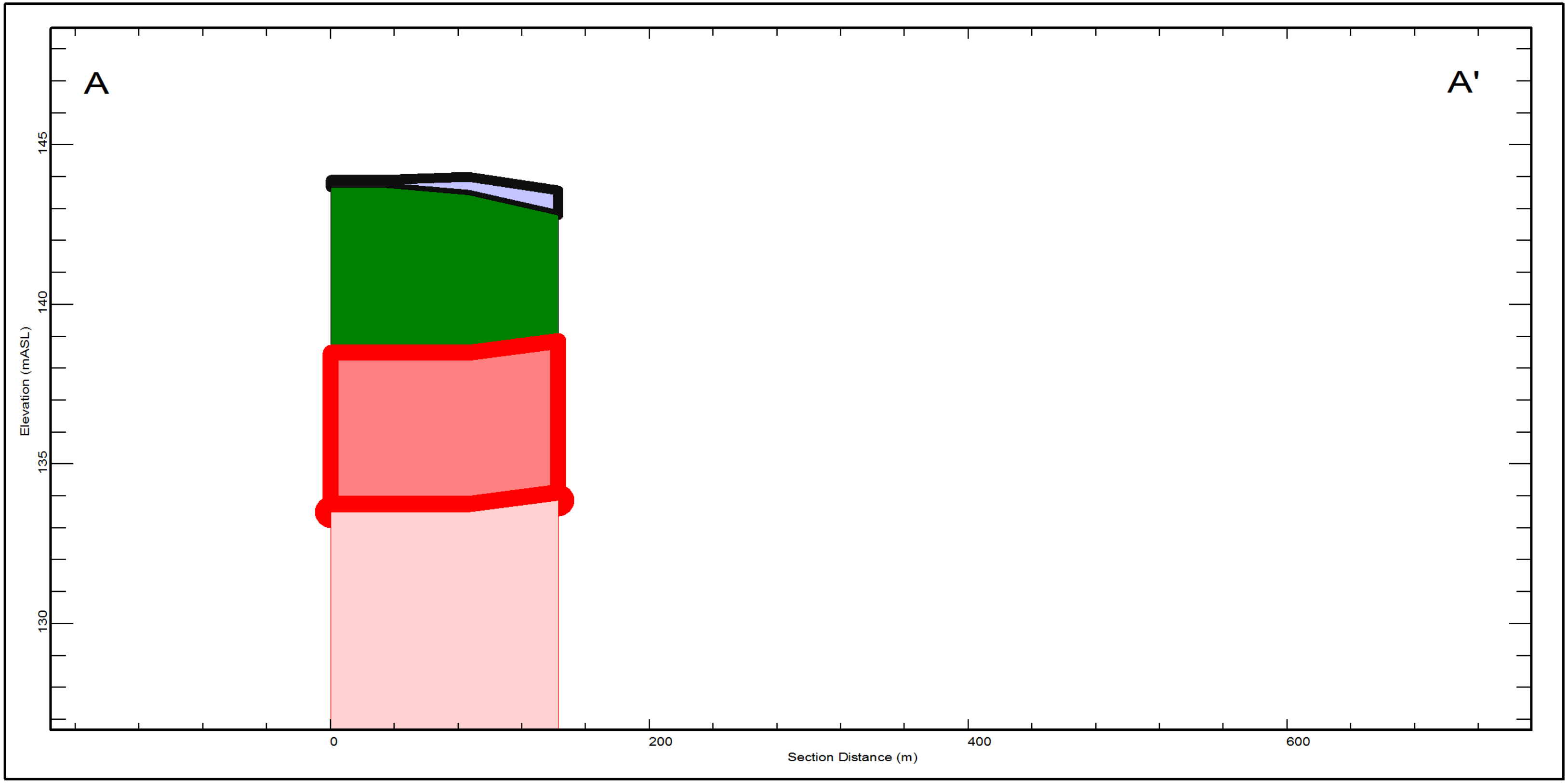
Map Compiled by the Oak Ridges Moraine Groundwater Program.101 Exchange Avenue, Vaughan, Ontario, M3N 1S4

This map is for information purposes only and the Oak Ridges Moraine Groundwater Program takes no responsibility for, nor guarantees, the accuracy of all the information contained within the map.

SOURCE: ORMGP 2020; MNRF 2020;

PROJECTION: WGS_1984_Web_Mercator_Auxiliary_Sphere

DATE PRINTED: September 29, 2020



Legend:
- Named places
- Post glacial deposits
- Halton Till
- Upper ORAC sand
- ORAC Silt
- Lower ORAC sand
- Upper Newmarket Till
- Thorncliffe Formation
- Sunnybrook Drift (or equivalent)
- Weathered Bedrock
- Upper Bedrock
- Amabel/Goat Island
- Reynales
- Whirlpool
- Queenston
- Georgian Bay Fm.

0 50 100 150

Units: UTM NAD83 Zone 17
Section Distance in metres
Vertical elevation in mASL
Vertical Exaggeration: 20x
Borehole Offset Projection: 100 m

Data Sources:
Produced with information provided by the Ministry of Natural Resources,

Drawing prepared by Earthfx 9/29/2020

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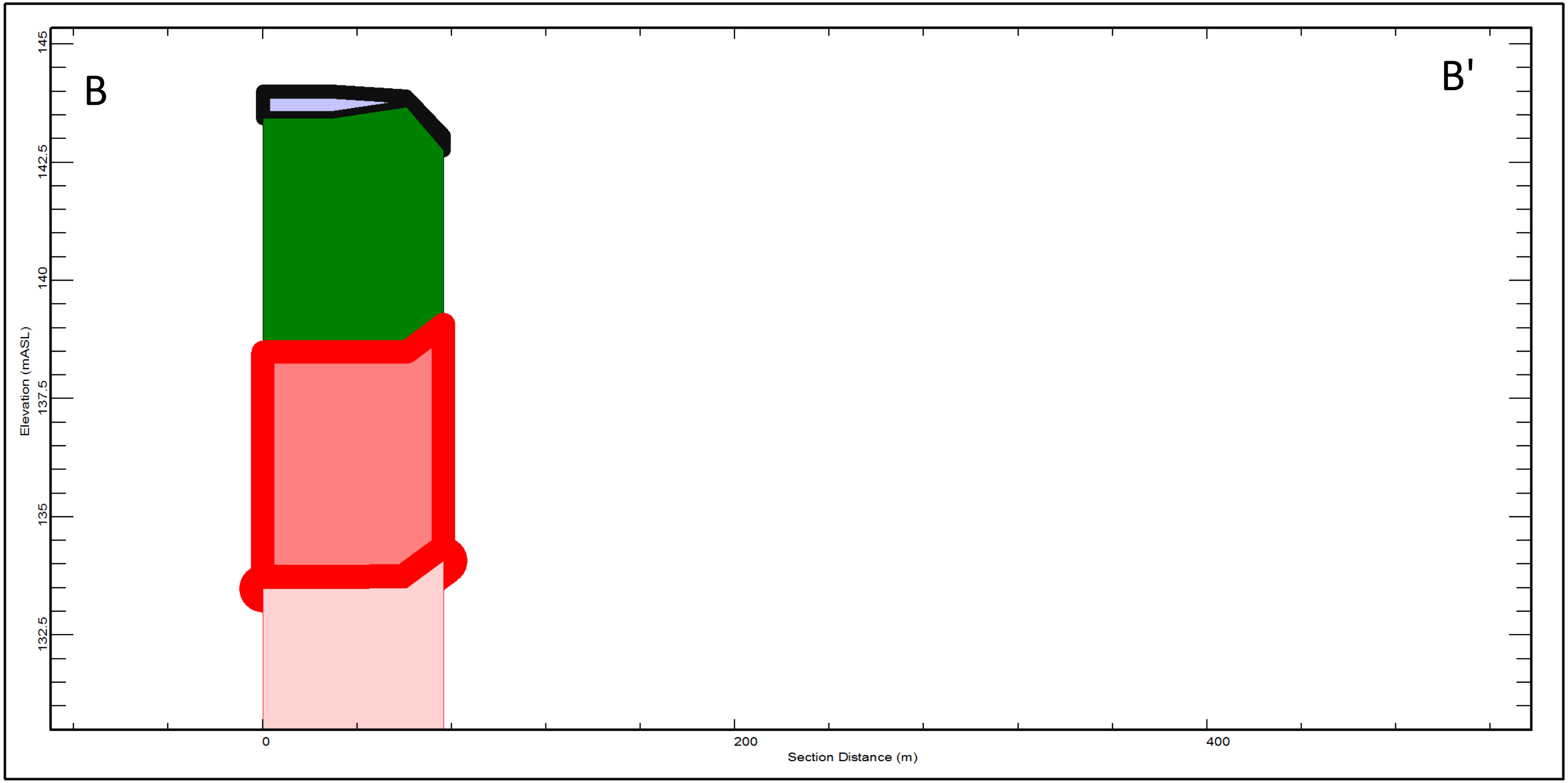
Cross Section

Burnhamthorpe Rd



Legend:
- Named places
- Post glacial deposits
- Halton Till
- Upper ORAC sand
- ORAC Silt
- Lower ORAC sand
- Upper Newmarket Till
- Thorncliffe Formation
- Sunnybrook Drift (or equivalent)
- Weathered Bedrock
- Upper Bedrock
- Amabel/Goat Island
- Reynales
- Whirlpool
- Queenston
- Georgian Bay Fm.

0 40 80

Units: UTM NAD83 Zone 17
Section Distance in metres
Vertical elevation in mASL
Vertical Exaggeration: 20x
Borehole Offset Projection: 100 m

Data Sources:
Produced with information provided by the Ministry of Natural Resources,

Drawing prepared by Earthfx 9/29/2020

Region of Peel
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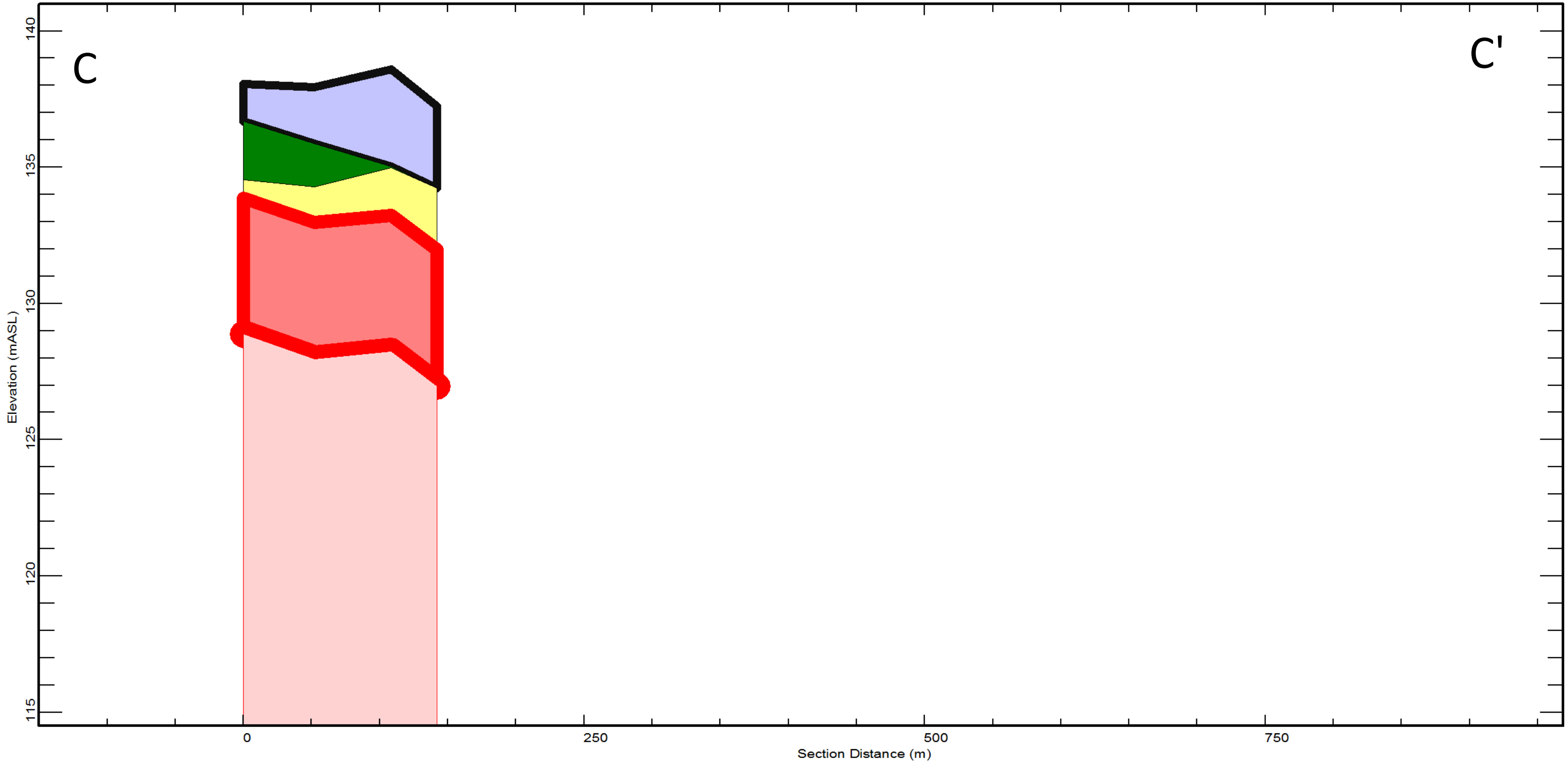
Peel Region Water Management Model 2019

Earthfx Incorporated

Cross Section

Burnhamthorpe Rd



Legend:
- Named places
- Post glacial deposits
- Halton Till
- Upper ORAC sand
- ORAC Silt
- Lower ORAC sand
- Upper Newmarket Till
- Thorncliffe Formation
- Sunnybrook Drift (or equivalent)
- Weathered Bedrock
- Upper Bedrock
- Amabel/Goat Island
- Reynales
- Whirlpool
- Queenston
- Georgian Bay Fm.

0 100 200

Units: UTM NAD83 Zone 17
Section Distance in metres
Vertical elevation in mASL
Vertical Exaggeration: 20x
Borehole Offset Projection: 100 m

Data Sources:
Produced with information provided by the Ministry of Natural Resources,

Drawing prepared by Earthfx 9/29/2020

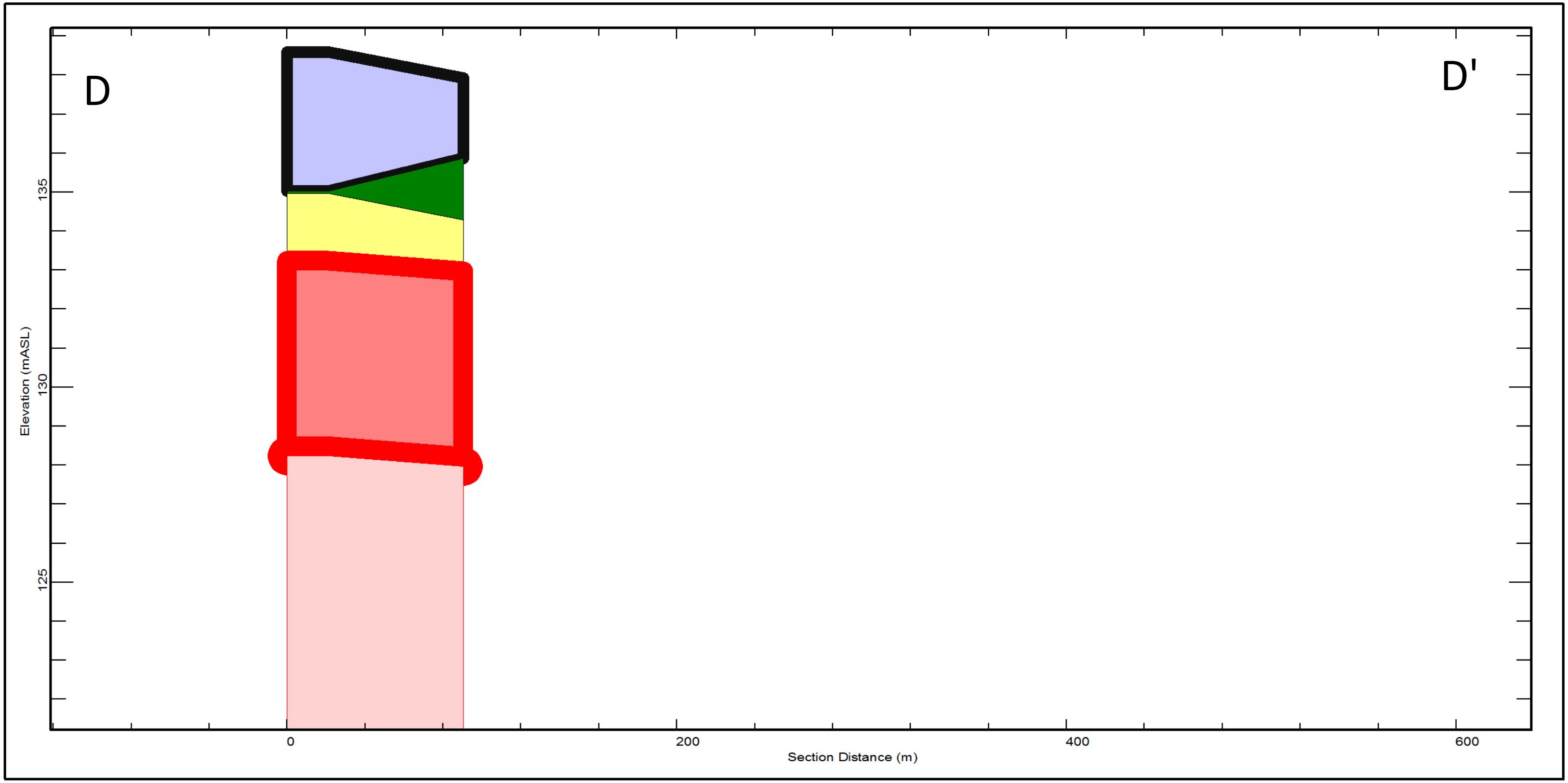
Region of Peel working with you

Peel Region Water Management Model 2019

Earthfx Incorporated

Cross Section

Burnhamthorpe Rd



Legend:
- Named places
- Post glacial deposits
- Halton Till
- Upper ORAC sand
- ORAC Silt
- Lower ORAC sand
- Upper Newmarket Till
- Thorncliffe Formation
- Sunnybrook Drift (or equivalent)
- Weathered Bedrock
- Upper Bedrock
- Amabel/Goat Island
- Reynales
- Whirlpool
- Queenston
- Georgian Bay Fm.

0 50 100

Units: UTM NAD83 Zone 17
Section Distance in metres
Vertical elevation in mASL
Vertical Exaggeration: 20x
Borehole Offset Projection: 100 m

Data Sources:
Produced with information provided by the Ministry of Natural Resources,

Drawing prepared by Earthfx 9/29/2020

Region of Peel working with you

Peel Region Water Management Model 2019

Earthfx Incorporated

Cross Section
Burnhamthorpe Rd

APPENDIX D:
TABULATED SUMMARY OF WATER WELL RECORD INFORMATION

MOECC Well ID	Lot	Conc.	County/ Municipality	Township	Easting	Northing	Well Use	Bedrock/ Overburden	Static Water Level (m)	Total Depth of Well (m)	Depth to Bedrock (m)	Abandonment Record?
4902247	4	1	PEEL	MISSISSAUGA CITY	615912.6	4828854	Domestic	Bedrock	10	12.4968	3.7	
4902248	6	1	PEEL	MISSISSAUGA CITY	614534.6	4828995	Not Used	Bedrock		7.0104	1.8	
4902249	6	1	PEEL	MISSISSAUGA CITY	614500.6	4828920	Not Used	Bedrock		6.096	5.8	
4902250	10	1	PEEL	MISSISSAUGA CITY	613064.6	4827846	Industrial	Bedrock	8	16.4592	6.1	
4907748	6	1	PEEL	MISSISSAUGA CITY	614515.1	4828820						
4909407			PEEL	MISSISSAUGA CITY	613538	4827215	Not Used	Bedrock		3.6	2.1	
4909432			PEEL	MISSISSAUGA CITY	612324	4825112	Not Used	Bedrock		2.8	0.3	
4909616	9	1	PEEL	MISSISSAUGA CITY	613878	4827756		Bedrock		7.3152	1.5	
4909651			PEEL	MISSISSAUGA CITY	614852	4829292		Bedrock		3.43	1.2	
4909746			PEEL	MISSISSAUGA CITY	614876	4828937		Bedrock		8.8392	7.3	
4909768			PEEL	MISSISSAUGA CITY	611569	4829168	Not Used	Bedrock		4.6	3	
4909828			PEEL	MISSISSAUGA CITY	612773	4827980	Not Used	Bedrock		10	7.9	
4909835			PEEL	MISSISSAUGA CITY	614856	4829134	Not Used	Bedrock		5.6	2.1	
4909894	2	1	PEEL	MISSISSAUGA CITY	615159	4829800		Overburden		3.6		
4909960			PEEL	MISSISSAUGA CITY	612094	4825835	Not Used					Y
4909980			PEEL	MISSISSAUGA CITY	613081	4825905		Overburden		4		
4910087			PEEL	MISSISSAUGA CITY	615320.5	4829969		Overburden		3.96		Y
4910124	65		PEEL	MISSISSAUGA CITY	611417	4829209	Not Used	Overburden		4.42		
4910138			PEEL	MISSISSAUGA CITY	613141.1	4826147						Y
4910285			PEEL	MISSISSAUGA CITY	611505	4829165		Bedrock		4.1	3.4	
4910343			PEEL	MISSISSAUGA CITY	612882	4826645	Not Used					
6928573			YORK	TORONTO CITY	615150	4829850		Bedrock		3.6	3	
7035425			PEEL	MISSISSAUGA CITY	613394	4827812		Bedrock		6.1	2.4	
7047171			PEEL	MISSISSAUGA CITY	615461	4830029				6		
7047896			PEEL	MISSISSAUGA CITY	614683	4828862				4.27		
7100281			PEEL	MISSISSAUGA CITY	612302	4825181	Not Used			7.62		
7107064			PEEL	MISSISSAUGA CITY	613059	4827325	Monitoring			4.5		
7107064			PEEL	MISSISSAUGA CITY	613012	4827267	Monitoring			4.5		
7107064			PEEL	MISSISSAUGA CITY	613012	4827267	Monitoring			4.5		
7107064			PEEL	MISSISSAUGA CITY	613012	4827267	Monitoring			4.5		
7107064			PEEL	MISSISSAUGA CITY	613028	4827310	Monitoring			4.5		
7107064			PEEL	MISSISSAUGA CITY	613028	4827310	Monitoring			4.5		
7107064			PEEL	MISSISSAUGA CITY	613012	4827267	Monitoring			4.5		
7107064			PEEL	MISSISSAUGA CITY	613059	4827325	Monitoring			4.5		
7107064			PEEL	MISSISSAUGA CITY	613028	4827310	Monitoring			4.5		
7107064			PEEL	MISSISSAUGA CITY	613059	4827325	Monitoring			4.5		
7107064			PEEL	MISSISSAUGA CITY	613055	4827274	Monitoring			4.5		
7107064			PEEL	MISSISSAUGA CITY	613055	4827274	Monitoring			4.5		
7107064			PEEL	MISSISSAUGA CITY	613055	4827274	Monitoring			4.5		
7107064			PEEL	MISSISSAUGA CITY	613028	4821310	Monitoring			4.5		
7107064			PEEL	MISSISSAUGA CITY	613055	4827274	Monitoring			4.5		
7107064			PEEL	MISSISSAUGA CITY	613028	4827310	Monitoring			4.5		
7107064			PEEL	MISSISSAUGA CITY	613028	4821310	Monitoring			4.5		
7107064			PEEL	MISSISSAUGA CITY	613028	4821310	Monitoring			4.5		
7107064			PEEL	MISSISSAUGA CITY	613028	4821310	Monitoring			4.5		
7107064			PEEL	MISSISSAUGA CITY	613059	4827325	Monitoring			4.5		
7110880			PEEL	MISSISSAUGA CITY	611410	4829223						Y
7116422			PEEL	MISSISSAUGA CITY	611404	4829253	Monitoring			4.6		
7116449			PEEL	MISSISSAUGA CITY	611502	4829159	Monitoring		2.4			Y
7116747			PEEL	MISSISSAUGA CITY	613121	4827588	Test Hole			3.6576		
7126165			PEEL	MISSISSAUGA CITY	615084	4828744						Y
7128687			PEEL	MISSISSAUGA CITY	610500	4829614	Monitoring			6		
7128687			PEEL	MISSISSAUGA CITY	610500	4829614	Monitoring			6		
7128687			PEEL	MISSISSAUGA CITY	616081	4828984	Monitoring			6		
7128687			PEEL	MISSISSAUGA CITY	616081	4828984	Monitoring			6		
7128687			PEEL	MISSISSAUGA CITY	610457	4829737	Monitoring			6		
7128687			PEEL	MISSISSAUGA CITY	610457	4829737	Monitoring			6		
7130497			PEEL	MISSISSAUGA CITY	610940	4828127	Monitoring			4.4196		
7130892			PEEL	MISSISSAUGA CITY	614836	4829308	Monitoring		1.3	7.5		
7130892			PEEL	MISSISSAUGA CITY	614856	4829430	Monitoring		1.3	7.5		
7130892			PEEL	MISSISSAUGA CITY	614836	4829308	Monitoring		1.3	7.5		
7130892			PEEL	MISSISSAUGA CITY	614856	4829430	Monitoring		1.6	7.5		
7130892			PEEL	MISSISSAUGA CITY	614836	4829308	Monitoring		1.6	7.5		
7130892			PEEL	MISSISSAUGA CITY	614836	4829308	Monitoring		1.6	7.5		
7130892			PEEL	MISSISSAUGA CITY	614836	4829308	Monitoring		2.8	7.5		
7130892			PEEL	MISSISSAUGA CITY	614856	4829430	Monitoring		2.8	7.5		
7130892			PEEL	MISSISSAUGA CITY	614836	4829308	Monitoring		2.8	7.5		
7136258	10	1	PEEL	MISSISSAUGA CITY	613173	4828157	Monitoring			7.3		
7136678			PEEL	MISSISSAUGA CITY	615019	4828693	Monitoring and Test Hole			4.8768		
7136678			PEEL	MISSISSAUGA CITY	615089	4828768	Monitoring and Test Hole			4.8768		
7136678			PEEL	MISSISSAUGA CITY	615089	4828768	Monitoring and Test Hole			4.8768		
7136678			PEEL	MISSISSAUGA CITY	615089	4828768	Monitoring and Test Hole			4.8768		
7136678			PEEL	MISSISSAUGA CITY	615026	4828729	Monitoring and Test Hole			4.8768		
7136678			PEEL	MISSISSAUGA CITY	615026	4828729	Monitoring and Test Hole			4.8768		
7136678			PEEL	MISSISSAUGA CITY	615026	4828729	Monitoring and Test Hole			4.8768		
7136678			PEEL	MISSISSAUGA CITY	615069	4828762	Monitoring and Test Hole			4.8768		
7136678			PEEL	MISSISSAUGA CITY	615026	4828729	Monitoring and Test Hole			4.8768		
7136678			PEEL	MISSISSAUGA CITY	615019	4828693	Monitoring and Test Hole			4.8768		
7136678			PEEL	MISSISSAUGA CITY	615019	4828693	Monitoring and Test Hole			4.8768		
7136678			PEEL	MISSISSAUGA CITY	615019	4828693	Monitoring and Test Hole			4.8768		
7136678			PEEL	MISSISSAUGA CITY	615019	4828693	Monitoring and Test Hole			4.8768		
7136678			PEEL	MISSISSAUGA CITY	615089	4828768	Monitoring and Test Hole			4.8768		
7136678			PEEL	MISSISSAUGA CITY	615026	4828729	Monitoring and Test Hole			4.8768		
7136678			PEEL	MISSISSAUGA CITY	615079	4828744	Monitoring and Test Hole			4.8768		
7136678			PEEL	MISSISSAUGA CITY	615079	4828744	Monitoring and Test Hole			4.8768		
7136678			PEEL	MISSISSAUGA CITY	615079	4828744	Monitoring and Test Hole			4.8768		
7136678			PEEL	MISSISSAUGA CITY	615089	4828768	Monitoring and Test Hole			4.8768		
7136678			PEEL	MISSISSAUGA CITY	615079	4828744	Monitoring and Test Hole			4.8768		

GM BluePlan Engineering Ltd.
Guelph, Owen Sound, Listowel, Kitchener, London, Hamilton, GTA
650 Woodlawn Rd. W. Block C, Unit 2, Guelph, ON N1K 1B8
www.GMBluePlan.ca

MOECC Well ID	Lot	Conc.	County/ Municipality	Township	Easting	Northing	Well Use	Bedrock/ Overburden	Static Water Level (m)	Total Depth of Well (m)	Depth to Bedrock (m)	Abandonment Record?
7136678			PEEL	MISSISSAUGA CITY	615069	4828762	Monitoring and Test Hole			4.8768		
7136678			PEEL	MISSISSAUGA CITY	615069	4828762	Monitoring and Test Hole			4.8768		
7136678			PEEL	MISSISSAUGA CITY	615069	4828762	Monitoring and Test Hole			4.8768		
7136678			PEEL	MISSISSAUGA CITY	615069	4828762	Monitoring and Test Hole			4.8768		
7136678			PEEL	MISSISSAUGA CITY	615081	4828797	Monitoring and Test Hole			4.8768		
7136678			PEEL	MISSISSAUGA CITY	615081	4828797	Monitoring and Test Hole			4.8768		
7136678			PEEL	MISSISSAUGA CITY	615081	4828797	Monitoring and Test Hole			4.8768		
7136678			PEEL	MISSISSAUGA CITY	615081	4828797	Monitoring and Test Hole			4.8768		
7136678			PEEL	MISSISSAUGA CITY	615081	4828797	Monitoring and Test Hole			4.8768		
7136678			PEEL	MISSISSAUGA CITY	615079	4828744	Monitoring and Test Hole			4.8768		
7139581			PEEL	MISSISSAUGA CITY	611402	4829257				4.59		Y
7141979			PEEL	MISSISSAUGA CITY	613599	4827215	Monitoring			4.5		
7141979			PEEL	MISSISSAUGA CITY	613578	4827218	Monitoring			4.5		
7142213			PEEL	MISSISSAUGA CITY	614696	4828829	Monitoring and Test Hole			3.1		
7142214			PEEL	MISSISSAUGA CITY	614721	4828837	Monitoring and Test Hole			3.1		
7142215			PEEL	MISSISSAUGA CITY	615203	4829014	Monitoring and Test Hole			3.1		
7142216			PEEL	MISSISSAUGA CITY	615271	4829099				3.1		
7142217			PEEL	MISSISSAUGA CITY	614741	4828847	Monitoring and Test Hole			3.1		
7142218			PEEL	MISSISSAUGA CITY	614752	4828874	Monitoring and Test Hole			3.1		
7144069			PEEL	MISSISSAUGA CITY	614988	4828768				3.6		
7145408			PEEL	MISSISSAUGA CITY	615166	4829616	Monitoring and Test Hole			30		
7145408			PEEL	MISSISSAUGA CITY	615160	4829602	Monitoring and Test Hole			30		
7145408			PEEL	MISSISSAUGA CITY	615160	4829602	Monitoring and Test Hole			30		
7145408			PEEL	MISSISSAUGA CITY	615160	4829602	Monitoring and Test Hole			30		
7145408			PEEL	MISSISSAUGA CITY	615166	4829616	Monitoring and Test Hole			30		
7145408			PEEL	MISSISSAUGA CITY	615166	4829616	Monitoring and Test Hole			30		
7145408			PEEL	MISSISSAUGA CITY	615166	4829616	Monitoring and Test Hole			30		
7145408			PEEL	MISSISSAUGA CITY	615166	4829616	Monitoring and Test Hole			30		
7145408			PEEL	MISSISSAUGA CITY	615166	4829616	Monitoring and Test Hole			30		
7145408			PEEL	MISSISSAUGA CITY	615166	4829616	Monitoring and Test Hole			30		
7145408			PEEL	MISSISSAUGA CITY	615215	4829714	Monitoring and Test Hole			30		
7145408			PEEL	MISSISSAUGA CITY			Monitoring and Test Hole			30		
7145408			PEEL	MISSISSAUGA CITY	615215	4829714	Monitoring and Test Hole			30		
7145408			PEEL	MISSISSAUGA CITY	615215	4829714	Monitoring and Test Hole			30		
7145408			PEEL	MISSISSAUGA CITY	615215	4829714	Monitoring and Test Hole			30		
7145408			PEEL	MISSISSAUGA CITY	615215	4829714	Monitoring and Test Hole			30		
7145408			PEEL	MISSISSAUGA CITY	615215	4829714	Monitoring and Test Hole			30		
7145408			PEEL	MISSISSAUGA CITY	615215	4829714	Monitoring and Test Hole			30		
7145408			PEEL	MISSISSAUGA CITY	615160	4829602	Monitoring and Test Hole			30		
7145408			PEEL	MISSISSAUGA CITY	615166	4829616	Monitoring and Test Hole			30		
7145408			PEEL	MISSISSAUGA CITY	615160	4829581	Monitoring and Test Hole			30		
7145408			PEEL	MISSISSAUGA CITY	615154	4829606	Monitoring and Test Hole			30		
7145408			PEEL	MISSISSAUGA CITY			Monitoring and Test Hole			30		
7145408			PEEL	MISSISSAUGA CITY			Monitoring and Test Hole			30		
7145408			PEEL	MISSISSAUGA CITY			Monitoring and Test Hole			30		
7145408			PEEL	MISSISSAUGA CITY			Monitoring and Test Hole			30		
7145408			PEEL	MISSISSAUGA CITY			Monitoring and Test Hole			30		
7145408			PEEL	MISSISSAUGA CITY			Monitoring and Test Hole			30		
7145408			PEEL	MISSISSAUGA CITY	615160	4829581	Monitoring and Test Hole			30		
7145408			PEEL	MISSISSAUGA CITY	615160	4829581	Monitoring and Test Hole			30		
7145408			PEEL	MISSISSAUGA CITY	615160	4829602	Monitoring and Test Hole			30		
7145408			PEEL	MISSISSAUGA CITY	615160	4829581	Monitoring and Test Hole			30		
7145408			PEEL	MISSISSAUGA CITY	615160	4829581	Monitoring and Test Hole			30		
7145408			PEEL	MISSISSAUGA CITY	615160	4829581	Monitoring and Test Hole			30		
7145408			PEEL	MISSISSAUGA CITY	615160	4829581	Monitoring and Test Hole			30		
7145408			PEEL	MISSISSAUGA CITY	615160	4829581	Monitoring and Test Hole			30		
7145408			PEEL	MISSISSAUGA CITY	615160	4829602	Monitoring and Test Hole			30		
7145408			PEEL	MISSISSAUGA CITY	615160	4829602	Monitoring and Test Hole			30		
7145408			PEEL	MISSISSAUGA CITY	615160	4829602	Monitoring and Test Hole			30		
7145408			PEEL	MISSISSAUGA CITY			Monitoring and Test Hole			30		
7145408			PEEL	MISSISSAUGA CITY	615093	4829660	Monitoring and Test Hole			30		
7145408			PEEL	MISSISSAUGA CITY	615313	4829637	Monitoring and Test Hole			30		
7145408			PEEL	MISSISSAUGA CITY	615313	4829637	Monitoring and Test Hole			30		
7145408			PEEL	MISSISSAUGA CITY	615205	4829524	Monitoring and Test Hole			30		
7145408			PEEL	MISSISSAUGA CITY	615205	4829524	Monitoring and Test Hole			30		
7145408			PEEL	MISSISSAUGA CITY	615205	4829524	Monitoring and Test Hole			30		
7145408			PEEL	MISSISSAUGA CITY	615205	4829524	Monitoring and Test Hole			30		
7145408			PEEL	MISSISSAUGA CITY	615205	4829524	Monitoring and Test Hole			30		
7145408			PEEL	MISSISSAUGA CITY	615313	4829637	Monitoring and Test Hole			30		
7145408			PEEL	MISSISSAUGA CITY	615205	4829524	Monitoring and Test Hole			30		
7145408			PEEL	MISSISSAUGA CITY	615205	4829524	Monitoring and Test Hole			30		
7145408			PEEL	MISSISSAUGA CITY	615093	4829660	Monitoring and Test Hole			30		
7145408			PEEL	MISSISSAUGA CITY	615093	4829660	Monitoring and Test Hole			30		
7145408			PEEL	MISSISSAUGA CITY	615093	4829660	Monitoring and Test Hole			30		
7145408			PEEL	MISSISSAUGA CITY	615093	4829660	Monitoring and Test Hole			30		
7145408			PEEL	MISSISSAUGA CITY	615093	4829660	Monitoring and Test Hole			30		
7145408			PEEL	MISSISSAUGA CITY	615093	4829660	Monitoring and Test Hole			30		
7145408			PEEL	MISSISSAUGA CITY	615154	4829606	Monitoring and Test Hole			30		
7145408			PEEL	MISSISSAUGA CITY	615215	4829714	Monitoring and Test Hole			30		
7145408			PEEL	MISSISSAUGA CITY	615205	4829524	Monitoring and Test Hole			30		
7145408			PEEL	MISSISSAUGA CITY	615154	4829606	Monitoring and Test Hole			30		
7145408			PEEL	MISSISSAUGA CITY	615154	4829606	Monitoring and Test Hole			30		
7145408			PEEL	MISSISSAUGA CITY	615093	4829660	Monitoring and Test Hole			30		
7145408			PEEL	MISSISSAUGA CITY	615313	4829637	Monitoring and Test Hole			30		
7145408			PEEL	MISSISSAUGA CITY	615154	4829606	Monitoring and Test Hole			30		
7145408			PEEL	MISSISSAUGA CITY	615154	4829606	Monitoring and Test Hole			30		
7145408			PEEL	MISSISSAUGA CITY	615154	4829606	Monitoring and Test Hole			30		
7145408			PEEL	MISSISSAUGA CITY	615190	4829587	Monitoring and Test Hole			30		

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MOECC Well ID	Lot	Conc.	County/ Municipality	Township	Easting	Northing	Well Use	Bedrock/ Overburden	Static Water Level (m)	Total Depth of Well (m)	Depth to Bedrock (m)	Abandonment Record?
7145408			PEEL	MISSISSAUGA CITY	615190	4829587	Monitoring and Test Hole			30		
7145408			PEEL	MISSISSAUGA CITY	615190	4829587	Monitoring and Test Hole			30		
7145408			PEEL	MISSISSAUGA CITY	615313	4829637	Monitoring and Test Hole			30		
7145408			PEEL	MISSISSAUGA CITY	615190	4829587	Monitoring and Test Hole			30		
7145408			PEEL	MISSISSAUGA CITY	615190	4829587	Monitoring and Test Hole			30		
7145408			PEEL	MISSISSAUGA CITY	615190	4829587	Monitoring and Test Hole			30		
7145408			PEEL	MISSISSAUGA CITY	615190	4829587	Monitoring and Test Hole			30		
7145408			PEEL	MISSISSAUGA CITY	615313	4829637	Monitoring and Test Hole			30		
7145408			PEEL	MISSISSAUGA CITY	615190	4829587	Monitoring and Test Hole			30		
7145408			PEEL	MISSISSAUGA CITY	615154	4829606	Monitoring and Test Hole			30		
7145408			PEEL	MISSISSAUGA CITY	615313	4829637	Monitoring and Test Hole			30		
7145408			PEEL	MISSISSAUGA CITY	615313	4829637	Monitoring and Test Hole			30		
7146653			PEEL	MISSISSAUGA CITY	615005	4829095	Test Hole			8.2		
7146653			PEEL	MISSISSAUGA CITY	615005	4829095	Test Hole			8.2		
7146653			PEEL	MISSISSAUGA CITY			Test Hole			8.2		
7146653			PEEL	MISSISSAUGA CITY	615004	4829096	Test Hole			8.2		
7146653			PEEL	MISSISSAUGA CITY			Test Hole			8.2		
7146653			PEEL	MISSISSAUGA CITY			Test Hole			8.2		
7146653			PEEL	MISSISSAUGA CITY			Test Hole			8.2		
7146653			PEEL	MISSISSAUGA CITY	615005	4829095	Test Hole			8.2		
7146653			PEEL	MISSISSAUGA CITY	615005	4829095	Test Hole			8.2		
7146653			PEEL	MISSISSAUGA CITY			Test Hole			8.2		
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7146653			PEEL	MISSISSAUGA CITY			Test Hole			8.2		
7146653			PEEL	MISSISSAUGA CITY	615005	4829095	Test Hole			8.2		
7146653			PEEL	MISSISSAUGA CITY	615005	4829095	Test Hole			8.2		
7146653			PEEL	MISSISSAUGA CITY	615005	4829095	Test Hole			8.2		
7146653			PEEL	MISSISSAUGA CITY	615005	4829095	Test Hole			8.2		
7146653			PEEL	MISSISSAUGA CITY	615005	4829095	Test Hole			8.2		
7146653			PEEL	MISSISSAUGA CITY	615005	4829095	Test Hole			8.2		
7146653			PEEL	MISSISSAUGA CITY	615005	4829095	Test Hole			8.2		
7146653			PEEL	MISSISSAUGA CITY	615005	4829095	Test Hole			8.2		
7146653			PEEL	MISSISSAUGA CITY	615005	4829095	Test Hole			8.2		
7146653			PEEL	MISSISSAUGA CITY	615004	4829096	Test Hole			8.2		
7146653			PEEL	MISSISSAUGA CITY			Test Hole			8.2		
7146653			PEEL	MISSISSAUGA CITY			Test Hole			8.2		
7146653			PEEL	MISSISSAUGA CITY	615005	4829095	Test Hole			8.2		
7146653			PEEL	MISSISSAUGA CITY			Test Hole			8.2		
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7146653			PEEL	MISSISSAUGA CITY			Test Hole			8.2		
7146653			PEEL	MISSISSAUGA CITY	614940	4829161	Test Hole			8.2		
7146653			PEEL	MISSISSAUGA CITY			Test Hole			8.2		
7146653			PEEL	MISSISSAUGA CITY	615004	4829096	Test Hole			8.2		
7146653			PEEL	MISSISSAUGA CITY			Test Hole			8.2		
7146653			PEEL	MISSISSAUGA CITY			Test Hole			8.2		
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7146653			PEEL	MISSISSAUGA CITY			Test Hole			8.2		
7146653			PEEL	MISSISSAUGA CITY	614982	4829230	Test Hole			8.2		
7146653			PEEL	MISSISSAUGA CITY	614941	4829160	Test Hole			8.2		
7146653			PEEL	MISSISSAUGA CITY	614941	4829160	Test Hole			8.2		
7146653			PEEL	MISSISSAUGA CITY	614941	4829160	Test Hole			8.2		
7146653			PEEL	MISSISSAUGA CITY	614941	4829160	Test Hole			8.2		
7146653			PEEL	MISSISSAUGA CITY	614941	4829160	Test Hole			8.2		
7146653			PEEL	MISSISSAUGA CITY	614941	4829160	Test Hole			8.2		
7146653			PEEL	MISSISSAUGA CITY	614941	4829160	Test Hole			8.2		
7146653			PEEL	MISSISSAUGA CITY	614941	4829160	Test Hole			8.2		
7146653			PEEL	MISSISSAUGA CITY	614941	4829160	Test Hole			8.2		
7146653			PEEL	MISSISSAUGA CITY	614982	4829230	Test Hole			8.2		
7146653			PEEL	MISSISSAUGA CITY	614940	4829161	Test Hole			8.2		
7146653			PEEL	MISSISSAUGA CITY	614982	4829230	Test Hole			8.2		
7146653			PEEL	MISSISSAUGA CITY	614941	4829160	Test Hole			8.2		
7146653			PEEL	MISSISSAUGA CITY	614982	4829230	Test Hole			8.2		
7146653			PEEL	MISSISSAUGA CITY	614982	4829230	Test Hole			8.2		
7146653			PEEL	MISSISSAUGA CITY	614982	4829230	Test Hole			8.2		
7146653			PEEL	MISSISSAUGA CITY	614982	4829230	Test Hole			8.2		
7146653			PEEL	MISSISSAUGA CITY	614982	4829230	Test Hole			8.2		
7146653			PEEL	MISSISSAUGA CITY	614982	4829230	Test Hole			8.2		
7146653			PEEL	MISSISSAUGA CITY	614982	4829230	Test Hole			8.2		
7146653			PEEL	MISSISSAUGA CITY	614982	4829230	Test Hole			8.2		
7146653			PEEL	MISSISSAUGA CITY	614982	4829230	Test Hole			8.2		
7146653			PEEL	MISSISSAUGA CITY	614982	4829230	Test Hole			8.2		

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MOECC Well ID	Lot	Conc.	County/ Municipality	Township	Easting	Northing	Well Use	Bedrock/ Overburden	Static Water Level (m)	Total Depth of Well (m)	Depth to Bedrock (m)	Abandonment Record?
7146653			PEEL	MISSISSAUGA CITY			Test Hole			8.2		
7146653			PEEL	MISSISSAUGA CITY	614982	4829230	Test Hole			8.2		
7146653			PEEL	MISSISSAUGA CITY	614940	4829161	Test Hole			8.2		
7146653			PEEL	MISSISSAUGA CITY	615004	4829096	Test Hole			8.2		
7146653			PEEL	MISSISSAUGA CITY	615004	4829096	Test Hole			8.2		
7146653			PEEL	MISSISSAUGA CITY	615004	4829096	Test Hole			8.2		
7146653			PEEL	MISSISSAUGA CITY	615004	4829096	Test Hole			8.2		
7146653			PEEL	MISSISSAUGA CITY	615004	4829096	Test Hole			8.2		
7146653			PEEL	MISSISSAUGA CITY	615004	4829096	Test Hole			8.2		
7146653			PEEL	MISSISSAUGA CITY	615004	4829096	Test Hole			8.2		
7146653			PEEL	MISSISSAUGA CITY	615004	4829096	Test Hole			8.2		
7146653			PEEL	MISSISSAUGA CITY	615004	4829096	Test Hole			8.2		
7146653			PEEL	MISSISSAUGA CITY	615004	4829096	Test Hole			8.2		
7146653			PEEL	MISSISSAUGA CITY	614940	4829161	Test Hole			8.2		
7146653			PEEL	MISSISSAUGA CITY	614941	4829160	Test Hole			8.2		
7146653			PEEL	MISSISSAUGA CITY	614940	4829161	Test Hole			8.2		
7146653			PEEL	MISSISSAUGA CITY	614941	4829160	Test Hole			8.2		
7146653			PEEL	MISSISSAUGA CITY	614940	4829161	Test Hole			8.2		
7146653			PEEL	MISSISSAUGA CITY	614940	4829161	Test Hole			8.2		
7146653			PEEL	MISSISSAUGA CITY	614940	4829161	Test Hole			8.2		
7146653			PEEL	MISSISSAUGA CITY	614940	4829161	Test Hole			8.2		
7146653			PEEL	MISSISSAUGA CITY	614940	4829161	Test Hole			8.2		
7146653			PEEL	MISSISSAUGA CITY	614940	4829161	Test Hole			8.2		
7146653			PEEL	MISSISSAUGA CITY	614940	4829161	Test Hole			8.2		
7146653			PEEL	MISSISSAUGA CITY	614940	4829161	Test Hole			8.2		
7146653			PEEL	MISSISSAUGA CITY	614941	4829160	Test Hole			8.2		
7146653			PEEL	MISSISSAUGA CITY	614941	4829160	Test Hole			8.2		
7146653			PEEL	MISSISSAUGA CITY	615004	4829096	Test Hole			8.2		
7146653			PEEL	MISSISSAUGA CITY	614940	4829161	Test Hole			8.2		
7146653			PEEL	MISSISSAUGA CITY			Test Hole			8.2		
7146653			PEEL	MISSISSAUGA CITY	615111	4829208	Test Hole			8.2		
7146653			PEEL	MISSISSAUGA CITY	615111	4829208	Test Hole			8.2		
7146653			PEEL	MISSISSAUGA CITY	615111	4829208	Test Hole			8.2		
7146653			PEEL	MISSISSAUGA CITY	615111	4829208	Test Hole			8.2		
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7146653			PEEL	MISSISSAUGA CITY	615111	4829208	Test Hole			8.2		
7146653			PEEL	MISSISSAUGA CITY	615111	4829208	Test Hole			8.2		
7146653			PEEL	MISSISSAUGA CITY	615111	4829208	Test Hole			8.2		
7146653			PEEL	MISSISSAUGA CITY	615111	4829208	Test Hole			8.2		
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7146653			PEEL	MISSISSAUGA CITY	615111	4829208	Test Hole			8.2		
7146653			PEEL	MISSISSAUGA CITY	615111	4829208	Test Hole			8.2		
7146653			PEEL	MISSISSAUGA CITY	615111	4829209	Test Hole			8.2		
7146653			PEEL	MISSISSAUGA CITY			Test Hole			8.2		
7146653			PEEL	MISSISSAUGA CITY	614948	4829015	Test Hole			8.2		
7146653			PEEL	MISSISSAUGA CITY			Test Hole			8.2		
7146653			PEEL	MISSISSAUGA CITY			Test Hole			8.2		
7146653			PEEL	MISSISSAUGA CITY			Test Hole			8.2		
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7146653			PEEL	MISSISSAUGA CITY			Test Hole			8.2		
7146653			PEEL	MISSISSAUGA CITY	615111	4829209	Test Hole			8.2		
7146653			PEEL	MISSISSAUGA CITY	615111	4829209	Test Hole			8.2		
7146653			PEEL	MISSISSAUGA CITY			Test Hole			8.2		
7146653			PEEL	MISSISSAUGA CITY	614948	4829015	Test Hole			8.2		
7146653			PEEL	MISSISSAUGA CITY	614948	4829017	Test Hole			8.2		
7146653			PEEL	MISSISSAUGA CITY	614948	4829017	Test Hole			8.2		
7146653			PEEL	MISSISSAUGA CITY	614948	4829017	Test Hole			8.2		
7146653			PEEL	MISSISSAUGA CITY	614948	4829017	Test Hole			8.2		
7146653			PEEL	MISSISSAUGA CITY	614948	4829017	Test Hole			8.2		
7146653			PEEL	MISSISSAUGA CITY	614948	4829017	Test Hole			8.2		
7146653			PEEL	MISSISSAUGA CITY	614948	4829017	Test Hole			8.2		
7146653			PEEL	MISSISSAUGA CITY	614948	4829017	Test Hole			8.2		
7146653			PEEL	MISSISSAUGA CITY	614948	4829017	Test Hole			8.2		
7146653			PEEL	MISSISSAUGA CITY	614948	4829017	Test Hole			8.2		
7146653			PEEL	MISSISSAUGA CITY	614948	4829017	Test Hole			8.2		
7146653			PEEL	MISSISSAUGA CITY	614948	4829017	Test Hole			8.2		
7146653			PEEL	MISSISSAUGA CITY	615111	4829208	Test Hole			8.2		
7146653			PEEL	MISSISSAUGA CITY	614948	4829017	Test Hole			8.2		
7146653			PEEL	MISSISSAUGA CITY	615111	4829208	Test Hole			8.2		
7146653			PEEL	MISSISSAUGA CITY	614948	4829015	Test Hole			8.2		
7146653			PEEL	MISSISSAUGA CITY	614948	4829015	Test Hole			8.2		
7146653			PEEL	MISSISSAUGA CITY	614948	4829015	Test Hole			8.2		
7146653			PEEL	MISSISSAUGA CITY	614948	4829015	Test Hole			8.2		
7146653			PEEL	MISSISSAUGA CITY	614948	4829015	Test Hole			8.2		
7146653			PEEL	MISSISSAUGA CITY	614948	4829015	Test Hole			8.2		
7146653			PEEL	MISSISSAUGA CITY	614948	4829015	Test Hole			8.2		
7146653			PEEL	MISSISSAUGA CITY	614948	4829015	Test Hole			8.2		
7146653			PEEL	MISSISSAUGA CITY	614948	4829015	Test Hole			8.2		
7146653			PEEL	MISSISSAUGA CITY	614948	4829015	Test Hole			8.2		
7146653			PEEL	MISSISSAUGA CITY	614948	4829015	Test Hole			8.2		
7146653			PEEL	MISSISSAUGA CITY	614948	4829015	Test Hole			8.2		
7146653			PEEL	MISSISSAUGA CITY			Test Hole			8.2		
7146653			PEEL	MISSISSAUGA CITY	614948	4829017	Test Hole			8.2		

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MOECC Well ID	Lot	Conc.	County/ Municipality	Township	Easting	Northing	Well Use	Bedrock/ Overburden	Static Water Level (m)	Total Depth of Well (m)	Depth to Bedrock (m)	Abandonment Record?
7146653			PEEL	MISSISSAUGA CITY	614982	4829231	Test Hole			8.2		
7146653			PEEL	MISSISSAUGA CITY	615067	4829273	Test Hole			8.2		
7146653			PEEL	MISSISSAUGA CITY	615067	4829273	Test Hole			8.2		
7146653			PEEL	MISSISSAUGA CITY	615067	4829273	Test Hole			8.2		
7146653			PEEL	MISSISSAUGA CITY	615067	4829273	Test Hole			8.2		
7146653			PEEL	MISSISSAUGA CITY	615067	4829273	Test Hole			8.2		
7146653			PEEL	MISSISSAUGA CITY	615067	4829273	Test Hole			8.2		
7146653			PEEL	MISSISSAUGA CITY	615067	4829273	Test Hole			8.2		
7146653			PEEL	MISSISSAUGA CITY	615067	4829273	Test Hole			8.2		
7146653			PEEL	MISSISSAUGA CITY	614982	4829231	Test Hole			8.2		
7146653			PEEL	MISSISSAUGA CITY	614982	4829231	Test Hole			8.2		
7146653			PEEL	MISSISSAUGA CITY	614982	4829231	Test Hole			8.2		
7146653			PEEL	MISSISSAUGA CITY	615111	4829209	Test Hole			8.2		
7146653			PEEL	MISSISSAUGA CITY	615067	4829273	Test Hole			8.2		
7146653			PEEL	MISSISSAUGA CITY			Test Hole			8.2		
7146653			PEEL	MISSISSAUGA CITY	614982	4829231	Test Hole			8.2		
7146653			PEEL	MISSISSAUGA CITY	614982	4829231	Test Hole			8.2		
7146653			PEEL	MISSISSAUGA CITY	614982	4829231	Test Hole			8.2		
7146653			PEEL	MISSISSAUGA CITY	614982	4829231	Test Hole			8.2		
7146653			PEEL	MISSISSAUGA CITY	614982	4829231	Test Hole			8.2		
7146653			PEEL	MISSISSAUGA CITY	614982	4829231	Test Hole			8.2		
7146653			PEEL	MISSISSAUGA CITY	614982	4829231	Test Hole			8.2		
7146653			PEEL	MISSISSAUGA CITY	614982	4829231	Test Hole			8.2		
7146653			PEEL	MISSISSAUGA CITY			Test Hole			8.2		
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7146653			PEEL	MISSISSAUGA CITY			Test Hole			8.2		
7146653			PEEL	MISSISSAUGA CITY			Test Hole			8.2		
7146653			PEEL	MISSISSAUGA CITY			Test Hole			8.2		
7146653			PEEL	MISSISSAUGA CITY			Test Hole			8.2		
7146653			PEEL	MISSISSAUGA CITY	614982	4829231	Test Hole			8.2		
7146653			PEEL	MISSISSAUGA CITY	615111	4829209	Test Hole			8.2		
7146653			PEEL	MISSISSAUGA CITY	614982	4829231	Test Hole			8.2		
7146653			PEEL	MISSISSAUGA CITY	615111	4829209	Test Hole			8.2		
7146653			PEEL	MISSISSAUGA CITY	615067	4829273	Test Hole			8.2		
7146653			PEEL	MISSISSAUGA CITY	615111	4829209	Test Hole			8.2		
7146653			PEEL	MISSISSAUGA CITY	615111	4829209	Test Hole			8.2		
7146653			PEEL	MISSISSAUGA CITY	615111	4829209	Test Hole			8.2		
7146653			PEEL	MISSISSAUGA CITY	615111	4829209	Test Hole			8.2		
7146653			PEEL	MISSISSAUGA CITY	615111	4829209	Test Hole			8.2		
7146653			PEEL	MISSISSAUGA CITY	615111	4829209	Test Hole			8.2		
7146653			PEEL	MISSISSAUGA CITY	615111	4829209	Test Hole			8.2		
7146653			PEEL	MISSISSAUGA CITY	615111	4829209	Test Hole			8.2		
7146653			PEEL	MISSISSAUGA CITY	615066	4829273	Test Hole			8.2		
7146653			PEEL	MISSISSAUGA CITY	615066	4829273	Test Hole			8.2		
7146653			PEEL	MISSISSAUGA CITY	615066	4829273	Test Hole			8.2		
7146653			PEEL	MISSISSAUGA CITY	615067	4829273	Test Hole			8.2		
7146653			PEEL	MISSISSAUGA CITY	615066	4829273	Test Hole			8.2		
7146653			PEEL	MISSISSAUGA CITY	615067	4829273	Test Hole			8.2		
7146653			PEEL	MISSISSAUGA CITY	615067	4829273	Test Hole			8.2		
7146653			PEEL	MISSISSAUGA CITY	615066	4829273	Test Hole			8.2		
7146653			PEEL	MISSISSAUGA CITY	615066	4829273	Test Hole			8.2		
7146653			PEEL	MISSISSAUGA CITY	615066	4829273	Test Hole			8.2		
7146653			PEEL	MISSISSAUGA CITY	615066	4829273	Test Hole			8.2		
7146653			PEEL	MISSISSAUGA CITY	615066	4829273	Test Hole			8.2		
7146653			PEEL	MISSISSAUGA CITY	615066	4829273	Test Hole			8.2		
7146653			PEEL	MISSISSAUGA CITY	615066	4829273	Test Hole			8.2		
7146653			PEEL	MISSISSAUGA CITY	615066	4829273	Test Hole			8.2		
7146653			PEEL	MISSISSAUGA CITY	615066	4829273	Test Hole			8.2		
7146653			PEEL	MISSISSAUGA CITY	615067	4829273	Test Hole			8.2		
7146653			PEEL	MISSISSAUGA CITY	615066	4829273	Test Hole			8.2		
7149162			PEEL	MISSISSAUGA CITY	611494	4829140	Monitoring		1.8	3.8		
7149162			PEEL	MISSISSAUGA CITY	611497	4829177	Monitoring		1.8	3.8		
7149162			PEEL	MISSISSAUGA CITY	611497	4829177	Monitoring		1.8	3.8		
7149162			PEEL	MISSISSAUGA CITY	611494	4829140	Monitoring		1.8	3.8		
7149162			PEEL	MISSISSAUGA CITY	611471	4829169	Monitoring		1.8	3.8		
7149162			PEEL	MISSISSAUGA CITY	611471	4829169	Monitoring		1.8	3.8		
7149162			PEEL	MISSISSAUGA CITY	611470	4829190	Monitoring		1.8	3.8		
7149162			PEEL	MISSISSAUGA CITY	611476	4829192	Monitoring		1.8	3.8		
7149162			PEEL	MISSISSAUGA CITY	611476	4829192	Monitoring		1.8	3.8		
7149162			PEEL	MISSISSAUGA CITY	611470	4829190	Monitoring		1.8	3.8		
7149162			PEEL	MISSISSAUGA CITY	611497	4829177	Monitoring		2	3.8		
7149162			PEEL	MISSISSAUGA CITY	611470	4829190	Monitoring		2	3.8		
7149162			PEEL	MISSISSAUGA CITY	611494	4829140	Monitoring		2	3.8		
7149162			PEEL	MISSISSAUGA CITY	611471	4829169	Monitoring		2	3.8		
7149162			PEEL	MISSISSAUGA CITY	611476	4829192	Monitoring		2	3.8		
7149162			PEEL	MISSISSAUGA CITY	611471	4829169	Monitoring		2.2	3.8		
7149162			PEEL	MISSISSAUGA CITY	611497	4829177	Monitoring		2.2	3.8		
7149162			PEEL	MISSISSAUGA CITY	611494	4829140	Monitoring		2.2	3.8		
7149162			PEEL	MISSISSAUGA CITY	611470	4829190	Monitoring		2.2	3.8		
7149162			PEEL	MISSISSAUGA CITY	611476	4829192	Monitoring		2.2	3.8		
7149162			PEEL	MISSISSAUGA CITY	611497	4829177	Monitoring		2.7	3.8		
7149162			PEEL	MISSISSAUGA CITY	611494	4829140	Monitoring		2.7	3.8		
7149162			PEEL	MISSISSAUGA CITY	611471	4829169	Monitoring		2.7	3.8		
7149162			PEEL	MISSISSAUGA CITY	611470	4829190	Monitoring		2.7	3.8		
7149162			PEEL	MISSISSAUGA CITY	611476	4829192	Monitoring		2.7	3.8		
7151598			PEEL	MISSISSAUGA CITY	610957	4828439	Dewatering		30	14.6304		
7151599			PEEL	MISSISSAUGA CITY	610954	4828433	Dewatering		30	15.5448		
7151600			PEEL	MISSISSAUGA CITY	610953	4828446	Dewatering		30	16.1544		

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MOECC Well ID	Lot	Conc.	County/ Municipality	Township	Easting	Northing	Well Use	Bedrock/ Overburden	Static Water Level (m)	Total Depth of Well (m)	Depth to Bedrock (m)	Abandonment Record?
7157562			PEEL	MISSISSAUGA CITY	610955	4828446	Not Used					Y
7157563			PEEL	MISSISSAUGA CITY	610914	4828506	Not Used					Y
7158695			PEEL	MISSISSAUGA CITY	613575	4827368						Y
7160191			PEEL	MISSISSAUGA CITY	613631	4827499						
7161951			PEEL	MISSISSAUGA CITY	613544	4827351	Test Hole			4.572		
7162889			PEEL	MISSISSAUGA CITY	613093	4828064	Monitoring			6.096		
7166126			PEEL	MISSISSAUGA CITY	610954	4828445	Not Used		4			
7170240			YORK	ETOBICOKE BOROUGH	616171	4829279						
7170592	10	1	PEEL	MISSISSAUGA CITY	613173	4828160						
7171621			PEEL	MISSISSAUGA CITY	614822	4828553	Monitoring and Test Hole			5.1816		
7171622			PEEL	MISSISSAUGA CITY	614803	4828561	Monitoring and Test Hole			5.1816		
7174339			PEEL	MISSISSAUGA CITY	615250	4829054	Monitoring and Test Hole			4.1148		
7174340			PEEL	MISSISSAUGA CITY	615238	4829042	Monitoring and Test Hole			3.048		
7174341			PEEL	MISSISSAUGA CITY	615233	4829062	Monitoring and Test Hole			3.048		
7174342			PEEL	MISSISSAUGA CITY	615205	4829062	Monitoring and Test Hole			3.9624		
7174343			PEEL	MISSISSAUGA CITY	615158	4829007	Monitoring and Test Hole			33.8328		
7179291	15	1	PEEL	MISSISSAUGA CITY	612450	4825655						
7179424			PEEL	MISSISSAUGA CITY	615424	4829284						
7179903			PEEL	MISSISSAUGA CITY	613844	4827735	Test Hole			3.6576		
7181195			PEEL	MISSISSAUGA CITY	611438	4829272	Monitoring and Test Hole			5.7		
7181196			PEEL	MISSISSAUGA CITY	611442	4829250	Monitoring and Test Hole			5.7		
7183363			PEEL	MISSISSAUGA CITY	611255	4829487	Monitoring and Test Hole			5.7		
7183444			PEEL	MISSISSAUGA CITY	611434	4829245						
7183741			PEEL	MISSISSAUGA CITY	615212	4829569	Monitoring and Test Hole			5.49		
7186906			PEEL	MISSISSAUGA CITY	615115	4828814						
7186907			PEEL	MISSISSAUGA CITY	615114	4828814						
7186908			PEEL	MISSISSAUGA CITY	615116	4828814						
7186909			PEEL	MISSISSAUGA CITY	615117	4828814						
7188458			PEEL	MISSISSAUGA CITY	615213	4828933						
7188911			PEEL	MISSISSAUGA CITY	613105	4827314						
7189025			PEEL	MISSISSAUGA CITY	615057	4828908						
7191934			PEEL	MISSISSAUGA CITY	614956	4829505						
7193392			PEEL	MISSISSAUGA CITY	615126	4829259						
7195017			PEEL	MISSISSAUGA CITY	613268	4828027						
7199439			PEEL	MISSISSAUGA CITY	615262	4829184						
7202010			PEEL	MISSISSAUGA CITY	611691	4828962	Monitoring and Test Hole			3.048		
7206200			PEEL	MISSISSAUGA CITY (PORT CREDIT)	612149	4825134	Monitoring			9.144		
7219359			PEEL	MISSISSAUGA CITY	613100	4827834	Monitoring and Test Hole			5.0292		
7219360			PEEL	MISSISSAUGA CITY	613140	4827792	Monitoring and Test Hole			5.6388		
7219790			PEEL	MISSISSAUGA CITY	614896	4828787						
7221302			PEEL	MISSISSAUGA CITY	614878	4828760						
7222397			PEEL	MISSISSAUGA CITY	614856	4829117						
7223583			PEEL	MISSISSAUGA CITY	614968	4828918						
7224919			PEEL	MISSISSAUGA CITY	613390	4827231	Monitoring			5.5		
7224920			PEEL	MISSISSAUGA CITY	613402	4827253	Monitoring			5.5		
7224921			PEEL	MISSISSAUGA CITY	613402	4827253	Monitoring			5.5		
7224922			PEEL	MISSISSAUGA CITY	613398	4827257	Monitoring			3.4		
7224923			PEEL	MISSISSAUGA CITY	613427	4827299	Monitoring			4.9		
7224924			PEEL	MISSISSAUGA CITY	613376	4827237	Monitoring			5.5		
7224925			PEEL	MISSISSAUGA CITY	613346	4827199	Monitoring			5.5		
7227449			PEEL	MISSISSAUGA CITY	613189	4826227	Monitoring			7.62		
7231835			PEEL	MISSISSAUGA CITY	615037	4828971						
7232602			PEEL	MISSISSAUGA CITY	614923	4828892						
7232603			PEEL	MISSISSAUGA CITY	614906	4828888						
7233719			PEEL	MISSISSAUGA CITY	613281	4828074	Monitoring and Test Hole			6.5532		
7233720			PEEL	MISSISSAUGA CITY	613282	4828103	Monitoring and Test Hole			5.6388		
7233721			PEEL	MISSISSAUGA CITY	613257	4828095	Monitoring and Test Hole			5.4864		
7233722			PEEL	MISSISSAUGA CITY	613255	4828082	Monitoring and Test Hole			6.2484		
7235321			PEEL	MISSISSAUGA CITY	614926	4828748	Monitoring and Test Hole			3.048		
7235322			PEEL	MISSISSAUGA CITY	614912	4828760	Monitoring and Test Hole			3.048		
7235323			PEEL	MISSISSAUGA CITY	614905	4828806	Monitoring and Test Hole			3.048		
7236350			PEEL	MISSISSAUGA CITY	615067	4829004	Monitoring and Test Hole			3.9624		
7236351			PEEL	MISSISSAUGA CITY	615068	4828919	Monitoring and Test Hole			3.9624		
7236352			PEEL	MISSISSAUGA CITY	615074	4828998	Monitoring and Test Hole			3.048		
7236353			PEEL	MISSISSAUGA CITY	615066	4828986	Monitoring and Test Hole			3.048		
7240692			PEEL	MISSISSAUGA CITY	612927	4827618						
7242095			PEEL	MISSISSAUGA CITY	614582	4828872	Monitoring and Test Hole					Y
7242096			PEEL	MISSISSAUGA CITY	614582	4828872	Monitoring and Test Hole			3.6576		
7242097			PEEL	MISSISSAUGA CITY	614578	4828985	Monitoring and Test Hole			2.7432		
7242098			PEEL	MISSISSAUGA CITY	614659	4829009	Monitoring and Test Hole					Y
7242099			PEEL	MISSISSAUGA CITY	614651	4829018	Monitoring and Test Hole			2.4384		
7243628			PEEL	MISSISSAUGA CITY	614721	4828584	Monitoring and Test Hole			7.62		
7244740			PEEL	MISSISSAUGA CITY	613364	4827273						
7244741			PEEL	MISSISSAUGA CITY	613371	4827265						
7250180			PEEL	MISSISSAUGA CITY	614841	4828837	Monitoring and Test Hole			3.9624		
7250181			PEEL	MISSISSAUGA CITY	614579	4828696	Monitoring and Test Hole			3.048		
7250182			PEEL	MISSISSAUGA CITY	614695	4828635	Monitoring and Test Hole			3.9624		
7250183			PEEL	MISSISSAUGA CITY	614812	4828702	Monitoring and Test Hole			4.2672		
7250184			PEEL	MISSISSAUGA CITY	614875	4828706	Monitoring and Test Hole			4.2672		
7250185			PEEL	MISSISSAUGA CITY	614747	4828659	Monitoring and Test Hole			3.2004		
7250186			PEEL	MISSISSAUGA CITY	614722	4828792	Monitoring and Test Hole			2.5908		
7250187			PEEL	MISSISSAUGA CITY	614813	4828707	Monitoring and Test Hole			7.3152		
7250188			PEEL	MISSISSAUGA CITY	614821	4828773	Monitoring and Test Hole			7.62		
7250189			PEEL	MISSISSAUGA CITY	614816	4828775	Monitoring and Test Hole			4.2672		
7250190			PEEL	MISSISSAUGA CITY	614778	4828741	Monitoring and Test Hole			3.81		
7250191			PEEL	MISSISSAUGA CITY	614785	4828736	Monitoring and Test Hole			3.9624		
7250217			PEEL	MISSISSAUGA CITY	614678	4828719	Monitoring and Test Hole			7.1628		
7252785			PEEL	MISSISSAUGA CITY	613415	4827974						

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MOECC Well ID	Lot	Conc.	County/ Municipality	Township	Easting	Northing	Well Use	Bedrock/ Overburden	Static Water Level (m)	Total Depth of Well (m)	Depth to Bedrock (m)	Abandonment Record?
7260102			PEEL	MISSISSAUGA CITY	612782	4825110						
7260207			PEEL	MISSISSAUGA CITY	615203	4829081						
7261975			PEEL	MISSISSAUGA CITY	614502	4828779	Monitoring and Test Hole			4.8768		
7261976			PEEL	MISSISSAUGA CITY	614502	4828779	Monitoring and Test Hole			6.096		
7261978			PEEL	MISSISSAUGA CITY	614706	4828999	Monitoring and Test Hole			3.9624		
7262613			YORK	ETOBICOKE BOROUGH	616187	4829223						
7265355			PEEL	MISSISSAUGA CITY (PORT CREDIT)	612167	4825162	Monitoring and Test Hole					Y
7266284			PEEL	MISSISSAUGA CITY	613377	4827891	Test Hole			4.6		
7267051			PEEL	MISSISSAUGA CITY	614807	4828643						
7271811			PEEL	MISSISSAUGA CITY	612938	4826537						
7273266			PEEL	MISSISSAUGA CITY	614709	4828915	Monitoring and Test Hole			3.048		
7273267			PEEL	MISSISSAUGA CITY	614710	4828915	Monitoring and Test Hole			3.048		
7273268			PEEL	MISSISSAUGA CITY	614660	4828859	Monitoring and Test Hole			3.048		
7273269			PEEL	MISSISSAUGA CITY	614581	4828782	Monitoring and Test Hole			3.048		
7273270			PEEL	MISSISSAUGA CITY	614525	4828703	Monitoring and Test Hole			4.2672		
7277549			PEEL	MISSISSAUGA CITY	612594	4825364	Monitoring			3.6		
7277550			PEEL	MISSISSAUGA CITY	612835	4825151	Monitoring			5.2		
7277560			PEEL	MISSISSAUGA CITY	612481	4825465	Monitoring			4.5		
7277561			PEEL	MISSISSAUGA CITY	612188	4825732	Monitoring			3		
7277730			PEEL	MISSISSAUGA CITY	614616	4828805	Monitoring and Test Hole			6.096		
7277731			PEEL	MISSISSAUGA CITY	614630	4828825	Monitoring and Test Hole			3.6576		
7277732			PEEL	MISSISSAUGA CITY	614601	4828831	Monitoring and Test Hole			5.7912		
7277990			PEEL	MISSISSAUGA CITY	613510	4826158						Y
7278350			PEEL	MISSISSAUGA CITY	613368	4826938						
7278354			PEEL	MISSISSAUGA CITY	613353	4827061						
7281874			PEEL	MISSISSAUGA CITY	613135	4827065	Test Hole			6.096		
7281875			PEEL	MISSISSAUGA CITY	613098	4827016	Test Hole			6.096		
7281876			PEEL	MISSISSAUGA CITY	613132	4826989	Test Hole			2.4384		
7281879			PEEL	MISSISSAUGA CITY	613037	4827052	Test Hole			6.096		
7281880			PEEL	MISSISSAUGA CITY	613089	4827289	Test Hole			5.4864		
7281882			PEEL	MISSISSAUGA CITY	613168	4827176	Test Hole			6.096		
7281883			PEEL	MISSISSAUGA CITY	613058	4827164	Test Hole			4.572		
7281909			PEEL	MISSISSAUGA CITY	613086	4827126	Test Hole			6.096		
7284406			PEEL	MISSISSAUGA CITY	613157	4827253	Test Hole					
7285144			PEEL	MISSISSAUGA CITY	615094	4828677						Y
7285145			PEEL	MISSISSAUGA CITY	614718	4829026						Y
7285815			PEEL	MISSISSAUGA CITY	613064	4828070						
7287214			PEEL	MISSISSAUGA CITY	613422	4827021						
7289572			PEEL	MISSISSAUGA CITY	615233	4829166						
7289820			PEEL	MISSISSAUGA CITY	613092	4827000	Test Hole			3.5052		
7289826			PEEL	MISSISSAUGA CITY	613085	4826999	Monitoring			10		
7289827			PEEL	MISSISSAUGA CITY	613115	4826967	Monitoring			3.048		
7289828			PEEL	MISSISSAUGA CITY	613135	4826976				3.048		
7289829			PEEL	MISSISSAUGA CITY	613137	4826993	Monitoring			3.048		
7289830			PEEL	MISSISSAUGA CITY	613111	4827002	Test Hole			3.5052		
7289831			PEEL	MISSISSAUGA CITY	613128	4827000	Test Hole			3.6576		
7291403			PEEL	MISSISSAUGA CITY	615260	4828514						Y
7292224			PEEL	MISSISSAUGA CITY	612846	4827417						
7295871			PEEL	MISSISSAUGA CITY	615207	4829624	Test Hole			4.1148		
7295872			PEEL	MISSISSAUGA CITY	615196	4829611	Test Hole			4.572		
7295873			PEEL	MISSISSAUGA CITY	615143	4829579	Test Hole			4.2672		
7295874			PEEL	MISSISSAUGA CITY	615213	4829563	Test Hole			4.572		
7295875			PEEL	MISSISSAUGA CITY	615254	4829580	Test Hole			11.5824		
7295876			PEEL	MISSISSAUGA CITY	615254	4829578	Test Hole			7.0104		
7295877			PEEL	MISSISSAUGA CITY	615331	4829575	Test Hole			7.3152		
7295878			PEEL	MISSISSAUGA CITY	615312	4829526	Test Hole			5.334		
7295879			PEEL	MISSISSAUGA CITY	615398	4829505	Test Hole			3.048		
7295880			PEEL	MISSISSAUGA CITY	615301	4829485	Test Hole			4.8768		
7295881			PEEL	MISSISSAUGA CITY	615163	4829498	Test Hole			7.9248		

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APPENDIX E:
SUMMARY INFORMATION FOR CONCEPTUAL SITE MODEL

Appendix E - Conceptual Hydrogeological Model Tabulated Summary

SITE ID	STATIC WATER LEVEL (masl)*	PROPOSED PIPE INVERT (masl)	DEPTH BELOW WATER (m)*	STRATIGRAPHY* Elev From (masl)	Elev To (masl)	Thickness (m)	Description	AQUIFER?	GROUNDWATER FLOW† VERTICAL GRADIENT	LATERAL DIRECTION	POTENTIAL FOR CONTAMINATION
01B	97	90.9	6.1	100	96	4	Sunnybrook Drift		Downward**	Toward Creek	Low
				96	91	5	Weathered Bedrock	Potentially			
				91	--	--	Georgian Bay Formation	Potentially			
02A	106.5	91.1	15.4	112.5	109.4	3.1	Sand, Sandy Gravel	Potentially	Downward**	E-NE	Low
				109.4	105.2	4.2	Silt-Sand Till				
				105.2	102.1	3.1	Weathered Bedrock	Potentially			
				102.1	--	--	Shale/ Georgian Bay Fm.	Potentially			
03A	111.2	92.3	18.9	112	110.4	1.6	Sand, Sandy Gravel	Yes	Downward	E	Low
				110.4	109.7	0.7	Clayey Silt Till				
				109.7	109.2	0.5	Sandy Silt Till				
				109.2	104	5.2	Weathered Bedrock	Potentially			
				104	--	--	Georgian Bay Formation	Potentially			
06A	106.8	94.4	12.4	109	107	2	Upper Newmarket Till		Downward	SSE	Low-Moderate
				107	105	2	Thorncliffe Formation	Yes			Potential transport from off-site
				105		thin layer	Sunnybrook Drift				during dewatering.
				105	100	5	Weathered Bedrock	Potentially			
				100	--	--	Georgian Bay Formation	Potentially			
07A	107	94.8	12.2	108	107.5	0.5	Oak Ridges Moraine Sand	Potentially	Downward	SSE	Low
				107.5	107	0.5	Upper Newmarket Till				
				107	102	5	Weathered Bedrock	Potentially			
				102	--	--	Georgian Bay Formation	Potentially			
08B	107	95.1	11.9	106.5		thin layer	Upper Newmarket Till		Downward	SSE	Low
				106	101	5	Weathered Bedrock	Potentially			
				101	--	--	Georgian Bay Formation	Potentially			
09C	105.9	95.5	10.4	108	106.5	1.5	Post-Glacial Deposits		Downward	SSE	Low
				106.5		thin layer	Halton Till				
				106.5	104.5	2	Thorncliffe Formation	Yes			
				104.5	100.5	4	Weathered Bedrock	Potentially			
				100.5	--	--	Georgian Bay Formation	Potentially			
10A	102	96.1	5.9	106.5	105	1.5	Post-Glacial Deposits		Downward	S	Low
				105	104	1	Thorncliffe Formation				
				104	102	2	Sunnybrook Drift				
				102	97	5	Weathered Bedrock	Potentially			
				97	--	--	Georgian Bay Formation	Potentially			

Appendix E - Conceptual Hydrogeological Model Tabulated Summary

SITE ID	STATIC WATER LEVEL (masl)*	PROPOSED PIPE INVERT (masl)	DEPTH BELOW WATER (m)*	STRATIGRAPHY* Elev From (masl)	Elev To (masl)	Thickness (m)	Description	AQUIFER?	GROUNDWATER FLOW† VERTICAL GRADIENT	LATERAL DIRECTION	POTENTIAL FOR CONTAMINATION
11A	101	96.2	4.8	102	100.5	1.5	Sunnybrook Drift		Downward**	Toward Creek	Low
				100.5	95.5	5	Weathered Bedrock	Potentially			
				95.5	--	--	Georgian Bay Formation	Potentially			
12B	102	96.7	5.3	105	103.5	1.5	Post-Glacial Deposits		Downward	SSE	Low
				103.5	99	4.5	Sunnybrook Drift				
				99	94	5	Weathered Bedrock	Potentially			
				94	--	--	Georgian Bay Formation	Potentially			
14B	125	117.5	7.5	130		thin layer	Halton Till		Downward	SE	Low
				128	120	8	Weathered Bedrock	Potentially			
				120	--	--	Georgian Bay Formation	Potentially			
15C	141	120.8	20.2	144	138	6	Halton Till		Downward	E	Moderate
				138	134	4	Weathered Bedrock	Potentially			Evidence of low levels of groundwater
				134	--	--	Georgian Bay Formation	Potentially			contamination on-Site.
17C	135	122.7	12.3	138.5	137	1.5	Post-Glacial Deposits		Downward	S	Low
				137	134	3	Halton Till				Potential transport from off-site
				134	133	1	Oak Ridges Moraine Sand	Yes			during dewatering.
				133	128	5	Weathered Bedrock	Potentially			
				128	--	--	Georgian Bay Formation	Potentially			

*-all measurements approximate, taken from historical reports on-file or from interpreted geological models.
**-groundwater gradient may be upward at greater depths, such as below the level of the adjacent creek.
†-interpreted from contour maps of regional groundwater levels and ground topography.

GM BluePlan Engineering Ltd.
Guelph, Owen Sound, Listowel, Kitchener, London, Hamilton, GTA
650 Woodlawn Rd. W. Block C, Unit 2, Guelph, ON N1K 1B8
www.GMBluePlan.ca