THURBER ENGINEERING LTD.

CHINGUACOUSY ROAD FROM MAYFIELD ROAD TO OLD SCHOOL ROAD
CALEDON GROWTH ROADS
PRELIMINARY HYDROGEOLOGICAL INVESTIGATION REPORT
TOWN OF CALEDON, ON

Report to:

Ainley Group

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File: 29748

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1. INTRODUCTION

Thurber Engineering Ltd. (Thurber) was retained by Ainley Group to carry out a preliminary hydrogeological investigation in support of the Town of Caledon Request for Proposal (RFP) No. 2020-98 for Growth Related Roads including Chinguacousy Road from Mayfield Road to Old School Road in the Town of Caledon, Ontario. The Growth Related Roads program includes repair and rehabilitation of the Town's roads and related infrastructure to accommodate the continued growth in the population of Caledon. The preliminary hydrogeological investigation was conducted to support the preliminary design for a Class Environmental Assessment (EA).

The Study Area of the hydrogeological investigation includes a 500-m radius from the alignment. For the convenience of reporting, the Chinguacousy Road is described as oriented north-south.

The purpose of the investigation was to establish baseline hydrogeological conditions, assess groundwater table conditions, and provide preliminary assessments of water taking permit requirements for potential construction works related to roadway repair and rehabilitation (i.e., culvert replacements and utility improvements). The hydrogeological investigation included the following tasks:

- Conduct a background review within 500 m of the site including the setting, Ministry of the Environment, Conservation and Parks (MECP) well records, and available geological maps.
- Quarterly groundwater measurements in five (5) monitoring wells on Chinguacousy Road,.
- Conduct in-situ hydraulic conductivity testing in two monitoring wells.
- Hydrogeological reporting including a preliminary assessment of water taking permit requirements for potential construction works related to roadway repair and rehabilitation.

It is a condition of this report that Thurber's performance of its professional services is subject to the attached Statement of Limitations and Conditions.

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2. BACKGROUND REVIEW

2.1 Site and Project Description

The Site for this report consists of approximately 3 km of roadway along Chinguacousy Road between Mayfield Road and Old School Road in the Town of Caledon, Ontario as shown on Drawing 29748-1 in Appendix A.

Chinguacousy Road is currently a two-lane roadway, primarily in a rural area. Urban residential developments are located south of Mayfield Road at the south end of the Chinguacousy Road segment. The roadways within the Site limits are asphalt-paved with gravel and/or vegetated shoulders on both sides. Both sides of the roadways are abutted by agricultural fields with farmhouses located adjacent to the road along the entire Site alignment. Road ditches are not discernible in agricultural surroundings.

Surface water appears to be abundant in the area. Within the Site limits, five potential water crossings were identified on Chinguacousy Road, based on a desktop review of satellite imagery. The locations of the potential water crossings are presented on Drawing 29748-2.

2.2 Physiography, Regional Geology and Hydrogeology Settings

The ground surface elevation in the Study Area slopes towards the south in general, from approximate Elevation 265 m to 255 m along Chinguacousy Road.

Multiple surface water features cross the Site alignment from northwest to southeast. The surface water features crossing Chinguacousy Road within the Site limits are branches of the Etobicoke Creek within Etobicoke Creek Watershed, which is under the jurisdiction of the Toronto and Region Conservation Authority (TRCA).

Physiographic Regions of Southern Ontario (Figure 19, L. J. Chapman and D. F. Putnam's 1984 edition of the Physiography of Southern Ontario), Surficial Geology of Southern Ontario (Ontario Geological Survey 2010; Surficial Geology of Southern Ontario; Miscellaneous Release-Data 128-Revised), and a Bedrock Geology map (Ontario Geological Survey 2011; 1:250 000 scale bedrock geology of Ontario; Miscellaneous Release-Data 126-Revision 1.) were reviewed. They indicated that the Study Area is located in the physiographic region of South Slope, which is the southern slope of the interlobate moraine. The Study Area is within the western portion of the south slope that lies north of Peel Plain and is mainly drumlinized. The surficial deposits mainly consist of clay to silt textured till, with occasional modern alluvial deposits at some water crossing locations on Chinguacousy Road. Fine-textured glaciolacustrine deposits are noted at the central

south portion of the Site alignment of Chinguacousy Road. The bedrock underneath the Study Area mainly consists of shale, limestone, dolostone and siltstone of the Queenston Formation.

The physiographic region map and surficial geology map are provided in Appendix B.

2.3 Environmental Setting and Source Water Protection

A review of the Natural Heritage Map provided as derived from the Ministry of Natural Resources and Forestry (MNRF) website indicated that the Study Area contains a number of provincially significant wetlands and woodlands in the vicinity of the Site alignment. The locations of these wetlands and woodlands are shown in the Natural Heritage Map provided in Appendix C. No other natural features were identified within the Study Area.

The MECP mandates the protection of existing and future sources of drinking water under the *Clean Water Act, 2006 (CWA)*. Initiatives undertaken under the CWA include the delineation of wellhead protection areas (WHPAs), significant groundwater recharge areas (SGRAs) and highly vulnerable aquifers (HVAs) as well as the assessment of drinking water quality and quantity threats within Source Protection Regions. A review of the MECP Drinking Water Source Protection Atlas indicated that the Site alignment and the Study Area are not located within any wellhead protection areas, nor within any intake protection zones. Nonetheless, the majority of the Study Area is within an HVA. Under the CTC Source Protection Plan, areas within an HVA may require management of or have limitations on the use of road salt, Dense Non-Aqueous Phase Liquids (DNAPLs), and organic solvents.

The majority of the Study Area is in rural settings with the exception of the area south of Mayfield Road at the south Site limit on Chinguacousy Road. The Site alignment is primarily surrounded by agricultural fields with farmhouses.

2.4 MECP Water Well Records Review and Water Well Status

A search of the MECP well record database for wells in the Study Areas was conducted in November 2021. A total of 109 records were found available for the Study Area surrounding Chinguacousy Road. A copy of the well record table is presented in Appendix D.

Of the records found for Chinguacousy Road, 42 wells were listed for domestic uses, 3 wells for livestock uses, and 2 wells for livestock and domestic uses. The remaining wells were listed for monitoring, test hole, or unknown uses.

The locations and well IDs of the water supply wells (i.e., commercial uses, livestock uses, domestic uses or public supply) are presented on Drawing3 29748-3.

A review of the well records indicated that the Study Area is mainly serviced by domestic water wells. Municipal water supply is likely not available in these areas. Water depths were observed from 1.5 m to 35 m (5 ft to 115 ft) in the vicinity of Chinguacousy Road.

2.5 Existing Water Taking Permits

A search of MECP's Permit to Take Water (PTTW) mapping application in September 2022 indicated that three PTTW permits are registered for construction dewatering sites located approximately 200 m to 300 m south of Mayfield Road and west of Chinguacousy Road. A summary of the PTTW registrations is presented in the following table.

Table 1: Summary of Permit To Take Water (PTTW) Registrations

Permit Number	Permit Holder Name	Purpose	Specific Purpose	Max Litres per Day	Source Type
4678-BAXNPZ	TFP Clockwork Developments Inc.	Dewatering Construction	Construction	931000	Ground Water
4678-BAXNPZ	TFP Clockwork Developments Inc.	Dewatering Construction	Construction	410800	Ground Water
4678-BAXNPZ	TFP Clockwork Developments Inc.	Dewatering Construction	Construction	128250	Ground Water

A search of MECP's Environmental Activity and Sector Registry (EASR) mapping application in September 2022 indicated that there were no water taking registrations within the Study Area.

3. INVESTIGATION PROCEDURES

3.1 Geotechnical Investigation

Thurber conducted geotechnical pavement investigation between July 19 and September 23, 2021, along Chinguacousy Road. A total of 15 boreholes (CR-01 to CR-15) were advanced on Chinguacousy Road. Record of borehole sheets of all boreholes are presented in Appendix E of this report.

A number of monitoring wells were installed in selected boreholes during the geotechnical investigation and the wells were used in the hydrogeological investigation for water level measurements and slug tests. A summary of the well construction details is presented in the following table.

Table 2: Monitoring Well Construction Details

Well ID	Well Diameter (mm)	Screen Depth (m)	Water Level in Open Borehole	Screened Geology and Depths (m)
CR-02	50	1.5 – 4.6	4.1	Silt Till
CR-08	50	1.5 – 4.6	2.1	Clayey Sand (1.5-2.1) Sand with Gravel (2.1-3.1) Clay (3.1-4.5)
CR-11	50	1.5 – 4.6	Dry	Silty Clay to Clayey Silt
CR-12	50	1.5 – 4.6	Dry	Silt Till
CR-13	50	1.5 – 4.6	Dry	Silt Till

3.2 Water Level Monitoring

The groundwater levels were measured manually with a portable water level meter. The depth to the piezometric water surface was documented in meters below ground surface.

The groundwater levels were monitored quarterly for one year. The first round of water level measurement was conducted on October 28, 2021, prior to well development. Additional water level measurements were conducted in selected wells after well development prior to slug tests. The subsequent rounds of water level measurements were conducted on January 26, 2022, April 26, 2022, and August 11, 2022. A summary of all water level measurement results is presented in Section 4.2.

In addition, visual observations of the water crossings were made in April and August 2022, and the surface water elevations were measured where able.

3.3 Single Well Response Tests

Single well response tests (“slug” tests) were carried out in two wells. The slug test results are presented in Section 4.3. The slug test analysis sheet is presented in Appendix F.

The tests were completed using the following method:

- In advance of conducting the slug tests, development was carried out to remove sediment accumulation and restore the function of the well screen and sand pack.
- Once the water level returned to a stabilized level, the static water level was measured and recorded, and a datalogger was inserted into the well below the water level. The datalogger was set to record water levels whenever there was a change detected.
- A physical slug was placed in the well to induce a rapid increase in hydraulic head, or a bailer of water was removed rapidly to induce a decrease in hydraulic head.

- Manual and electronic measurements were recorded until the water level in the well recovered sufficiently. Manual measurements were not able to capture the change in water levels due to the fast recovery observed in the well.

4. TESTING RESULTS AND ANALYSIS

4.1 Subsurface Conditions

Details of the encountered soil stratigraphy are presented on the Record of Borehole sheets included in Appendix E. A general summary of the stratigraphy, based on the conditions encountered in the boreholes, is given in the following paragraphs and on the drawings in Appendix A. However, the factual data presented on the Record of Borehole sheets takes precedence over this summary and must be used for interpretation of the site conditions. It should be recognized and expected that soil conditions will vary between and beyond borehole locations.

A review of the boreholes drilled on Chinguacousy Road indicated that the soils underneath the surficial pavement materials mainly consist of a layer of mixed sand and gravel, occasional peat, and sandy clay or clayey sand. Underneath the mixed soil layer was fine textured clay and/or silt till. The fine-textured till was encountered at various depths ranging from approximately 0.5 m to 2.1 m.

4.2 Water Level Monitoring

A summary of the water levels measured in the relevant monitoring wells is provided in the table below. Groundwater levels that are not under the influence of water taking or dewatering will fluctuate naturally over time, as a function of a number of factors including intensity, duration, and frequency of precipitation events as well as temperatures, which affect precipitation type and timing of snowmelt and accumulation. It is not uncommon for groundwater levels to vary naturally by several metres.

Table 3: Summary of Water Level Measurement Results

Well ID	Date of Measurement	Water Depths (m)
CR-02	2021-10-28	1.6
	2022-01-26	1.5
	2022-04-26	1.3
	2022-08-11	1.9
CR-08	2021-10-28	1.2
	2021-10-29	1.2
	2022-01-26	Well not located
	2022-04-26	Well not located

Well ID	Date of Measurement	Water Depths (m)
	2022-08-11	Well not located
CR-11	2021-10-28	1.6
	2021-11-01	2.3
	2022-01-26	1.5
	2022-04-26	1.2
	2022-08-11	1.7
CR-12	2021-10-28	1.8
	2022-01-26	1.3
	2022-04-26	0.9
	2022-08-11	1.4
CR-13	2021-10-28	1.3
	2022-01-26	1.3
	2022-04-26	1.3
	2022-08-11	1.5

A review of the water levels measurement results indicated that the shallowest water depth was measured at 0.9 m for Chinguacousy Road.

In total, 5 water crossings or potential water crossings were considered. The locations of the water crossings are provided on Figures 29748-2. A summary of the findings of the water crossing observations and measurements is provided in the following table.

Table 4: Summary of Water Crossing Observations

Water Crossing	Date of Observation	Water Conditions	Surface Water Elevation (m)
CR-W-1	2022-04-26	Water present	255.7
	2022-08-11	Dry	-
CR-W-2	2022-04-26	Water present	254.4
	2022-08-11	Water present	256.8
CR-W-3	2022-04-26	Water present	258.1
	2022-08-11	Water present	258.9
CR-W-4	2022-04-26	Water present	260.5
	2022-08-11	Dry	-
CR-W-5	2022-04-26	Water present	262.1
	2022-08-11	Dry	-

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4.3 Hydraulic Conductivity

The slug tests conducted in selected monitoring wells were analyzed using the groundwater software AquiferTest Pro and the hydraulic conductivity estimate was obtained using the Hvorslev method. The slug test analysis sheets are provided in Appendix F. A summary of the slug test results is presented in the following table.

Table 5: Summary of Hydraulic Conductivity Test Results

Well ID	Hydraulic Conductivity (m/s)	Dominant Soil around Saturated Screen Interval
CR-08	1.4E-05	Sand, some gravel to gravelly
CR-11	9.5E-09	Silty clay

5. DEWATERING ASSESSMENT

Groundwater taking for construction dewatering is governed by the Ontario Water Resources Act (OWRA), Environmental Protection Act (EPA) and the Water Taking and Transfer Regulation 387/04, a regulation under the OWRA. If the water taking rate will be greater than 50,000 L/day and less than 400,000 L/day, then EASR registration will be required. If the water taking rate will be greater than 400,000 L/day, then a Category 3 PTTW will be required.

A preliminary assessment of the need for a Category 3 PTTW or registration on the EASR is provided for a number of scenarios that are typical for roadway widening and improvements. These preliminary assessments were conducted based on the water level measurements to date and the hydraulic conductivity tests as reported in previous sections. In such cases, the preliminary assessment results are solely intended to provide an indication of potential permitting requirements. Detailed analysis will be required following detailed design. Depending on the design, additional field investigation may be required. A copy of the preliminary dewatering estimate is provided in Appendix G.

The soils underneath Chinguacousy Road primarily consisted of a layer of sand and gravel fill occasional peat, and sandy clay or clayey sand, overlying fine-textured till. The thickness of the coarse-textured soil varies between approximately 0.5 m and 2 m. The highest groundwater level was measured at 0.9 m bgs. The preliminary dewatering estimates are provided in the following table.

Table 6: Dewatering Estimate – Chinguacousy Rd

Parameter	Scenario 1 Linear Open Cut Trenches	Scenario 2 Culvert Replacement
Assumed Excavation Extent (m)	50 by 3	15 by 3
Assumed Excavation Depth (m)	2	2.5
Assumed Target Drawdown to Create Stable Base (m)	2	2.5
Estimated Peak Dewatering Amount (L/day)	101,000	65,000
Estimated Radius of Influence (ROI) (m)	22	28

According to the preliminary dewatering estimate, any excavations extending beneath approximately 0.9 m will need groundwater control. The dewatering units primarily consist of a layer of approximately 1 m-thick saturated coarse-textured mixed soil that lies above the fine-textured till.

6. DISCUSSION

6.1 Water Taking Permit and Registration

Preliminary dewatering assessments were prepared for hypothetical excavation scenarios that are typical for roadway improvements. The estimated peak dewatering rate and radius of influence for each scenario is presented in the sections above.

Water taking permitting needs must be assessed by contract. If one contract is issued for all work, the water taking needs would be based on the permitting needs for the highest water taking rate for any overlapping zone of influence.

Dewatering rates must be re-assessed following detailed design. It is possible that the need for additional investigation may be required.

Based on the preliminary findings to date, it appears that registration on the EASR may be required, subject to detailed design and analysis. A Water Taking Report and Discharge Report satisfying the EASR requirements would need to be prepared for the Contractor to use in registering on the EASR. It is also possible that the final dewatering estimate may be above 400,000 litres per day, in which case a Category 3 PTTW would be required. The time for MECP review of a Category 3 PTTW application is typically 3 to 5 months.

6.2 Discharge of Groundwater

No groundwater quality samples were collected during the hydrogeological investigation. Groundwater sampling will be required to assess groundwater conditions in the vicinity of proposed groundwater extraction locations.

6.3 Additional Recommendations

A considerable number of water supply wells of various uses were identified in the study area. A well survey is recommended in advance of construction to establish a baseline condition of the water quality and water levels in the water supply wells in the vicinity of the Site alignment. A continuous well monitoring program is also recommended during and after the construction to assess any potential impact to the water supplies raised by the construction works.

7. CLOSURE

We trust that this report provides the information you require at this time. If you have any questions regarding this report, please contact the authors at your earliest convenience.

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STATEMENT OF LIMITATIONS AND CONDITIONS

1. STANDARD OF CARE

This Report has been prepared in accordance with generally accepted engineering or environmental consulting practices in the applicable jurisdiction. No other warranty, expressed or implied, is intended or made.

2. COMPLETE REPORT

All documents, records, data and files, whether electronic or otherwise, generated as part of this assignment are a part of the Report, which is of a summary nature and is not intended to stand alone without reference to the instructions given to Thurber by the Client, communications between Thurber and the Client, and any other reports, proposals or documents prepared by Thurber for the Client relative to the specific site described herein, all of which together constitute the Report.

IN ORDER TO PROPERLY UNDERSTAND THE SUGGESTIONS, RECOMMENDATIONS AND OPINIONS EXPRESSED HEREIN, REFERENCE MUST BE MADE TO THE WHOLE OF THE REPORT. THURBER IS NOT RESPONSIBLE FOR USE BY ANY PARTY OF PORTIONS OF THE REPORT WITHOUT REFERENCE TO THE WHOLE REPORT.

3. BASIS OF REPORT

The Report has been prepared for the specific site, development, design objectives and purposes that were described to Thurber by the Client. The applicability and reliability of any of the findings, recommendations, suggestions, or opinions expressed in the Report, subject to the limitations provided herein, are only valid to the extent that the Report expressly addresses proposed development, design objectives and purposes, and then only to the extent that there has been no material alteration to or variation from any of the said descriptions provided to Thurber, unless Thurber is specifically requested by the Client to review and revise the Report in light of such alteration or variation.

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5. INTERPRETATION OF THE REPORT

a) Nature and Exactness of Soil and Contaminant Description: Classification and identification of soils, rocks, geological units, contaminant materials and quantities have been based on investigations performed in accordance with the standards set out in Paragraph 1. Classification and identification of these factors are judgmental in nature. Comprehensive sampling and testing programs implemented with the appropriate equipment by experienced personnel may fail to locate some conditions. All investigations utilizing the standards of Paragraph 1 will involve an inherent risk that some conditions will not be detected and all documents or records summarizing such investigations will be based on assumptions of what exists between the actual points sampled. Actual conditions may vary significantly between the points investigated and the Client and all other persons making use of such documents or records with our express written consent should be aware of this risk and the Report is delivered subject to the express condition that such risk is accepted by the Client and such other persons. Some conditions are subject to change over time and those making use of the Report should be aware of this possibility and understand that the Report only presents the conditions at the sampled points at the time of sampling. If special concerns exist, or the Client has special considerations or requirements, the Client should disclose them so that additional or special investigations may be undertaken which would not otherwise be within the scope of investigations made for the purposes of the Report.

b) Reliance on Provided Information: The evaluation and conclusions contained in the Report have been prepared on the basis of conditions in evidence at the time of site inspections and on the basis of information provided to Thurber. Thurber has relied in good faith upon representations, information and instructions provided by the Client and others concerning the site. Accordingly, Thurber does not accept responsibility for any deficiency, misstatement or inaccuracy contained in the Report as a result of misstatements, omissions, misrepresentations, or fraudulent acts of the Client or other persons providing information relied on by Thurber. Thurber is entitled to rely on such representations, information and instructions and is not required to carry out investigations to determine the truth or accuracy of such representations, information and instructions.

c) Design Services: The Report may form part of design and construction documents for information purposes even though it may have been issued prior to final design being completed. Thurber should be retained to review final design, project plans and related documents prior to construction to confirm that they are consistent with the intent of the Report. Any differences that may exist between the Report's recommendations and the final design detailed in the contract documents should be reported to Thurber immediately so that Thurber can address potential conflicts.

d) Construction Services: During construction Thurber should be retained to provide field reviews. Field reviews consist of performing sufficient and timely observations of encountered conditions in order to confirm and document that the site conditions do not materially differ from those interpreted conditions considered in the preparation of the report. Adequate field reviews are necessary for Thurber to provide letters of assurance, in accordance with the requirements of many regulatory authorities.

6. RELEASE OF POLLUTANTS OR HAZARDOUS SUBSTANCES

Geotechnical engineering and environmental consulting projects often have the potential to encounter pollutants or hazardous substances and the potential to cause the escape, release or dispersal of those substances. Thurber shall have no liability to the Client under any circumstances, for the escape, release or dispersal of pollutants or hazardous substances, unless such pollutants or hazardous substances have been specifically and accurately identified to Thurber by the Client prior to the commencement of Thurber's professional services.

7. INDEPENDENT JUDGEMENTS OF CLIENT

The information, interpretations and conclusions in the Report are based on Thurber's interpretation of conditions revealed through limited investigation conducted within a defined scope of services. Thurber does not accept responsibility for independent conclusions, interpretations, interpolations and/or decisions of the Client, or others who may come into possession of the Report, or any part thereof, which may be based on information contained in the Report. This restriction of liability includes but is not limited to decisions made to develop, purchase or sell land.

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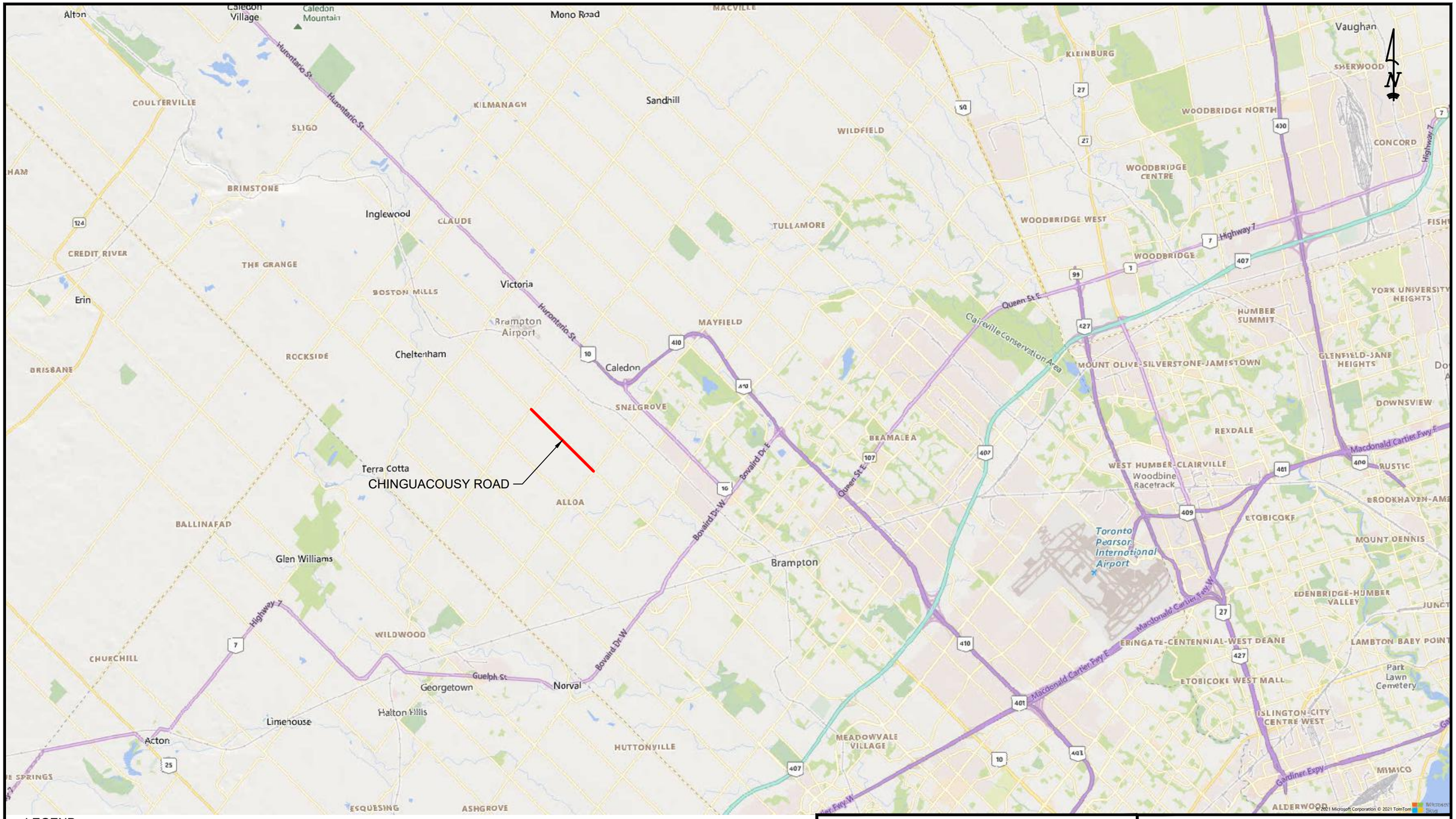
Appendix A

Drawings



LEGEND:

PROJECT ALIGNMENT

AINLEY GROUP

HYDROGEOLOGICAL INVESTIGATION REPORT
CHINGUACOUSY ROAD
TOWN OF CALEDON, ON

SITE LOCATION PLAN

JOB# 29748

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LEGEND:

- PROJECT ALIGNMENT
- POTENTIAL WATER CROSSING LOCATIONS
- BOREHOLE LOCATION

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HYDROGEOLOGICAL INVESTIGATION REPORT
CHINGUACOUSY ROAD
TOWN OF CALEDON, ON

BOREHOLE AND WATER CROSSING LOCATIONS

JOB# 29748

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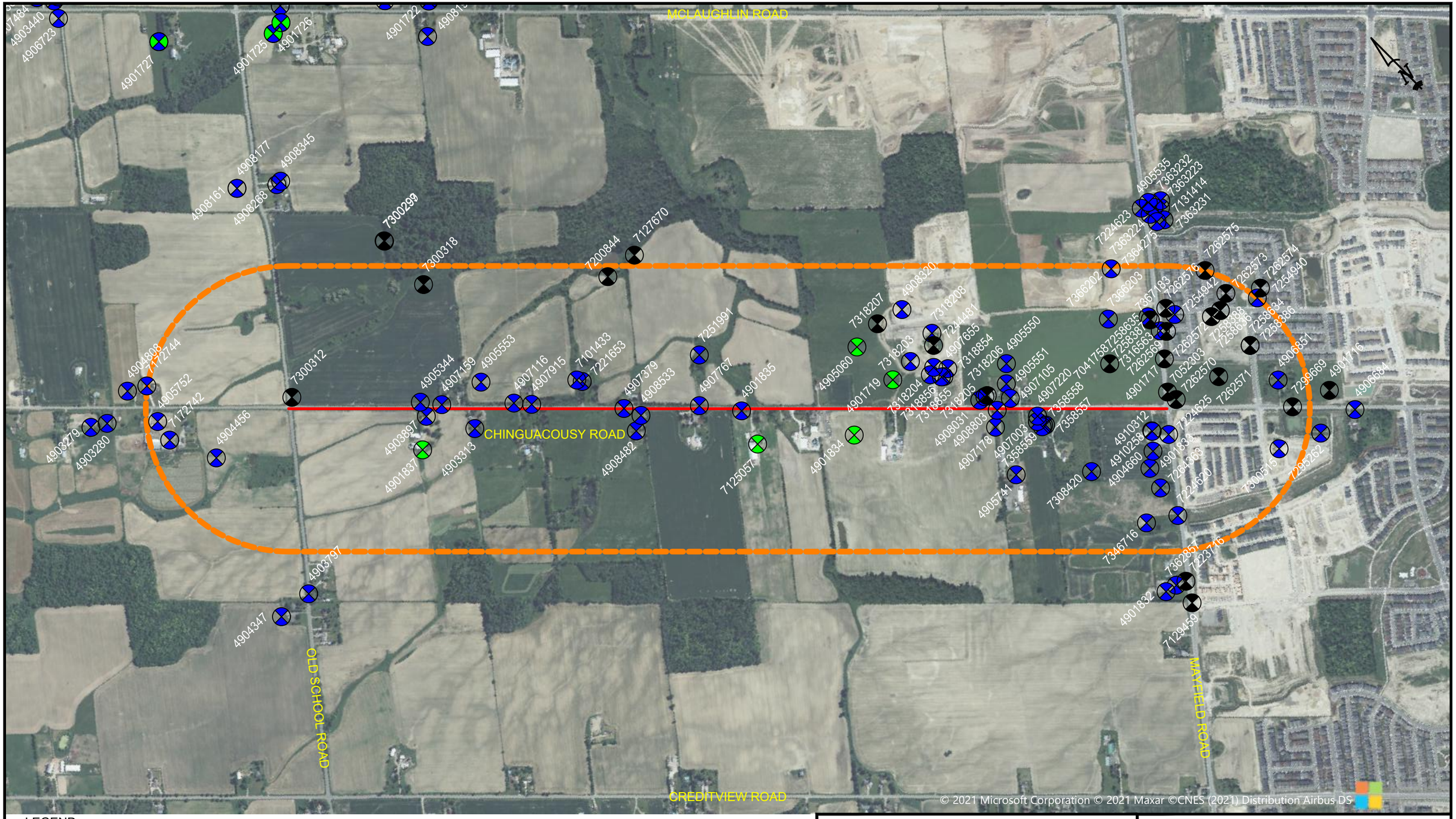

LEGEND:

- PROJECT ALIGNMENT
- STUDY AREA (500m Buffer)
- DOMESTIC WELL
- LIVESTOCK WELL
- OTHER WELL

AINLEY GROUP

HYDROGEOLOGICAL INVESTIGATION REPORT
CHINGUACOUSY ROAD
TOWN OF CALEDON, ON

WATER WELL LOCATIONS

JOB# 29748

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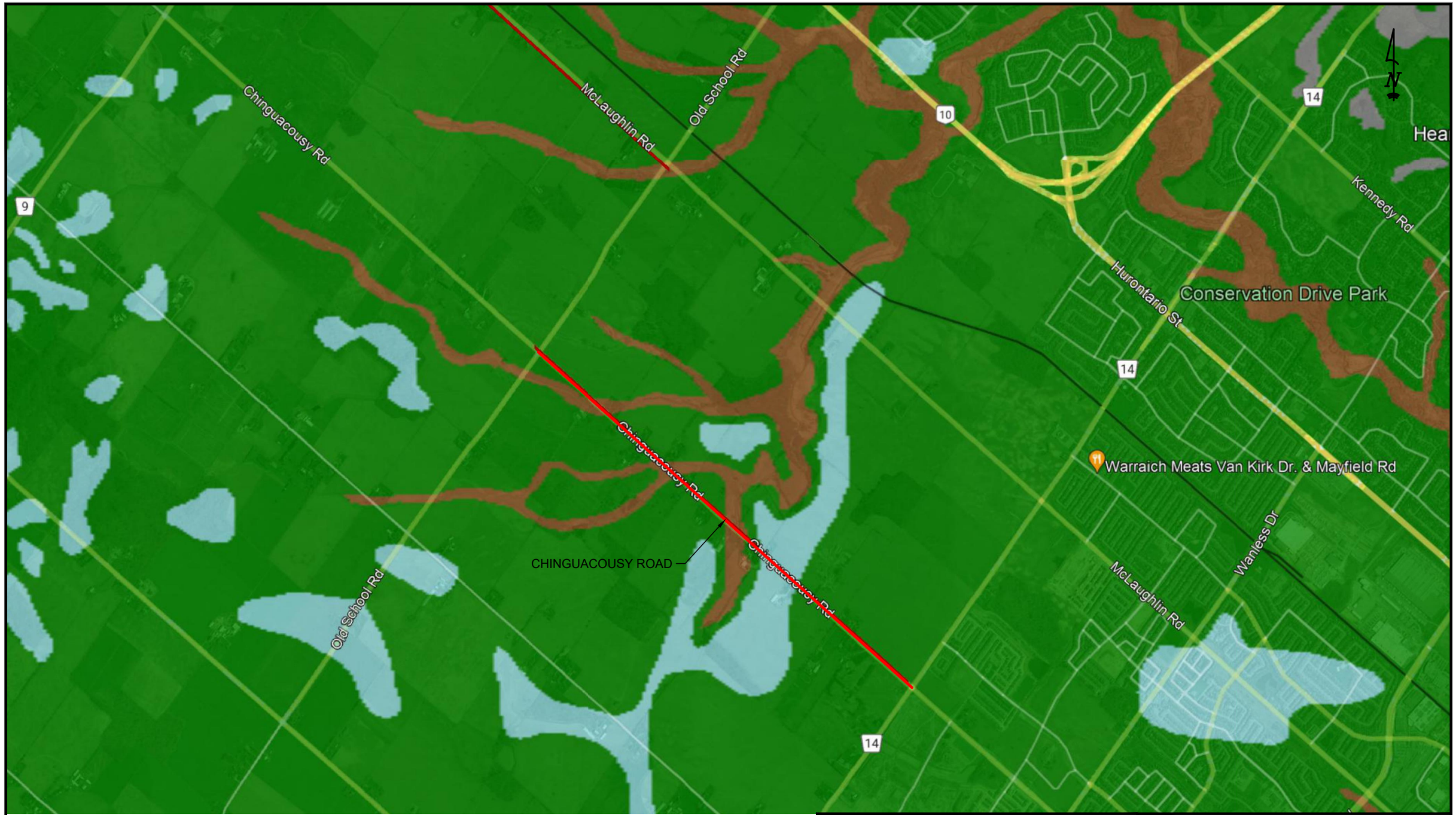
Appendix B

Physiography Map and Surficial Deposits Maps



LEGEND:

- PROJECT ALIGNMENT
- CLAY TO SILT-TEXTURED TILL
- MODERN ALLUVIAL DEPOSITS
- FINE-TEXTURED GLACIOLACUSTRINE DEPOSITS
- COARSE-TEXTURED GLACIOLACUSTRINE DEPOSITS

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HYDROGEOLOGICAL INVESTIGATION REPORT
CHINGUACOUSY ROAD
TOWN OF CALEDON, ON

SURFICIAL DEPOSITS MAP

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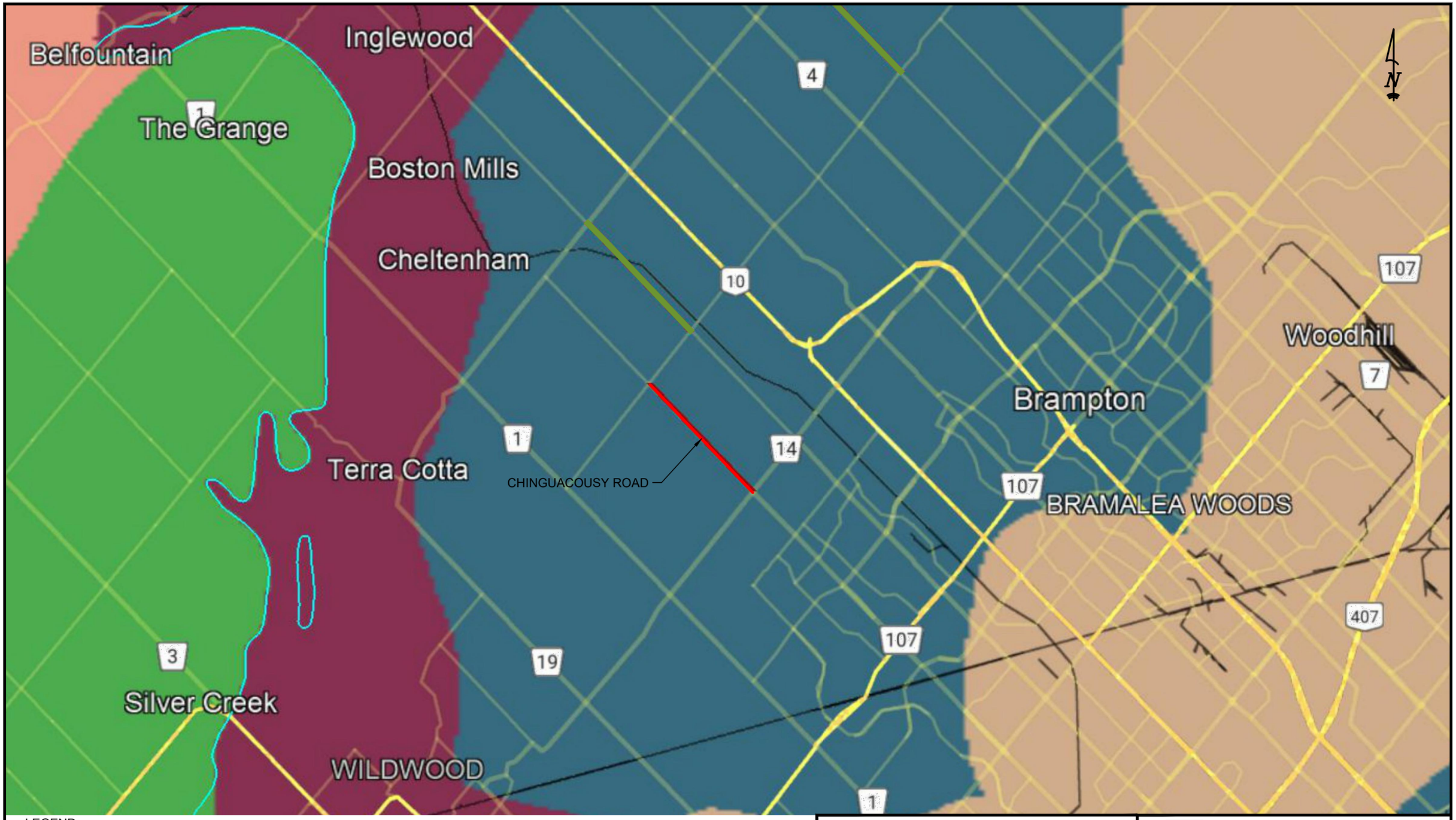

LEGEND:

- PROJECT ALIGNMENT
- HILLSBURGH SANDHILLS
- GUELPH DRUMLIN FIELD
- HORSESHOE MORAINES
- NIAGARA ESCARPMENT
- SOUTH SLOPE
- PEEL PLAIN
- IROQUOIS PLAIN
- OAK RIDGES MORAINE
- SCHOMBERG CLAY PLAINS
- SIMCOE LOWLANDS

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HYDROGEOLOGICAL INVESTIGATION REPORT
CHINGUACOUSY ROAD
TOWN OF CALEDON, ON

PHYSIOGRAPHY MAP

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Appendix C

Natural Heritage Map

Ontario

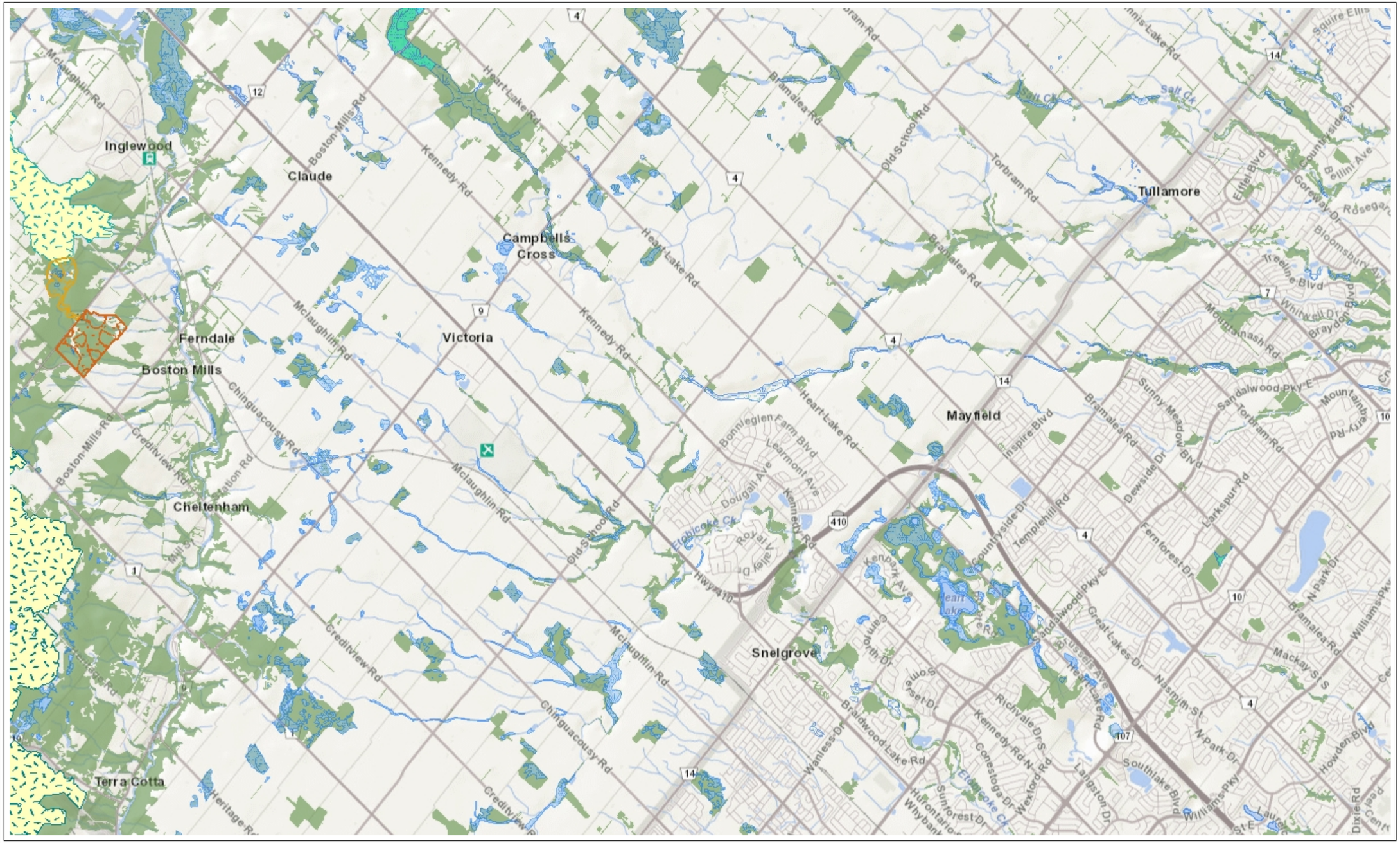
Ministry of Natural Resources and Forestry

Make-a-Map: Natural Heritage Areas

Natural Heritage Map

Map created: 11/24/2021

Notes:



Legend

ANSI

- Earth Science Provincially Significant/sciences de la terre d'importance provinciale
- Earth Science Regionally Significant/sciences de la terre d'importance régionale
- Life Science Provincially Significant/sciences de la vie d'importance provinciale
- Life Science Regionally Significant/sciences de la vie d'importance régionale

Evaluated Wetland

- Provincially Significant/considérée d'importance provinciale
- Non-Provincially Significant/non considérée d'importance provinciale

Unevaluated Wetland

Woodland

Conservation Reserve

Provincial Park

0 2.6 Kilometres

Absence of a feature in the map does not mean they do not exist in this area.

Projection: Web Mercator

THURBER

Appendix D

MECP Well Record Summary

Water Well Records

TOWNSHIP CON LOT	UTM		DATE CNTR	CASING DIA	WATER	PUMP TEST	WELL USE	SCREEN	WELL	FORMATION
BRAMPTON CITY	17 592535	4840221 W	2009-07 6809	2			MT	0030 5	7129459 (M04946) A084304	RED TILL HARD 0009 GREY TILL SOFT 0035
BRAMPTON CITY	17 592994	4840805 W	2007-10 6809	2		///:	MO		7052303 (Z69282) A062223	BRWN SILT TILL HARD 0010 GREY SILT 0020
BRAMPTON CITY (CHING	17 593326	4840877 W	7472						7258636 (Z227532) A192567 A	
BRAMPTON CITY (CHING	17 593387	4841014 W	2016-01 7472	2			MO	0010 10	7262575 (Z230593) A202644	BRWN CLAY LOOS 0010 BRWN SILT CLAY LOOS 0020
BRAMPTON CITY (CHING	17 593481	4840834 W	2016-01 7472	2			MO	0015 10	7262574 (Z230592) A202643	BRWN CLAY LOOS 0010 BRWN SILT CLAY LOOS 0025
BRAMPTON CITY (CHING	17 593382	4840906 W	2016-01 7472	2			MO	0020 10	7262573 (Z230591) A202642	BRWN CLAY LOOS 0010 BRWN SILT CLAY LOOS 0020 BRWN SAND SILT LOOS 0030
BRAMPTON CITY (CHING	17 593289	4840884 W	2016-01 7472	2			MO	0015 10	7262572 (Z230585) A202626	BRWN CLAY LOOS 0010 BRWN SILT CLAY LOOS 0015 BRWN FSND SILT LOOS 0025
BRAMPTON CITY (CHING	17 593159	4840717 W	2016-01 7472	2			MO	0035 10	7262571 (Z230586) A202625	BRWN CLAY LOOS 0010 BRWN SILT CLAY LOOS 0015 BRWN FSND SILT LOOS 0025 BRWN SILT CLAY LOOS 0045
BRAMPTON CITY (CHING	17 593268	4840460 W	2017-11 7360	2			MO	0015 5	7299669 (Z239585) A231615	LOAM 0005 GREY CLAY 0020
BRAMPTON CITY (CHING	17 593141	4840958 W	2016-01 7472	2			MO	0015 10	7262569 (Z230588) A201516	BRWN CLAY LOOS 0010 BRWN SILT CLAY LOOS 0015 BRWN FSND SILT LOOS 0025
BRAMPTON CITY (CHING	17 593314	4840717 W	7472						7258634 (Z227528) A192565 A	
BRAMPTON CITY (CHING	17 593326	4840877 W	2015-11 7472	0.80			MO	0015 10	7258388 (Z227531) A192567	BRWN SILT SAND GRVL 0015 GREY SILT CLAY LOOS 0025
BRAMPTON CITY (CHING	17 593314	4840717 W	2015-10 7472	0.80			MO	0030 10	7258386 (Z227527) A192565	BRWN SILT GRVL LOOS 0015 GREY SILT CLAY LOOS 0025 GREY SAND SILT LOOS 0040
BRAMPTON CITY (CHING	17 593449	4840817 W	2015-09 7523	2.5					7254940 (Z218833) A	
BRAMPTON CITY (CHING	17 592573	4840290 W	2014-02 7215	2			TH	0020 10	7223716 (Z163904) A142390	
BRAMPTON CITY (CHING	17 592997	4840765 W	2016-01 7472	2			MO	0045 10	7262570 (Z230587) A201517	BRWN CLAY LOOS 0010 BRWN SILT CLAY LOOS 0015 BRWN FSND LOOS 0025 BRWN SILT CLAY LOOS 0045 GREY SILT SAND LOOS 0055
BRAMPTON CITY (CHING	17 592610	4841024 W	2020-03 7241						7358557 (Z330419) A115006 P	
BRAMPTON CITY (CHING	17 593410	4841241 W	6946						7363231 (Z334844) A301743 P	
BRAMPTON CITY (CHING	17 593416	4841297 W	6946						7363232 (Z334845) A301742 P	
BRAMPTON CITY (CHING	17 593449	4841297 W	6946						7363223	

Water Well Records

TOWNSHIP CON LOT	UTM		DATE CNTR	CASING DIA	WATER	PUMP TEST	WELL USE	SCREEN	WELL	FORMATION
									(Z334868) A299524 P	
BRAMPTON CITY (CHING	17 593388	4841254 W	6946						7364275 (Z334843) A301741 P	
BRAMPTON CITY (CHING	17 593389	4841289 W	6946						7363224 (Z334866) A294871 P	
BRAMPTON CITY (CHING	17 592604	4841028 W	2020-03 7241						7358558 (Z330417) A115007 P	
BRAMPTON CITY (CHING	17 593131	4840389 W	2017-11 7424						7300515 (Z278302)	
BRAMPTON CITY (CHING	17 592597	4841028 W	2020-03 7241						7358559 (Z330418) A115008 P	
BRAMPTON CITY (CHING 006	17 593416	4840299 W	1987-03 3349	6 6	FR 0069	0/71/8/1:0	DO		4906684 (NA)	BLCK LOAM0002 BRWNCLAY 0025 GREYCLAY0054 RED SHLE 0071
BRAMPTON CITY (CHING HS W 02 017	17 593298	4840562 W	1988-03 4919	30 30	UK 0050	/50//1:0	DO		4906851 (NA)	BRWNLOAMHARD0001BRWNCLAY HARD0020 GREYCLAY HARD 0050 GREY GRVL LOOS 0060
BRAMPTON CITY (CHING HS W 02 017	17 593431	4841280 W	2009-10 4011			1///:			7131414 (Z103953) A	
BRAMPTON CITY (CHING HS W 02 017	17 593414	4841323 W	1978-11 3349	6 6	FR 0044 FR 0080	5/86/10/1:0	DO		4905535 ()	BRWN CLAY STNS 0028 RED SHLE 0086
BRAMPTON CITY (CHING HS W 02 017	17 593203	4840980 W	2015-09 7523	2.5					7254942 (Z218831) A	
BRAMPTON CITY (CHING HS W 02 017	17 593068	4840895 W	1964-01 2801	5			NU		4901717 ()	LOAM 0001 CLAY GRVL BLDR 0020 SILT FSND GRVL 0054 CLAY GRVL 0076 MSND CLAY SILT 0103 RED CLAY MSND 0129 CLAY MSND GRVL 0152 SHLE 0160
BRAMPTON CITY (CHING HS W 02 017	17 593400	4840410 W	1964-01 2801	5			NU		4901716 ()	LOAM 0001 CLAYSILTGRVL 0073RED CLAYGRVL0120 SHLE 0127
BRAMPTON CITY (CHING HS W 03 017	17 593273	4840325 W	2017-08 7147	1.97	UT 0004			0008 10	7295262 (Z255091) A187687 A	
CALEDON TOWN (CALEDO HS W 03 018	17 592598	4841053 W	1988-10 1660		UK 0065	11/18/30/5:0	DO		4907003 (43011)	BRWN CLAY LOOS 0004 GREY CLAY SNDY LOOS 0017 GREY CLAY GRVL LOOS 0037 BRWN SAND GRVL LOOS 0046 GREY CLAY SNDY GRVL 0050 GREY CLAY SLTY LOOS 0058 BRWN CLAY GRVL LOOS 0060 FGVL SAND LOOS 0062 GREY CLAY GRVL LOOS 0063 GREY GRVL LOOS 0065
CALEDON TOWN (CHINGU	17 593127	4840975 W	2018-07 7230						7316563 (C43600) A234706 P	
CALEDON TOWN (CHINGU	17 592715	4840473 W	2013-02 7215					0020 10	7224620 (Z163843) A142407	
CALEDON TOWN (CHINGU	17 593382	4841326 W	2014-02 7215					0022 10	7224623 (Z163846) A142413	
CALEDON TOWN (CHINGU	17 593129	4841027 W	2015-11 7472	0.80			MO	0015 10	7258387 (Z227529) A192566	BRWN SILT SAND GRVL 0015 GREY SILT CLAY LOOS 0025
CALEDON TOWN (CHINGU	17 593129	4841027 W	7472						7258635 (Z227530) A192566 A	
CALEDON TOWN (CHINGU	17 592609	4840795 W	2017-12 7230						7308420 (C41603) A239967 P	
CALEDON TOWN	17 592892	4840697 W	2013-02 7215					0020 10	7224625	

Water Well Records

TOWNSHIP CON LOT	UTM		DATE CNTR	CASING DIA	WATER	PUMP TEST	WELL USE	SCREEN	WELL	FORMATION
(CHINGU									(Z163845) A128843	
CALEDON TOWN (CHINGU 02 018	17 592920	4841018 W	2007-02 3108				NU		7041758 (Z30639) A	
CALEDON TOWN (CHINGU 03 018	17 592859	4840748 W	2006-07 7143						4910312 (Z42473) A038082 A	
CALEDON TOWN (CHINGU HS W 02 018	17 593131	4841040 W	2020-08 7147	1.97	UT 0013	///:		0029 10	7367183 (M8I7FLP4) _NO_TAG A	
CALEDON TOWN (CHINGU HS W 02 018	17 593027	4841132 W	2020-07 7147	1.97		///:		0015 10	7366203 (T2POJXP7) _NO_TAG A	
CALEDON TOWN (CHINGU HS W 02 018	17 592664	4841273 W	1978-07 3637	30 32 21	FR 0063 FR 0074	13/65/8/99:59	DO		4905550 ()	BRWN LOAM 0001 BRWN LMSN HARD 0014 BLUE CLAY SILT SOFT 0040 GREY CLAY STNS HARD 0063 GREY CLAY SILT SAND 0069 GREY CLAY STNS SAND 0079
CALEDON TOWN (CHINGU HS W 02 018	17 592508	4841248 W	1995-05 3132	6 6	FR 0129	24/65/10/4:0	DO		4908031 (159776)	BRWN CLAY STNS DNSE 0005 GREY CLAY STNS DNSE 0014 BLUE CLAY STNS DNSE 0111 RED CLAY STNS DNSE 0118 RED SHLE SOFT 0126 RED SHLE HARD 0136
CALEDON TOWN (CHINGU HS W 02 018	17 592614	4841223 W	1978-07 3637	30	FR 0045 FR 0067	12/29/14/1:0	DO		4905551 ()	BRWNLOAM0001BRWNCLAYHARD0010BLUECLAY SILTSOFT 0045 GREY CLAY SAND LYRD 0067
CALEDON TOWN (CHINGU HS W 02 018	17 593196	4841017 W	2016-01 7472	2			MO	0010 10	7262576 (Z230594) A202645	BRWN CLAY LOOS 0010 BRWN SILT CLAY LOOS 0020
CALEDON TOWN (CHINGU HS W 02 018	17 593158	4841250 W	2020-07 7147	1.97		///:		0019 10	7366202 (V3WG27M2) _NO_TAG A	
CALEDON TOWN (CHINGU HS W 02 019	17 592588	4841177 W	1989-03 4919	30 30	UK 0090	20/40/5/1:0	DO		4907105 (47117)	BRWN CLAY HARD 0001 GREY CLAY HARD 0090 GREY SAND LOOS 0100
CALEDON TOWN (CHINGU HS W 02 019	17 592529	4841244 W	7147	35.4			DO		7318205 (Z271376) A	
CALEDON TOWN (CHINGU HS W 02 019	17 592538	4841241 W	7147	1.97			MO		7318206 (Z271360) A	
CALEDON TOWN (CHINGU HS W 03 018	17 592480	4841142 W	1989-07 4919	30 30	UK 0055	10/20/10/1:0	DO		4907178 (62476)	BRWNLOAMHARD0001BRWNCLAY HARD0020 GREYCLAY HARD 0055 GREY GRVL LOOS 0060
CALEDON TOWN (CHINGU HS W 03 018	17 592414	4840973 W	1980-07 4919	30 30	UK 0060	10/55//0:30	DO		4905741 ()	BRWNLOAMHARD0001BRWNCLAY HARD0020 GREYCLAY HARD 0050 GREY SAND STNS PCKD 0060
CALEDON TOWN (CHINGU HS W 03 018	17 592612	4841066 W	1989-11 1660	6	FR 0120	16/27/10/3:0	DO		4907220 (43828)	BLCK LOAM 0001 BRWN CLAY 0017 GREY CLAY SAND 0042 GREY SAND GRVL 0066 GREY SAND 0087 GREY SAND CLAY 0095 RED SAND GRVL 0106 GREY GRVL CGVL 0120
CALEDON TOWN (CHINGU HS W 03 018	17 592526	4841180 W	2001-05 6300	6 5	FR 0073	41//4/10:0	DO	0074 4	4908803 (219347)	BRWNCLAY0012 BLUE CLAY 0037 BRWNSANDCLAY0051 BLUE CLAY SNDY 0073 BLUE SAND CLN 0079 BLUECLAY 0086
CALEDON TOWN (CHINGU HS W 03 018	17 592740	4840584 W	2016-05 7147	35.4	UT 0005				7264363 (Z228028) A	
CALEDON TOWN (CHINGU HS W 03 018	17 592812	4840694 W	1975-05 2918	5 5	FR 0074 FR 0078	4/15/7/1:0	DO		4904660 ()	PRDG 0017 GREY SAND 0032 BRWN SAND STNS 0063 BLUE SHLE 0080
CALEDON TOWN (CHINGU HS W 03 018	17 592762	4840659 W	1963-12 1325	30	FR 0058	17/55/10/1:0	DO		4901833 ()	BRWN CLAY BLDR 0015 BLUE CLAY 0038 BLUE CLAY BLDR 0055 BLUE CLAY BLDR 0058
CALEDON TOWN (CHINGU HS W 03 018	17 592498	4840313 W	1962-08 1307	30	FR 0050	6//50/:	DO		4901832 ()	BRWN LOAM CLAY 0012 GREY CLAY 0049 GRVL 0050
CALEDON TOWN (CHINGU HS W 03 018	17 592859	4840745 W	2006-06 7143	6	0121	/118/2/3:	DO		4910258 (Z42507) A038077	BRWN CLAY 0014 GREY CLAY STNS 0080 GREY STNS CLAY HARD 0108 RED SHLE 0122
CALEDON TOWN (CHINGU HS W 03 018	17 592539	4840304 W	2020-06 7147	29.9	UT 0013	///:			7362857 (LIJ6XUXL) _NO_TAG A	

Water Well Records

TOWNSHIP CON LOT	UTM		DATE CNTR	CASING DIA	WATER	PUMP TEST	WELL USE	SCREEN	WELL	FORMATION
CALEDON TOWN (CHINGU HS W 03 018	17 592619	4840532 W	2019-10 7147	35.4	UT 0013	///:			7346716 (J6IBYEBN) _NO_TAG A	
CALEDON TOWN (CHINGU	17 590398	4843147 W	2011-08 7143	6 6	UT 0120	15/64/4/24:	DO	0103 20	7172742 (Z128066) A112891	BRWN CLAY STNS 0017 GREY CLAY STNS 0045 RED GRVL CLAY 0048 RED CLAY STNS 0049 GREY CLAY STNS 0097 RED GRVL 0102 RED SHLE 0123
CALEDON TOWN (CHINGU	17 590807	4842952 W	2017-11 7360	2	UT 0010		MO	0015 11	7300312 (Z239554) A231636	BRWN LOAM 0005 GREY SILT SAND 0020
CALEDON TOWN (CHINGU HS W 02 021	17 591161	4842564 W	1989-08 4868	30 30	FR 0032	15/25/5/1:0	DO		4907159 (41641)	BRWN LOAM SOFT 0001 BRWN CLAY 0013 GREY CLAY 0023 GREY SILT SAND SOFT 0025 GREY SAND SOFT 0032 GREY CLAY SLTY SOFT 0035
CALEDON TOWN (CHINGU HS W 02 021	17 591314	4842523 W	1979-09 3637	30 32	FR 0022 FR 0028	7/12/15/30:0	DO		4905553 ()	BRWN CLAY STNS MUCK 0028 BLCK CSND GRVL MSND 0032
CALEDON TOWN (CHINGU HS W 02 022	17 591114	4842623 W	1978-05 4919	30 30	UK 0020	5/20//0:30	DO		4905344 ()	BRWNLOAMHARD0001BRWNCLAY HARD0010 GREYCLAY HARD 0020 GREY SAND SOFT 0025 GREY CLAY HARD 0028
CALEDON TOWN (CHINGU HS W 02 023	17 590414	4843373 W	1975-12 1307	30	FR	15/30/6/1:0	DO		4904808 ()	BRWN LOAM 0012 GREY CLAY 0033 GREY CLAY 0035
CALEDON TOWN (CHINGU HS W 02 023	17 590475	4843338 W	2011-06 7143	6 6	UT 0095	/75/5/3:	DO	0082 16	7172744 (Z128089) A112863	BRWN CLAY STNS 0018 GREY CLAY STNS 0085 RED SHLE SOFT 0098
CALEDON TOWN (CHINGU HS W 03 021	17 591184	4842423 W	1969-08 1307	30	FR 0030	5/20/20/1:0	DO		4903313 ()	BRWN CLAY MSND 0005 GREY CLAY 0028 GREY MSND 0030
CALEDON TOWN (CHINGU HS W 03 021	17 591094	4842573 W	1972-09 1307	30	FR 0035	5/15/50/1:0	DO		4903897 ()	BRWN LOAM 0010 GREY CLAY 0030 SAND 0035
CALEDON TOWN (CHINGU HS W 03 022	17 591002	4842499 W	1966-08 4813	5	FR 0072	3/8/20/3:0	ST DO	0077 4	4901837 ()	BRWN CLAY 0016 BLUE CLAY 0050 SILT 0072 GRVL 0081
CALEDON TOWN (CHINGU HS W 03 022	17 590364	4842423 W	1971-08 3637	30	FR 0025	4/30//:	DO		4903797 ()	BRWN LOAM 0001 BRWN CLAY 0013 GREY CLAY 0025 GREY MSND SILT 0032
CALEDON TOWN (CHINGU HS W 03 023	17 590284	4843343 W	1969-07 4813	5	FR 0110	9/45/10/2:0	DO		4903280 ()	BRWN CLAY 0020 SILT 0055 BLUE CLAY 0095 RED SILT 0104 RED SHLE 0110
CALEDON TOWN (CHINGU HS W 03 023	17 590470	4842988 W	1974-09 5206	7 7	FR 0115	48/130/4/5:0	DO		4904456 ()	BRWNCLAY0027 BLUECLAY0100BLUECLAYSAND0108 RED SHLE 0155
CALEDON TOWN (CHINGU HS W 03 023	17 590414	4843223 W	1980-07 3513	6	FR 0110	30/100/7/2:0	DO		4905752 ()	BRWNCLAY0010BLUECLAY0047GREYSANDGRVLDRTY0056 GREY CLAY 0102 RED SHLE 0125
CALEDON TOWN (CHINGU HS W 03 023	17 590240	4842433 W	1973-08 3637	30 32	FR 0021	12/24/8/1:0	DO		4904347 ()	BRWNLOAM0001 BRWNCLAYSTNS0011GREYCLAYSAND STNS 0021 GREY MSND CSND FSND 0028
CALEDON TOWN (CHINGU HS W 03 024	17 590234	4843373 W	1969-07 4813	5	FR 0108	70/70/10/2:0	DO		4903279 ()	GREY CLAY 0012 SILT 0040 GREY CLAY 0070 SILT 0081 FSND 0092 RED SILT 0104 RED SHLE 0108
BRAMPTON CITY (CHING	17 591422	4843113 W	2017-11 7360	2	UT 0010		MO	0019 10	7300299 (Z239555) A231646	BRWN LOAM 0005 GREY SILT SAND 0020 RED TILL SAND 0029
BRAMPTON CITY (CHING	17 591412	4842907 W	2017-11 7360	2	UT 0005		MO	0015 10	7300318 (Z239556) A231654	BRWN LOAM 0005 GREY SILT SAND 0021 RED TILL SAND 0025
CALEDON TOWN (ALBION CON 02 021	17 591557	4842292 W	2007-01 7143		UK 0080	6/24/10/24:0	DO		7101433 (Z69409) A040889	BLCK LOAM 0002 BRWN CLAY STNS 0013 GREY CLAY 0080 RED CLAY GRVL 0084
CALEDON TOWN (CHINGU HS W 02 020	17 591604	4842105 W	1990-09 3656	6	UK 0075	2/15/15/4:0	DO	0073 5	4907379 (39311)	BLCK LOAM 0001 BRWN SAND SLTY 0010 GREY CLAY SILT 0020 GREY CLAY SILT SAND 0030 GREY CLAY SILT LYRD 0045 GREY SAND SILT 0052 GREY SILT TILL 0060 GREY SILT TILL LYRD 0075 RED GRVL SAND LYRD 0078
CALEDON TOWN (CHINGU HS W 02 021	17 591344	4842390 W	1989-05 4868	30 30	FR 0025	/12/6/1:0	DO		4907116 (41671)	BRWNLOAMLOOS 0001 BRWNCLAYUNKN0011GREYCLAY SILT UNKN 0025 GREY SAND LOOS 0030

Water Well Records

TOWNSHIP CON LOT	UTM		DATE CNTR	CASING DIA	WATER	PUMP TEST	WELL USE	SCREEN	WELL	FORMATION
CALEDON TOWN (CHINGU HS W 02 021	17 591385	4842343 W	1994-10 3132	6 6	FR 0097 FR 0139	8/140//1:0	DO		4907915 (144304)	BRWN CLAY STNS DNSE 0016 BLUE CLAY STNS DNSE 0048 BLUE CLAY SILT SOFT 0052 BLUE CLAY SNDS DNSE 0069 RED SILT SNDS LOOS 0074 BLUE CLAY STNS PCKD 0082 RED SHLE HARD 0155
CALEDON TOWN (CHINGU HS W 02 021	17 591567	4842275 W	2014-05 7147	35.4	0002				7221653 (Z180552) A	
CALEDON TOWN (CHINGU HS W 02 022	17 591422	4843111 W	2017-11 7360	2	UT 0010		MO	0011 5	7300297 (Z239550) A231621	BRWN LOAM 0005 GREY SILT SAND 0016
CALEDON TOWN (CHINGU HS W 03 020	17 591629	4842046 W	1999-09 3132	6 6	FR 0096 FR 0157	1/38/14/42:0	DO		4908533 (194153)	BRWNCLAYSTNSSAND 0010 BLUECLAYSTNSDNSE0086 RED SHLE HARD 0165
CALEDON TOWN (CHINGU	17 592008	4842460 W	2009-02 6607	2.00	UK 0026		MO		7127670 (M04311) A081319	BRWN SAND 0005 BRWN TILL GRVL 0015 GREY CLAY SILT 0020 GREY SILT SAND 0030
CALEDON TOWN (CHINGU HS W 02 019	17 591798	4841926 W	1993-03 4919	30	UK 0020 UK 0040	20/40/10/1:0	DO		4907767 (125587)	BRWNLOAMHARD0001BRWNCLAY HARD0040 GREYCLAY GRVL PCKD0071
CALEDON TOWN (CHINGU HS W 02 020	17 591923	4842052 W	2015-10 7147	35.4	FR 0009				7251991 (Z218368) A	
CALEDON TOWN (CHINGU HS W 02 021	17 591889	4842472 W	2012-05 7143	30			NU		7200844 (Z144265) A127298 A	
CALEDON TOWN (CHINGU HS W 03 020	17 591848	4841687 W	2009-05 7143	6	UK 0050	-2/8/14/8:0	DO ST	0049 4	7125057 (Z91098) A080100	BRWN CLAY GRVL 0013 GREY CLAY STNS 0048 RED GRVL CLAY LYRD 0053
CALEDON TOWN (CHINGU HS W 03 020	17 591579	4842019 W	1999-09 3132	6 6	FR 0080 FR 0162	2/60/8/2:	DO		4908482 (194170)	BRWNCLAYSTNSDNSE0017BLUECLAYSTNSDNSE0034 RED CLAY STNS DNSE 0078 RED SHLE HARD 0165
CALEDON TOWN (CHINGU HS W 03 020	17 591890	4841809 W	1963-04 1325	30	FR 0020	1/20/4/1:0	DO		4901835 ()	BRWNCLAYBLDR0010BLUECLAYBLDR0020BLUEFSND0029
CALEDON TOWN (CHINGU HS W 02 019	17 592342	4841513 W	1962-07 1325	30	FR 0061	45//2/1:0	ST		4901719 ()	BRWNCLAY0015BLUECLAY MSND BLDR0061GRVLBLDR 0063
CALEDON TOWN (CHINGU HS W 03 019	17 592110	4841471 W	1959-11 1325	30	FR 0058	20//1/:	ST		4901834 ()	BRWN CLAY 0012 BLUE CLAY 0045 BLUE CLAY 0058 GRVL 0060
CALEDON TOWN (CHINGU	17 592528	4841498 W	2015-04 6032	1.79			MO	0010 10	7244481 (Z194236) A138167	BRWN FILL PCKD 0005 BRWN CLAY SILT DNSE 0020
CALEDON TOWN (CHINGU HS W 02 019	17 592474	4841443 W	1992-02 4919	30	UK 0080	30/50/10/1:0	DO		4907655 (110914)	BRWNLOAMHARD0001BRWNCLAY HARD0020 GREYCLAY SAND STNS 0100
CALEDON TOWN (CHINGU HS W 02 019	17 592334	4841683 W	1976-12 3637	30 32 24	FR 0028	2/34/14/1:0	ST		4905060 ()	BRWN LOAM 0001 BRWN CLAY STNS PCKD 0011 GREY CLAY STNS PCKD 0015 BLUE CLAY SOFT 0028 GREY SAND 0034 BLUE CLAY 0038
CALEDON TOWN (CHINGU HS W 02 019	17 592431	4841515 W	7147	1.97	UT 0010			0010 10	7318203 (Z271363) A	
CALEDON TOWN (CHINGU HS W 02 019	17 592538	4841665 W	1998-01 6782	6 6	FR 0099	22/56/10/0:0	DO		4908320 (184385)	BLCK LOAM 0002 BRWN CLAY STNS 0016 GREY CLAY CGVL 0060 RED CLAY CGVL 0068 GREY CLAY CGVL 0097 RED CLAY CGVL 0099 RED SHLE 0101
CALEDON TOWN (CHINGU HS W 02 019	17 592448	4841433 W	7147	1.97	UT 0007			0010 10	7318204 (Z271364) A	
CALEDON TOWN (CHINGU HS W 02 019	17 592442	4841690 W	7147	1.97			MO		7318207 (Z271362) A	
CALEDON TOWN (CHINGU HS W 02 019	17 592554	4841532 W	7147	5.90			DO		7318208 (Z271361) A	

Water Well Records

TOWNSHIP CON LOT	UTM		DATE CNTR	CASING DIA	WATER	PUMP TEST	WELL USE	SCREEN	WELL	FORMATION
CALEDON TOWN (CHINGU HS W 02 019	17 592506	4841405 W	7147	35.4	UT 0015				7318854 (Z271368) A	
CALEDON TOWN (CHINGU HS W 02 019	17 592477	4841395 W	7147	35.4	UT 0018				7318855 (Z271369) A	
CALEDON TOWN (CHINGU HS W 02 019	17 592470	4841400 W	7147	35.4 7.86	UT 0011				7318856 (Z271370) A	

TOWNSHIP CON LOT	UTM	DATE CNTR	CASING DIA	WATER	PUMP TEST	WELL USE	SCREEN	WELL	FORMATION

Notes:
UTM: UTM in Zone, Easting, Northing and Datum is NAD83; L: UTM estimated from Centroid of Lot; W: UTM not from Lot Centroid
DATE CNTR: Date Work Completedand Well Contractor Licence Number
CASING DIA: .Casing diameter in inches
WATER: Unit of Depth in Fee. See Table 4 for Meaning of Code

PUMP TEST: Static Water Level in Feet / Water Level After Pumping in Feet / Pump Test Rate in GPM / Pump Test Duration in Hour : Minutes
WELL USE: See Table 3 for Meaning of Code
SCREEN: Screen Depth and Length in feet
WELL: WEL (AUDIT #) Well Tag . A: Abandonment; P: Partial Data Entry Only
FORMATION: See Table 1 and 2 for Meaning of Code

1. Core Material and Descriptive terms

Code	Description	Code	Description	Code	Description	Code	Description	Code	Description
BLDR	BOULDERS	FCRD	FRACTURED	IRFM	IRON FORMATION	PORS	POROUS	SOFT	SOFT
BSLT	BASALT	FGRD	FINE-GRAINED	LIMY	LIMY	PRDG	PREVIOUSLY DUG	SPST	SOAPSTONE
CGRD	COARSE-GRAINED	FGVL	FINE GRAVEL	LMSN	LIMESTONE	PRDR	PREV. DRILLED	STKY	STICKY
CGVL	COARSE GRAVEL	FILL	FILL	LOAM	TOPSOIL	QRTZ	QUARTZITE	STNS	STONES
CHRT	CHERT	FLDS	FELDSPAR	LOOS	LOOSE	QSND	QUICKSAND	STNY	STONEY
CLAY	CLAY	FLNT	FLINT	LTCL	LIGHT-COLOURED	QTZ	QUARTZ	THIK	THICK
CLN	CLEAN	FOSS	FOSILIFEROUS	LYRD	LAYERED	ROCK	ROCK	THIN	THIN
CLYY	CLAYEY	FSND	FINE SAND	MARL	MARL	SAND	SAND	TILL	TILL
CMTD	CEMENTED	GNIS	GNEISS	MGRD	MEDIUM-GRAINED	SHLE	SHALE	UNKN	UNKNOWN TYPE
CONG	CONGLOMERATE	GRNT	GRANITE	MGVL	MEDIUM GRAVEL	SHLY	SHALY	VERY	VERY
CRYS	CRYSTALLINE	GRSN	GREENSTONE	MRBL	MARBLE	SHRP	SHARP	WBRG	WATER-BEARING
CSND	COARSE SAND	GRVL	GRAVEL	MSND	MEDIUM SAND	SHST	SCHIST	WDFR	WOOD FRAGMENTS
DKCL	DARK-COLOURED	GRWK	GREYWACKE	MUCK	MUCK	SILT	SILT	WTHD	WEATHERED
DLMT	DOLOMITE	GVLY	GRAVELLY	OBDN	OVERBURDEN	SLTE	SLATE		
DNSE	DENSE	GYPS	GYPSUM	PCKD	PACKED	SLTY	SILTY		
DRTY	DIRTY	HARD	HARD	PEAT	PEAT	SNDS	SANDSTONE		
DRY	DRY	HPAN	HARDPAN	PGVL	PEA GRAVEL	SNDY	SANDYOAPSTONE		

2. Core Color

Code	Description
WHIT	WHITE
GREY	GREY
BLUE	BLUE
GREN	GREEN
YLLW	YELLOW
BRWN	BROWN
RED	RED
BLCK	BLACK
BLGY	BLUE-GREY

3. Well Use

Code	Description	Code	Description
DO	Domestic	OT	Other
ST	Livestock	TH	Test Hole
IR	Irrigation	DE	Dewatering
IN	Industrial	MO	Monitoring
CO	Commercial	MT	Monitoring TestHole
MN	Municipal		
PS	Public		
AC	Cooling And A/C		
NU	Not Used		

4. Water Detail

Code	Description	Code	Description
FR	Fresh	GS	Gas
SA	Salty	IR	Iron
SU	Sulphur		
MN	Mineral		
UK	Unknown		

THURBER

Appendix E

Record of Borehole Sheets

RECORD OF BOREHOLE CR-01

PROJECT : Town of Caledon Growth Related Roads 2020-98
LOCATION : Chinguacousy Road, Caledon
STARTED : July 19, 2021
COMPLETED : July 19, 2021
N 4 840 793.7 E 592 905.4

Project No. 29748
SHEET 1 OF 1
DATUM Geodetic

DEPTH SCALE (metres)	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	COMMENTS: DYNAMIC CONE PENETRATION RESISTANCE PLOT (20 40 60 80 100)	SHEAR STRENGTH: Cu, KPa (nat V - ✤, rem V - ●, Q - ✖, Cpen ▲) 40 80 120 160 / WATER CONTENT, PERCENT wp w wl 10 20 30 40	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
		GROUND SURFACE									
		ASPHALT: (90mm)		0.09	1	AS		Grain Size Analysis: Gr 16%/Sa 39%/Si 26%/ Cl 19%			
		SAND, silty, some clay, some gravel, brown, moist: (FILL)		0.23	2	AS					
		PEAT, coarse, fibrous		0.50							
1		**CLAY**, silty, sandy, trace gravel, hard, grey, moist									
					1	SS	82				
2		END OF BOREHOLE AT 2.1m		2.10							
3											
4											
5											
6											
7											
8											
9											

GROUNDWATER ELEVATIONS

▽ WATER LEVEL UPON COMPLETION ▼ WATER LEVEL IN WELL/PIEZOMETER

LOGGED : SG
CHECKED : YC

THURBER

THURBER2S TEL-29748.GPJ 12/12/22

RECORD OF BOREHOLE CR-02

PROJECT : Town of Caledon Growth Related Roads 2020-98 — Project No. 29748
LOCATION : Chinguacousy Road, Caledon
STARTED : July 19, 2021 — SHEET 1 OF 1
COMPLETED : July 19, 2021 — N 4 840 925.0 E 592 783.3 — DATUM Geodetic

DEPTH SCALE (metres)	BORING METHOD	DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	BLOWS/0.3m	COMMENTS
		GROUND SURFACE		255.73				
		SAND and **GRAVEL**, some silt, trace clay, brown, moist: (FILL)		0.00	1	AS		
		PEAT, coarse, fibrous		255.43 0.30				
1					2	AS		Grain Size Analysis: Gr 35%/Sa 41%/ Si & Cl 24%
		CLAY, silty, sandy, some gravel, hard brown to grey, moist		254.03 1.70	1	SS	50/ 0.125	Grain Size Analysis: Gr 10%/Sa 24%/ Si 38%/ Cl 28%
2								
3					2	SS		
4								
					3	SS	96/ 0.250	
5				250.63				
		END OF BOREHOLE AT 5.1m. Piezometer installation consists of 50mm diameter Schedule 40 PVC pipe with a 3.05m slotted screen		5.10				
6								
7								
8								
9								

SHEAR STRENGTH: Cu, KPa (nat V - ✚, rem V - ●, Q - ✖, Cpen ▲) 40 80 120 160
DYNAMIC CONE PENETRATION RESISTANCE PLOT 20 40 60 80 100
WATER CONTENT, PERCENT wp w wl 10 20 30 40

ADDITIONAL LAB. TESTING

PIEZOMETER OR STANDPIPE INSTALLATION: Concrete; Bentonite; Filter Sand; Slotted Screen

WATER LEVEL READINGS:

DATE	DEPTH(m)	ELEV.(m)
Oct 28/21	1.59	254.14
Jan 26/22	1.48	254.25
Apr 26/22	1.30	254.43
Aug 11/22	1.90	253.83

GROUNDWATER ELEVATIONS

▽ WATER LEVEL UPON COMPLETION ▼ WATER LEVEL IN WELL/PIEZOMETER

August 11, 2022

LOGGED : SG
CHECKED : YC

THURBER

THURBER2S TEL-29748.GPJ 12/12/22

RECORD OF BOREHOLE CR-03

PROJECT : Town of Caledon Growth Related Roads 2020-98
LOCATION : Chinguacousy Road, Caledon
STARTED : July 19, 2021
COMPLETED : July 19, 2021
N 4 841 108.6 E 592 586.8

Project No. 29748
SHEET 1 OF 1
DATUM Geodetic

DEPTH SCALE (metres)	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	COMMENTS: DYNAMIC CONE PENETRATION RESISTANCE PLOT (20 40 60 80 100)	SHEAR STRENGTH: Cu, KPa (nat V - ✤, rem V - ●, Q - ✖, Cpen ▲) (40 80 120 160) / WATER CONTENT, PERCENT (wp, w, wl) (10 20 30 40)	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
		GROUND SURFACE									
		ASPHALT: (110 mm)									
		SAND, silty, clayey, trace gravel, brown, moist: (FILL)		0.11	1	AS		Grain Size Analysis: Gr 8%/ Sa 41%/ Si 31%/ Cl 20%			
1		**CLAY**, silty, sandy, trace gravel, hard, brown, moist		0.60							
2					1	SS	58 /0.250				
		END OF BOREHOLE AT 2.1m.		2.10							
3											
4											
5											
6											
7											
8											
9											

GROUNDWATER ELEVATIONS

▽ WATER LEVEL UPON COMPLETION ▼ WATER LEVEL IN WELL/PIEZOMETER

LOGGED : SG
CHECKED : YC

THURBER

THURBER2S TEL-29748.GPJ 12/12/22

RECORD OF BOREHOLE CR-04

PROJECT : Town of Caledon Growth Related Roads 2020-98
LOCATION : Chinguacousy Road, Caledon
STARTED : July 19, 2021
COMPLETED : July 19, 2021
N 4 841 355.7 E 592 341.6

Project No. 29748
SHEET 1 OF 1
DATUM Geodetic

DEPTH SCALE (metres)	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	COMMENTS: DYNAMIC CONE PENETRATION RESISTANCE PLOT (20 40 60 80 100)	SHEAR STRENGTH: Cu, KPa (nat V - ✤, rem V - ●, Q - ✖, Cpen ▲; 40 80 120 160) / WATER CONTENT, PERCENT (wp, w, wl; 10 20 30 40)	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
		GROUND SURFACE									
		ASPHALT: (30mm)		0.03							
		SAND, silty, clayey, trace gravel, brown, moist: (FILL)			1	AS					
		CLAY, silty, sandy, trace to some gravel, hard, grey, moist		0.45							
1											
					1	SS	50 /0.100		○		
2		END OF BOREHOLE 2.1m.		2.10							
3											
4											
5											
6											
7											
8											
9											

GROUNDWATER ELEVATIONS

▽ WATER LEVEL UPON COMPLETION ▼ WATER LEVEL IN WELL/PIEZOMETER

LOGGED : SG
CHECKED : YC

THURBER

THURBER2S TEL-29748.GPJ 12/12/22

RECORD OF BOREHOLE CR-05

PROJECT : Town of Caledon Growth Related Roads 2020-98
LOCATION : Chinguacousy Road, Caledon
STARTED : July 19, 2021
COMPLETED : July 19, 2021
N 4 841 467.2 E 592 235.9

Project No. 29748
SHEET 1 OF 1
DATUM Geodetic

DEPTH SCALE (metres)	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	COMMENTS: DYNAMIC CONE PENETRATION RESISTANCE PLOT (20 40 60 80 100)	SHEAR STRENGTH: Cu, KPa (nat V - ✤, rem V - ●, Q - ✖, Cpen ▲; 40 80 120 160) / WATER CONTENT, PERCENT (wp, w, wl; 10 20 30 40)	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
		GROUND SURFACE									
		ASPHALT: (30mm)		0.03							
		SAND, silty, clayey, trace gravel, brown, moist: (FILL)			1	AS					
		CLAY, silty, sandy, trace to some gravel, hard, brown, moist		0.54					○		
1											
					1	SS	50 /0.025				
2		END OF BOREHOLE AT 2.1m.		2.10							
3											
4											
5											
6											
7											
8											
9											

GROUNDWATER ELEVATIONS

▽ WATER LEVEL UPON COMPLETION ▼ WATER LEVEL IN WELL/PIEZOMETER

LOGGED : SG
CHECKED : YC

THURBER

THURBER2S TEL-29748.GPJ 12/12/22

RECORD OF BOREHOLE CR-06

PROJECT : Town of Caledon Growth Related Roads 2020-98
LOCATION : Chinguacousy Road, Caledon
STARTED : July 19, 2021
COMPLETED : July 19, 2021
N 4 841 574.3 E 592 122.4

Project No. 29748
SHEET 1 OF 1
DATUM Geodetic

DEPTH SCALE (metres)	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	COMMENTS: DYNAMIC CONE PENETRATION RESISTANCE PLOT (20 40 60 80 100)	SHEAR STRENGTH: Cu, KPa (nat V - ✤, rem V - ●, Q - ✖, Cpen ▲) 40 80 120 160 / WATER CONTENT, PERCENT wp w wl 10 20 30 40	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
		GROUND SURFACE									
		ASPHALT: (80mm)		0.08	1	AS		Grain Size Analysis: Gr 8%/ Sa 45%/ Si 26%/ Cl 21%			
		SAND, silty, clayey, trace gravel, brown, moist: (FILL)									
		CLAY, silty, sandy, trace to some gravel, very stiff, grey, moist		0.37							
1											
					1	SS	17				
2		END OF BOREHOLE AT 2.1m.		2.10							
3											
4											
5											
6											
7											
8											
9											

GROUNDWATER ELEVATIONS

▽ WATER LEVEL UPON COMPLETION ▼ WATER LEVEL IN WELL/PIEZOMETER

LOGGED : SG
CHECKED : YC

THURBER

THURBER2S TEL-29748.GPJ 12/12/22

RECORD OF BOREHOLE CR-07

PROJECT : Town of Caledon Growth Related Roads 2020-98
LOCATION : Chinguacousy Road, Caledon
STARTED : July 19, 2021
COMPLETED : July 19, 2021
N 4 841 669.4 E 592 024.9

Project No. 29748
SHEET 1 OF 1
DATUM Geodetic

DEPTH SCALE (metres)	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	COMMENTS: DYNAMIC CONE PENETRATION RESISTANCE PLOT (20 40 60 80 100)	SHEAR STRENGTH: Cu, KPa (nat V - ✤, rem V - ●, Q - ✖, Cpen ▲) (40 80 120 160) / WATER CONTENT, PERCENT (wp, w, wl) (10 20 30 40)	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
		GROUND SURFACE									
		ASPHALT: (85mm)		0.09							
		SAND, silty, clayey, trace gravel, brown, moist: (FILL)			1	AS					
		PEAT, coarse, fibrous		0.40							
1					2	AS					
		CLAY, silty, sandy, trace to some gravel, brown to grey, soft		1.50	1	SS	4				
2		END OF BOREHOLE AT 2.1m		2.10							
3											
4											
5											
6											
7											
8											
9											

GROUNDWATER ELEVATIONS

▽ WATER LEVEL UPON COMPLETION ▼ WATER LEVEL IN WELL/PIEZOMETER

LOGGED : SG
CHECKED : YC

THURBER

THURBER2S TEL-29748.GPJ 12/12/22

RECORD OF BOREHOLE CR-08

PROJECT : Town of Caledon Growth Related Roads 2020-98
LOCATION : Chinguacousy Road, Caledon
STARTED : July 19, 2021
COMPLETED : July 19, 2021
N 4 841 773.0 E 591 934.7

Project No. 29748
SHEET 1 OF 1
DATUM Geodetic

DEPTH SCALE (metres)	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	COMMENTS: DYNAMIC CONE PENETRATION RESISTANCE PLOT (20 40 60 80 100)	SHEAR STRENGTH: Cu, KPa (nat V - ✤, rem V - ●, Q - ✖, Cpen ▲) (40 80 120 160) / WATER CONTENT, PERCENT (wp, w, wl) (10 20 30 40)	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
		GROUND SURFACE									
		SAND, gravelly, some silt, some clay, brown, moist: (FILL)		0.00	1	AS					Concrete
1		**CLAY**, silty, sandy, very soft, grey, moist		0.52							Bentonite ▼
					1	SS	0		○		Filter Sand
2		**SAND**, some gravel to gravelly, some clay, some silt, brown, moist		2.10	2	AS					
3		**CLAY**, silty, some sand, very stiff, grey, moist		3.10	2	SS	19				Slotted Screen
4											
					3	SS	22	Grain Size Analysis: Gr 0%/ Sa 11%/ Si 57%/ Cl 32%	○		
5		END OF BOREHOLE AT 5.1m Piezometer installation consists of 50mm diameter Schedule 40 PVC pipe with a 3.05m slotted screen		5.10							
6		WATER LEVEL READINGS: DATE DEPTH(m) ELEV.(m) Oct 28/21 1.16									
7											
8											
9											

GROUNDWATER ELEVATIONS

▽ WATER LEVEL UPON COMPLETION ▼ WATER LEVEL IN WELL/PIEZOMETER
October 28, 2021

LOGGED : SG
CHECKED : YC

THURBER

THURBER2S TEL-29748.GPJ 12/12/22

RECORD OF BOREHOLE CR-09

PROJECT : Town of Caledon Growth Related Roads 2020-98
LOCATION : Chinguacousy Road, Caledon
STARTED : July 19, 2021
COMPLETED : July 19, 2021
N 4 842 603.8 E 591 098.7

Project No. 29748
SHEET 1 OF 1
DATUM Geodetic

DEPTH SCALE (metres)	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	COMMENTS: DYNAMIC CONE PENETRATION RESISTANCE PLOT (20 40 60 80 100)	SHEAR STRENGTH: Cu, KPa (nat V - ✤, rem V - ●, Q - ✖, Cpen ▲; 40 80 120 160) / WATER CONTENT, PERCENT (wp, w, wl; 10 20 30 40)	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
		GROUND SURFACE									
		ASPHALT: (150mm)		0.00							
		SAND, some gravel, some silt, trace clay, brown, moist: (FILL)		0.15	1	AS			○		
1		**CLAY**, silty, sandy, trace gravel, firm, brown, moist		0.60							
2					1	SS	6		○		
		END OF BOREHOLE AT 2.1m		2.10							
3											
4											
5											
6											
7											
8											
9											

GROUNDWATER ELEVATIONS

▽ WATER LEVEL UPON COMPLETION ▼ WATER LEVEL IN WELL/PIEZOMETER

LOGGED : SG
CHECKED : YC

THURBER

THURBER2S TEL-29748.GPJ 12/12/22

RECORD OF BOREHOLE CR-10

PROJECT : Town of Caledon Growth Related Roads 2020-98
LOCATION : Chinguacousy Road, Caledon
STARTED : July 19, 2021
COMPLETED : July 19, 2021
N 4 842 022.6 E 591 669.1

Project No. 29748
SHEET 1 OF 1
DATUM Geodetic

DEPTH SCALE (metres)	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	COMMENTS: DYNAMIC CONE PENETRATION RESISTANCE PLOT (20 40 60 80 100)	SHEAR STRENGTH: Cu, KPa (nat V - ✤, rem V - ●, Q - ✖, Cpen ▲) (40 80 120 160) / WATER CONTENT, PERCENT (wp, w, wl) (10 20 30 40)	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
		GROUND SURFACE									
		ASPHALT: (75mm)		0.08							
		SAND, gravelly, some clay, trace silt, brown, moist: (FILL)			1	AS		Grain Size Analysis: Gr 32%/Sa 53%/ Si 3%/ Cl 12%			
1											
		CLAY, silty, sandy, stiff, brown, moist		1.50	1	SS	10	Grain Size Analysis: Gr 0%/ Sa 22%/ Si 48%/ Cl 30%	w		
2		END OF BOREHOLE AT 2.1m		2.10							
3											
4											
5											
6											
7											
8											
9											

GROUNDWATER ELEVATIONS

▽ WATER LEVEL UPON COMPLETION ▼ WATER LEVEL IN WELL/PIEZOMETER

LOGGED : SG
CHECKED : YC

THURBER

THURBER2S TEL-29748.GPJ 12/12/22

RECORD OF BOREHOLE CR-11

PROJECT : Town of Caledon Growth Related Roads 2020-98 — Project No. 29748

LOCATION :

STARTED : July 19, 2021 — SHEET 1 OF 1

COMPLETED : July 19, 2021 — N 4 842 146.9 E 591 559.0 — DATUM Geodetic

DEPTH SCALE (metres)	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	COMMENTS: DYNAMIC CONE PENETRATION RESISTANCE PLOT (20 40 60 80 100)	SHEAR STRENGTH: Cu, KPa (nat V - ✤, rem V - ●, Q - ✖, Cpen ▲; 40 80 120 160) / WATER CONTENT, PERCENT (wp, w, wl; 10 20 30 40)	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
		GROUND SURFACE		260.29							
		ASPHALT: (150mm)		0.00							Concrete
		SAND, some gravel, trace silt, trace clay, brown, moist: (FILL)		0.15	1	AS					
				259.49							Bentonite
1		**CLAY**, silty, trace to some sand, trace gravel, brown and grey, very stiff to hard, moist		0.80	2	AS					Filter Sand
2					3	AS					
3					1	SS	30				Slotted Screen
4											
					2	SS	18				
5				255.19							
		END OF BOREHOLE AT 5.1m. Piezometer installation consists of 50mm diameter Schedule 40 PVC pipe with a 3.05m slotted screen		5.10							
6		WATER LEVEL READINGS: DATE / DEPTH(m) / ELEV.(m): Oct 28/21 1.60 258.69; Jan 26/22 1.51 258.78; Apr 26/22 1.23 259.06; Aug 11/22 1.67 258.62									
7											
8											
9											

GROUNDWATER ELEVATIONS

▽ WATER LEVEL UPON COMPLETION

▼ WATER LEVEL IN WELL/PIEZOMETER August 11, 2022

LOGGED : SG

CHECKED : YC

THURBER

THURBER2S TEL-29748.GPJ 12/12/22

RECORD OF BOREHOLE CR-12

PROJECT : Town of Caledon Growth Related Roads 2020-98
LOCATION : Chinguacousy Road, Caledon
STARTED : July 19, 2021
COMPLETED : July 19, 2021
N 4 842 379.8 E 591 317.0

Project No. 29748
SHEET 1 OF 1
DATUM Geodetic

DEPTH SCALE (metres)	BORING METHOD	DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	BLOWS/0.3m	COMMENTS	SHEAR STRENGTH: Cu, KPa (nat V - ✤, rem V - ●, Q - ✖, Cpen ▲) 40 80 120 160 / WATER CONTENT, PERCENT wp ○w wl 10 20 30 40	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
		GROUND SURFACE		261.48				DYNAMIC CONE PENETRATION RESISTANCE PLOT 20 40 60 80 100			
		SAND, silty, clayey, trace gravel, brown, moist: (FILL)		0.00	1	AS		Grain Size Analysis: Gr 7%/ Sa 45%/ Si 27%/ Cl 21%			Concrete
1					2	AS					Bentonite
		CLAY, silty, sandy, trace gravel, very stiff to hard, brown, moist		259.88 1.60	1	SS	34	Grain Size Analysis: Gr 2%/ Sa 24%/ Si 41%/ Cl 33%	○		Filter Sand
2											
3					2	SS					Slotted Screen
4											
5					3	SS	17		○		
		END OF BOREHOLE AT 5.1m Piezometer installation consists of 50mm diameter Schedule 40 PVC pipe with a 3.05m slotted screen		256.38 5.10							
6		WATER LEVEL READINGS: DATE DEPTH(m) ELEV.(m) Oct 28/21 1.80 259.68 Jan 26/22 1.33 260.15 Apr 26/22 0.92 260.56 Aug 11/22 1.38 260.10									
7											
8											
9											

GROUNDWATER ELEVATIONS

▽ WATER LEVEL UPON COMPLETION ▼ WATER LEVEL IN WELL/PIEZOMETER
August 11, 2022

LOGGED : SG
CHECKED : YC

THURBER

THURBER2S TEL-29748.GPJ 12/12/22

RECORD OF BOREHOLE CR-13

PROJECT : Town of Caledon Growth Related Roads 2020-98 — Project No. 29748

LOCATION :

STARTED : July 19, 2021 — SHEET 1 OF 1

COMPLETED : July 19, 2021 — N 4 841 891.4 E 591 805.3 — DATUM Geodetic

DEPTH SCALE (metres)	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	COMMENTS: DYNAMIC CONE PENETRATION RESISTANCE PLOT (20 40 60 80 100)	SHEAR STRENGTH: Cu, KPa (nat V - ✤, rem V - ●, Q - ✖, Cpen ▲) 40 80 120 160 / WATER CONTENT, PERCENT wp w wl 10 20 30 40	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
		GROUND SURFACE		264.00							
		SAND, silty, clayey, trace gravel, brown, moist: (FILL)		0.00	1	AS					Concrete
				263.42							
		CLAY, silty, sandy, trace gravel, firm, brown, moist		0.58	2	AS					Bentonite
1											
					1	SS	18				Filter Sand
2											
3					2	SS	27				Slotted Screen
4											
					3	SS	6				
5				258.90							
		END OF BOREHOLE AT 5.1m Piezometer installation consists of 50mm diameter Schedule 40 PVC pipe with a 3.05m slotted screen		5.10							
6		WATER LEVEL READINGS: DATE — DEPTH(m) — ELEV.(m) Oct 28/21 — 1.30 — 262.70 Jan 26/22 — 1.34 — 262.66 Apr 26/22 — 1.34 — 262.66 Aug 11/22 — 1.51 — 262.49									
7											
8											
9											

GROUNDWATER ELEVATIONS

▽ WATER LEVEL UPON COMPLETION

▼ WATER LEVEL IN WELL/PIEZOMETER

August 11, 2022

LOGGED : SG

CHECKED : YC

THURBER

THURBER2S TEL-29748.GPJ 12/12/22

RECORD OF BOREHOLE CR-14

PROJECT : Town of Caledon Growth Related Roads 2020-98
LOCATION : Chinguacousy Road, Caledon
STARTED : July 19, 2021
COMPLETED : July 19, 2021
N 4 842 694.5 E 590 997.3

Project No. 29748
SHEET 1 OF 1
DATUM Geodetic

DEPTH SCALE (metres)	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	COMMENTS: DYNAMIC CONE PENETRATION RESISTANCE PLOT (20 40 60 80 100)	SHEAR STRENGTH: Cu, KPa (nat V - ✤, rem V - ●, Q - ✖, Cpen ▲) (40 80 120 160) / WATER CONTENT, PERCENT (wp, w, wl) (10 20 30 40)	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
		GROUND SURFACE									
		ASPHALT: (30mm)		0.03							
		SAND, silty, some clay, some gravel, grey, moist: (FILL)			1	AS		Grain Size Analysis: Gr 14%/Sa 48%/Si 24%/ Cl 14%			
1		**PEAT**, coarse, fibrous		0.53	2	AS					
		CLAY, silty, sandy, trace gravel, hard, brown, moist		1.50	1	SS	37	Grain Size Analysis: Gr 5%/ Sa 32%/ Si 41%/ Cl 22%			
2		END OF BOREHOLE AT 2.1m		2.10							
3											
4											
5											
6											
7											
8											
9											

GROUNDWATER ELEVATIONS

▽ WATER LEVEL UPON COMPLETION ▼ WATER LEVEL IN WELL/PIEZOMETER

LOGGED : SG
CHECKED : YC

THURBER

THURBER2S TEL-29748.GPJ 12/12/22

RECORD OF BOREHOLE CR-15

PROJECT : Town of Caledon Growth Related Roads 2020-98
LOCATION : Chinguacousy Road, Caledon
STARTED : July 19, 2021
COMPLETED : July 19, 2021
N 4 842 809.8 E 590 884.0

Project No. 29748
SHEET 1 OF 1
DATUM Geodetic

DEPTH SCALE (metres)	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	COMMENTS: DYNAMIC CONE PENETRATION RESISTANCE PLOT (20 40 60 80 100)	SHEAR STRENGTH: Cu, KPa (nat V - ✤, rem V - ●, Q - ✖, Cpen ▲) (40 80 120 160) / WATER CONTENT, PERCENT (wp, w, wl) (10 20 30 40)	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
		GROUND SURFACE									
		ASPHALT: (35mm)		0.04							
		SAND, silty, some clay, some gravel, brown, moist: (FILL)			1	AS					
1		**PEAT**, coarse, fibrous		0.55	2	AS					
		CLAY, silty, sandy, trace gravel, stiff, brown, moist		1.50	1	SS	17	Grain Size Analysis: Gr 3%/ Sa 31%/ Si 32%/ Cl 34%	w ○		
2		END OF BOREHOLE AT 2.1m		2.10							
3											
4											
5											
6											
7											
8											
9											

GROUNDWATER ELEVATIONS

▽ WATER LEVEL UPON COMPLETION ▼ WATER LEVEL IN WELL/PIEZOMETER

LOGGED : SG
CHECKED : YC

THURBER

THURBER2S TEL-29748.GPJ 12/12/22

THURBER

Appendix F

Slug Test Results

THURBER ENGINEERING LTD.

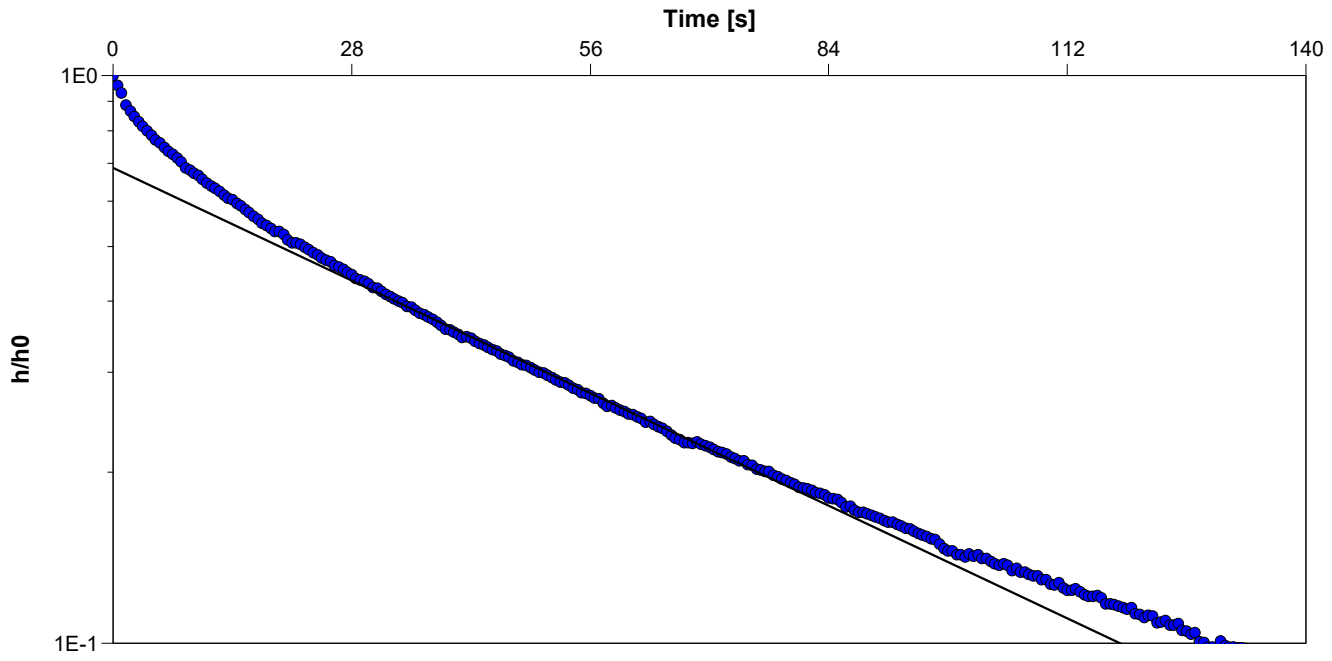
Slug Test Analysis Report

Project: Caledon Growth Related Roads

Number: 29748

Client: Ainley

Location: McLaughlin Road	Slug Test: CR-08	Test Well: CR-08
Test Conducted by: MP		Test Date: 2021-10-29
Analysis Performed by: YC	CR-08 SWRT	Analysis Date: 2021-11-20
Aquifer Thickness:		
Checked by: DH		



Calculation using Hvorslev

Observation Well	Hydraulic Conductivity [m/s]	
CR-08	1.4×10^{-5}	

THURBER ENGINEERING LTD.

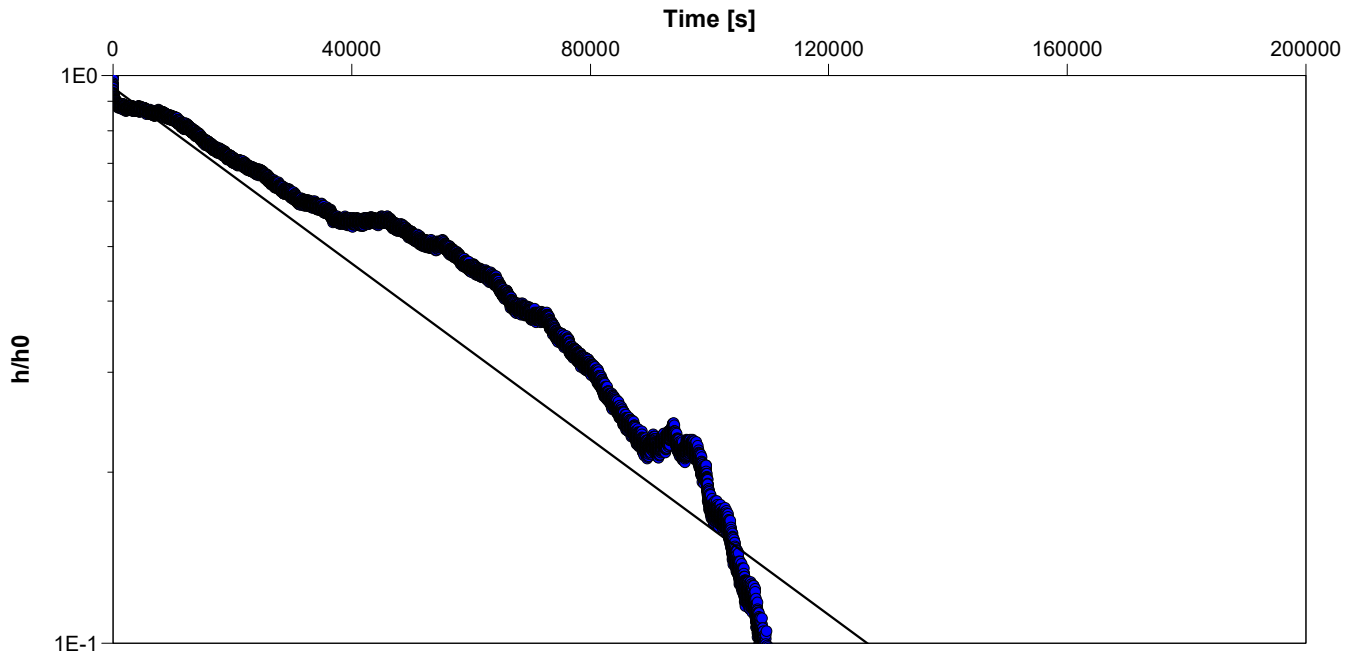
Slug Test Analysis Report

Project: Caledon Growth Related Roads

Number: 29748

Client: Ainley

Location: McLaughlin Road	Slug Test: CR-11	Test Well: CR-11
Test Conducted by:		Test Date: 2021-11-01
Analysis Performed by: YC	CR-11 SWRT	Analysis Date: 2021-11-20
Aquifer Thickness:		
Checked by: DH		



Calculation using Hvorslev

Observation Well	Hydraulic Conductivity [m/s]	
CR-11	9.5×10^{-9}	

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Appendix G

Preliminary Dewatering Estimates

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Dewatering Calculations for Unconfined Scenarios

Parameter	Units	Chinguacousy Open Cut	Chinguacousy Culvert
Geologic Unit to Dewater		Sand and Gravel Fill, Occasional Peat	Sand and Gravel Fill, Occasional Peat
10% diameter (D10)	mm		
Input Hydraulic Conductivity in m/s (K)	m/s	1.4E-05	1.4E-05
Hydraulic Conductivity converted to m/day	m/day	1.2	1.2
Input height of groundwater pressure (H)	m	3	3.5
Input dewatering height (h)	m	1	1
Input length of excavation (x, a)	m	50	15
Input width of excavation (b)	m	3	3
Input/calculate radius of trench (r_w or r_s)	m	1.5	1.5
Length to width ratio	unitless	16.7	5.0
Net water table lowering	m	2.00	2.50
Equation Type		Trench	Trench
Apply reduction for partial aquifer penetration?	yes/no	no	no
Vertical length actively dewatered	m		
Radius of a single extraction well	m		
Radii of Influence			
Sichardt Equation (Ro based on K, H, h)	m	22	28
Ro = Sichardt + (rw or rs)	m	24	30
Calculated Flow Rate			
Base groundwater flow	**L/day**	**31,000**	**21,000**
Partial Penetration Factor	unitless	1.00	1.00
Safety factor on groundwater flow	unitless	3	3
Groundwater flow with safety factor	L/day	93,000	63,000
Rainfall entering excavation	mm	50	50
Duration to remove rainfall	hours	24	24
Flow rate to remove rainfall	L/day	8,000	2,000
Budgeted peak flow rate	**L/day**	**101,000**	**65,000**
=	L/s	1.2	0.8
=	gal/min	15	10

Flow rate estimates rounded to nearest 1,000 L/day.

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Theory and Formulae

Trench flow in unconfined aquifer

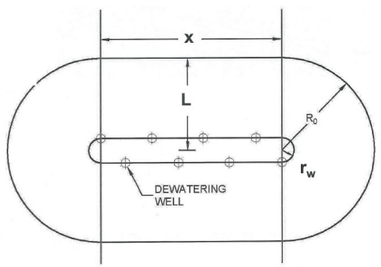
Use this equation when a/b > 1.5.

Equation 4.0

$$Q = \frac{\pi K\left(H^2 - h^2\right)}{\ln R_0 / r_w} + 2\left[\frac{xK\left(H^2 - h^2\right)}{2L}\right]$$

Trench flow in confined Aquifer

$$Q = \frac{2\pi KB(H-h)}{\ln(R_0 / r_s)} + 2\left[\frac{xKB(H-h)}{L}\right]$$



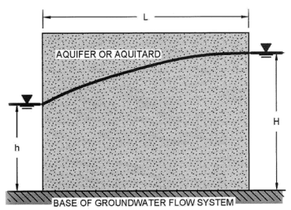


Figure 4.2 (Driscoll, 1986)

Note: L and Ro are the same distance

*Note: H, h measurements are relative to base of active groundwater

rw can be calculated (Eqn 4.1) or input = 1/2 the width of the trench.

For trench eqn estimate better if value is input as 1/2 the width of trench, Rw must be smaller than Ro.

Rs for trench can be distance from centre line of trench to line of dewatering points.

Radial flow to well in unconfined aquifer (Dupuit Equation):

$$Q = \frac{\pi K\left(H^2 - h^2\right)}{\ln R_0 / r_w}$$

Equation 4.1 (Rectangular)

$$r_w = \frac{a+b}{\pi}$$

OR

Equation 4.1 (Circular)

$$r_s = \sqrt{\frac{a \times b}{\pi}}$$

Steady-state flow in confined aquifer

Flow per well — Q = 2.73 K b (H - h)/log(R/r)

Source: Driscoll, Fletcher G. (1986). *Groundwater and Wells* (2nd ed). St. Paul, Minnesota: Johnson Filtration Systems Inc.

Radius of Influece

Ro is determined by the Sichardt Equation:

Ro = 3000(H-hw)K^0.5 when K is in m/s

Alternative equation by Bear (Bear, J., 1979. **Hydraulics of Groundwater**, McGraw-Hill, New York, 569p) $R_0 = 1.5(Tt/S)^{0.5}$ where **T** is transmissivity in **m^2/day**, **t** is pumping duration in **days. R_o** will be in **metres.**

Ro equals sichardt equation plus rw

add rw to Ro calculated from Sichardt's equation

rw as indicated in formulae

Hydraulic Conductivity and Grain Size

K = D10^2 , Hazen, where D10 = grain size diameter for 10% passing (smallest 10%) in mm and K in cm/s

OR

$$K = \left(\frac{\rho g}{\mu}\right)\left[\frac{n^3}{(1-n)^2}\right]\left(\frac{d_{10}^2}{180}\right)$$

Kozeny Carman equation

Image from groundwatersoftware.com

Partial Penetration Factor (F) Kozeny 1933

F = L/b*(1+cos(PI*L/(2b))*sqrt(r/2L))

where:

L = Vertical length from which water is being extracted

r = single well radius

b = saturated aquifer thickness

L/r must be > 30 L/b must be < 0.5

Assumption made that same factor may be applied to equivalent well and trench equations.

Sy to calculate the Radius of Influence of Unconfined aquifer using Bear 1979

The following table shows representative values of specific yield for various geologic materials (from Morris and Johnson 1967):

Material	Specific Yield (%)
Gravel, coarse	21
Gravel, medium	24
Gravel, fine	28
Sand, coarse	30
Sand, medium	32
Sand, fine	33
Silt	20
Clay	6
Sandstone, fine grained	21
Sandstone, medium grained	27
Limestone	14
Dune sand	38
Loess	18
Peat	44
Schist	26
Siltstone	12
Till, predominantly silt	6
Till, predominantly sand	16
Till, predominantly gravel	16
Tuff	21

Ss to calculate the Radius of Influence of Confined aquifer using Bear 1979

The following table provides representative values of specific storage for various geologic materials (Domenico and Mifflin [1965] as reported in Batu [1998]):

Material	S_s (ft^{-1})
Plastic clay	7.8×10^{-4} to 6.2×10^{-3}
Stiff clay	3.9×10^{-4} to 7.8×10^{-4}
Medium hard clay	2.8×10^{-4} to 3.9×10^{-4}
Loose sand	1.5×10^{-4} to 3.1×10^{-4}
Dense sand	3.9×10^{-5} to 6.2×10^{-5}
Dense sandy gravel	1.5×10^{-5} to 3.1×10^{-5}
Rock, fissured	1×10^{-6} to 2.1×10^{-5}
Rock, sound	$< 1\times10^{-6}$

To Convert	Divide By	To Obtain
ft^{-1}	0.3048	m^{-1}

Reference: Powers, J. P., Corwin, A. B., Schmall, Paul C. and Kaeck, W. E. 2007. Construction Dewatering and Groundwater Control: New Methods and Applications, Third Edition, New York, New York: John Wiley & Sons.