HYDROGEOLOGICAL ASSESSMENT

10249 HUNSDEN SIDEROAD

ESTATE RESIDENTIAL DEVELOPMENT

TOWN OF CALEDON
REGION OF PEEL

PREPARED FOR:

CARRINGWOOD HOMES

PREPARED BY:

C.F. CROZIER & ASSOCIATES INC.
2800 HIGH POINT DRIVE, SUITE 100
MILTON, ON L9T 6P4

JUNE 2022

CFCA FILE NO. 0952-6305

CROZIER
CONSULTING ENGINEERS

Revision Number	Date	Comments
Rev. 0	June 2022	Issued for First Submission (ZBA)

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1.0 Introduction

C.F. Crozier & Associates Inc. (Crozier) was retained by Carringwood Homes (Owner) to prepare a Hydrogeological Assessment in support of the Zoning By-Law Amendment Application (ZBA) for the estate residential development located at 10249 Hunsden Sideroad (the site) in the Town of Caledon, Region of Peel. This report has been prepared in accordance with the Hydrogeological Assessment Submissions, Conservation Authority, and Guidelines for Development Applications to characterize the local hydrogeological regime and determine the seasonally high groundwater elevations at the site.

1.1 Background Information

The following background studies and reports have been reviewed in preparation of this investigation:

- Source Protection Information Atlas, Ministry of Environment, Conservation and Parks, accessed June 2022
- The Physiography of Southern Ontario (Chapman and Putnam, 1984)
- The Ontario Geologic Survey (OGS) database, accessed June 2022
- Well Record Database, Ministry of Environment, Conservation and Parks, accessed June 2022
- Innisfil Creek Subwatershed Plan prepared by Nottawasaga Valley Conservation Authority (NVCA, 2006)
- NVCA Provincial Groundwater Monitoring Network Groundwater Quality Overview, 2002-2013 prepared by Nottawasaga Valley Conservation Authority (NVCA, 2013)
- NVCA Groundwater Monitoring Network Review and Assessment prepared by Nottawasaga Valley Conservation Authority (NVCA, 2019)

1.2 Site Description

The site is located at 10249 Hunsden Sideroad in the Town of Caledon, Region of Peel. The total property covers an area of approximately 21.60 ha consisting of a vacant grassed lot, forested area, and an existing detached residential dwelling. The site, currently zoned as Rural in the Town of Caledon, is bounded by Hunsden Sideroad to the north, a natural heritage woodlot to the south, agricultural lands to the east, and detached residential dwellings to the west (Figure 1).

According to the Draft Plan of Subdivision prepared by Glen Schnarr & Associates Inc. dated September 16, 2021, the key elements envisioned for this development include:

- Nineteen (19) single detached residential lots with associated on-site sewage systems (8.14 ha).
- Designated Natural Heritage System Lands and a 20.0 m Natural Heritage System buffer (11.97 ha).
- An internal 7.0 m municipal roadway with access to Hunsden Sideroad and the proposed residential development (Stinson Street) located west of the site (1.04 ha).

- Site access from Hunsden Sideroad and Stinson Street.

The existing residential dwelling located at 10249 Hunsden Sideroad is to remain unchanged.

2.0 Source Protection

Upon review of the Ministry of Environment, Conservation and Parks (MECP), Source Protection Information Atlas, the site is located within the Nottawasaga Valley Source Protection Area and is governed by the policies and procedures outlined in the South Georgian Bay Lake Simcoe Source Protection Plan as per Section 31 of the Clean Water Act.

Source Protection mapping indicates that there are no Wellhead Protection Areas, Intake Protection Zones, or Issue Contributing Areas located within the subject area. The site is located within a Significant Groundwater Recharge Area with a vulnerability index score that ranges from 4 – 6 and a Highly Vulnerable Aquifer with a vulnerability index score of 6. There are no significant threats associated with a Significant Groundwater Recharge Area or Highly Vulnerable Aquifer and thus, there are no legally binding Source Protection Policies that exist under Section 31 of the Clean Water Act for the site.

Although no significant drinking water threats are identified, best management practices should be applied when undertaking the following activities to prevent future threats to drinking water in the area:

- The handling and storage of a dense non-aqueous phase liquid and/or fuel during construction.
- The handling, storage, and application of an organic solvent, road salt, and/or pesticide to land, if applicable.
- The storage of snow.

The required use of best management practices is at the discretion of the municipality's Risk Management Official who will provide comments on the application.

3.0 Environmental Setting

3.1 Physiography, Drainage, & Topography

The site is in the physiographic region known as the Oak Ridges Moraine, which extends from the Niagara Escarpment in the west to the Trent River in the East (Chapman and Putnam, 1984) (Figure 2).

The Oak Ridges Moraine is bounded by the South Slope in the south and covers an area of approximately 1295 km^2. Chapman and Putnam (1984) describe this physiographic region as a hilly terrain that predominantly consists of sand and gravel soils. The site is located on both the Kame Moraines and the Till Moraines, and near the site, rough, hummocky relief is noted (Chapman and Putnam, 1984).

Most of the drainage on the site is toward the northeastern corner of the property which has the lowest elevation of approximately 285 m above sea level (masl). Meanwhile, the highest elevation is found in the southeast corner of the site at 305 masl. The surface drainage is interpreted to follow the topography the site, ultimately draining in the northerly direction.

The site is located within the Innisfil Creek Subwatershed of the regional Nottawasaga Valley Conservation Authority Watershed (NVCA, 2006). A tributary of Beeton Creek runs through the northern corner of the property, which flows northwest toward Beeton Creek. There are no reported wetlands on the site.

3.2 Geology

According to Ontario Geological Survey (OGS) Mapping, the site is located on the Georgian Bay Formation (Figure 3), which mainly consists of grey shale with thin interbeds of crystalline limestone, overlain by thick glacial tills, gravel, sand, and clay (Hewitt, 1972).

Regional geologic mapping indicates that the surficial geology in the area is predominantly comprised of ice contact stratified deposits of sand and gravel, minor silt, clay and till, as seen in Figure 4.

Soil Engineers Ltd. (Soil Eng.) supervised the drilling and installation of six (6) monitoring wells at the site in March of 2022. A summary of the materials encountered is listed below and shown in the attached borehole logs (Appendix A) (Soil Eng., 2022):

- Brown, loose topsoil extending to depths of 0.30 m below ground surface (mbgs).
- Brown, compact sand with some silt extending to depths ranging from 0.15 mbgs to 7.1 mbgs.
- Brown, dense silt with some sand extending to depths ranging from 0.18 mbgs to 9.6 mbgs.

The materials encountered during the monitoring well construction is consistent with surficial mapping.

4.0 Hydrogeology

4.1 Ministry of Environment, Conservation and Parks (MECP) Well Records

A review of the Ministry of Environment, Conservation and Parks Well Records Database identified a total of forty-four (44) wells within 500 m of the site, as shown on Figure 5. A summary table of the well records is included in Appendix B.

In general, the well records can be summarized as follows:

- Of the forty-four (44) well records identified, thirty (30) wells are domestic supply wells, three (3) are monitoring wells, and eight (8) wells have been abandoned. The remaining three (3) wells do not have a specified use identified.
- Thirty-one (31) wells are screened within the overburden aquifer and the remaining thirteen (13) wells are unidentified.
- The wells in the area have an average static water level of 17.4 m and an average depth of 32.6 m.
- The well records in the area indicate the surficial material of the study area is primarily brown silty clay covering grey silty clay.

4.2 Groundwater Properties

A review of available groundwater reports and studies indicates that regional groundwater flow in the Nottawasaga Valley Conservation Authority Watershed is toward the Nottawasaga River and its tributaries, or toward Georgian Bay. Shallow groundwater flow may also correspond to local surface drainage. Therefore, the direction of shallow groundwater flow at the site is interpreted to be north toward the tributary of Beeton Creek, located in the northeastern corner of the site.

The Nottawasaga Valley Conservation Authority Provincial Groundwater Monitoring Network Groundwater Quality Overview Report (2002-2013) issued by the Nottawasaga Valley Conservation Authority identifies parameters and pathogens of concern along with the corresponding municipal wells at which exceedances have previously occurred. The report indicates that several wells exceed the guideline of 20 mg/L for a salt-restrictive diet, but they do not exceed the aesthetic objective as per the Ontario Drinking Water Quality Standards. It is noted that the increasing trend of sodium levels in W244-2 is due to local land use of a public works yard containing a salt storage dome located within 250 m from the well (NVCA, 2013).

The Nottawasaga Valley Conservation Authority notes that the exceedances of the aesthetic objective per the Ontario Drinking Water Quality Standards for aluminum, iron, and manganese in several wells are reflective of natural background levels.

4.3 Aquifer Properties

The hydrostratigraphic framework of the Nottawasaga Valley Conservation Authority Watershed has been outlined by the Nottawasaga Valley Conservation Authority in the Nottawasaga Valley Conservation Authority Groundwater Monitoring Network Review and Assessment (2019). Table 1 summarizes the hydrostratigraphy of the site and surrounding area.

Table 1: Summary of Regional Hydrostratigraphy in the Nottawasaga Valley Conservation Authority Watershed (NVCA, 2019)

Layer	Name	Function	Material	Thickness
A1	Oak Ridges Moraine	Unconfined shallow aquifer	Coarse-grained glacial and interglacial sediments (contact stratified drift)	10 - 50 m
A2	Upper Thorncliffe Formation	Confined aquifer: private water / small municipal water supply	Surficial ice-contact sand deposits	25 - 100 m
A3	Lower Thorncliffe Formation	Confined aquifer: supply source for several municipalities	Medium-coarse sand with gravel and silty layers	40 - 50 m
A4[1]	Tunnel channels and Laurentian Channel	Aquifer: Deepest municipal water supply wells	Fine-medium sand with minor gravel areas; medium-coarse sand with gravel	3 - 30 m

1. Aquifer not continuous throughout watershed.

The Regional A1 Aquifer Unit is a shallow aquifer overlays three (3) thicker aquifer units (A2, A3, and A4) that act as water supply for both the private and municipal levels. The deep Regional A3 Aquifer Unit is the major supply source for many municipal wells in the area, followed by the Regional A1 Aquifer Unit and the Regional A2 Aquifer Unit.

5.0 Field Work

5.1 Monitoring Well Construction

Soil Eng. and Crozier supervised the drilling and installation of six (6) monitoring wells at the site on March 9 and 10, 2022. The locations of the monitoring wells are presented in Figure 6. The monitoring wells were installed to establish subsurface and groundwater conditions for use in preliminary engineering design. Table 2 below provides a summary of the construction details of each well.

Table 2: 2022 Monitoring Well Details (Soil Eng., 2022)

Monitoring Well	Total Depth (m)	Screened Interval (m)	Screened Material
MW1	9.1	6.1 – 9.1	Brown, dense, sandy silt with trace gravel and brown, compact silty sand.
MW2	6.1	3.1 – 6.1	Brown, dense, sandy silt with trace gravel.
MW3	7.6	4.6 – 7.6	Brown, dense, sandy silt with trace gravel.
MW4	6.1	3.1 – 6.1	Brown, dense, sandy silt and brown, dense, fine sand with some silt.
MW5	6.1	3.1 – 6.1	Brown, dense, sandy silt with trace clay layers.
MW6	6.1	3.1 – 6.1	Brown, very dense, fine grained, silty sand with trace clay.

All constructed monitoring wells were installed with a 50 mm (2-in) diameter and 3.0 m polyvinyl chloride #10 slot screen. Soil Eng. noted that all monitoring wells were dry upon completion of drilling.

5.2 Groundwater Monitoring

At the time of preparation of this report, one (1) round of groundwater monitoring has been completed by Crozier since the monitoring well installation. Manual measurements were collected using an electronic water meter. If required, additional data can be provided upon request.

Groundwater monitoring results are presented in Section 5.3.

5.3 Groundwater Monitoring Results

One (1) manual water level measurement was collected on April 6, 2022 and is presented in Table 3 below. Note that water levels are presented as meters below ground surface (mbgs) and meters above see level (masl).

Table 3: Groundwater Level Measurements

Monitoring Well	Elevation (masl)[1]	*April 6, 2022*	
		Water Level (mbgs)	Groundwater Elevation (masl)
MW1	296.0	DRY	DRY
MW2	295.9	DRY	DRY
MW3	298.2	DRY	DRY
MW4	293.2	5.85	287.35
MW5	301.5	DRY	DRY
MW6	294.4	DRY	DRY

1. Reported by Soil Eng. (April 2022).

As illustrated in Table 3, only one (1) well (BH-04) contained water inside when measured by Crozier staff, and the remaining five (5) wells were dry. According to borehole logs provided by Soil Eng., water is being held in the sand layer that was only encountered in MW4. As this sand layer was not encountered anywhere else on site, this sand unit is interpreted to be limited in extent and localized to the area immediately surrounding MW4. Crozier considers this to be a perched aquifer system that, once exposed and dewatered, would not be recharged by groundwater below or surface water inputs via infiltration. Seasonally high groundwater elevations at the site are anticipated to be 287.35 masl and lower, considering that the groundwater elevation at MW4 is anomalous.

As seen in the Ministry of Environment, Conservation and Parks well records summary (Appendix B), the static water level averages 17.4 m in the surrounding area. It is expected that the wells on the site are dry, as they are only drilled to a maximum of 9.1 mbgs.

6.0 Conclusions and Recommendations

Based on the findings above, Crozier is prepared to make the following conclusions:

- The site is characterized by silty sand and sandy silt with trace gravel and clay as identified by geological mapping, Ministry of Environment, Conservation and Parks well records, and attached borehole logs.
- A well records search identified forty-four (44) wells within 500 m of the study area. The wells are mainly used for domestic supply and there have been no reported concerns of water quality or quantity.
- Locally, the shallow groundwater flow is interpreted to flow in the northerly direction towards a tributary of Beeton Creek and ultimately flowing into the Nottawasaga River and Georgian Bay.
- Seasonally high groundwater elevations across the site are anticipated to range from 287.35 masl and below. The identified soils at the site are conducive to infiltration and Crozier does not anticipate any impacts to the groundwater aquifer from the proposed development.

Respectfully submitted,

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BP/cj

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APPENDIX A

Borehole Logs (Soil Eng., 2022)

LIST OF ABBREVIATIONS AND DESCRIPTION OF TERMS

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

SAMPLE TYPES

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

PENETRATION RESISTANCE

Dynamic Cone Penetration Resistance:

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

Plotted as '—●—'

Standard Penetration Resistance or 'N' Value:

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

Plotted as '○'

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

SOIL DESCRIPTION

Cohesionless Soils:

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

Cohesive Soils:

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

Method of Determination of Undrained Shear Strength of Cohesive Soils:

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

△ Laboratory vane test

□ Compression test in laboratory

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

METRIC CONVERSION FACTORS

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

JOB NO.: 2202-S079

LOG OF BOREHOLE NO.: 1

FIGURE NO.: 1

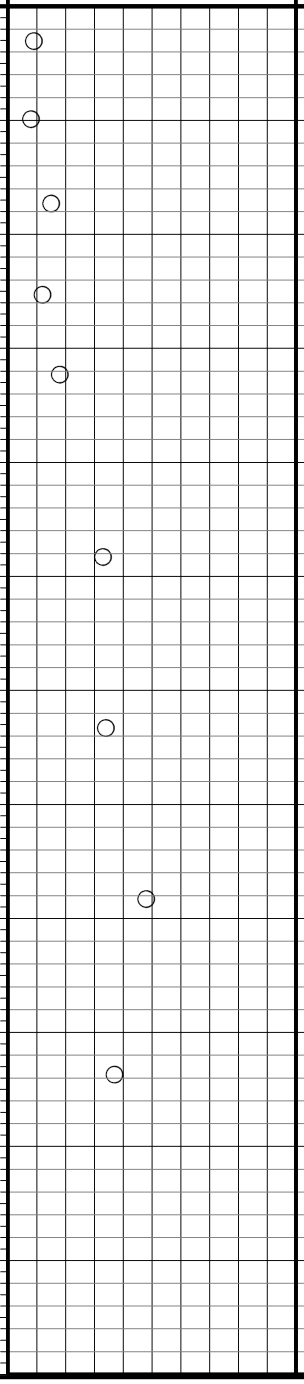
PROJECT DESCRIPTION: Proposed Residential Development

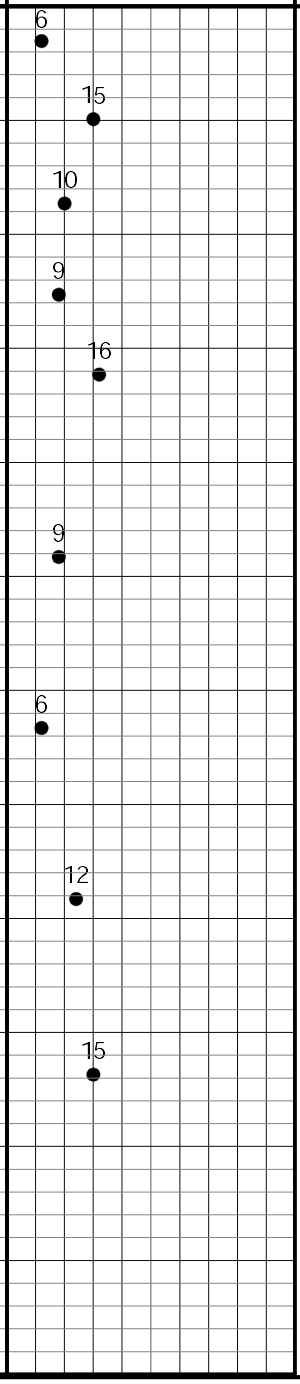
METHOD OF BORING: Flight-Auger

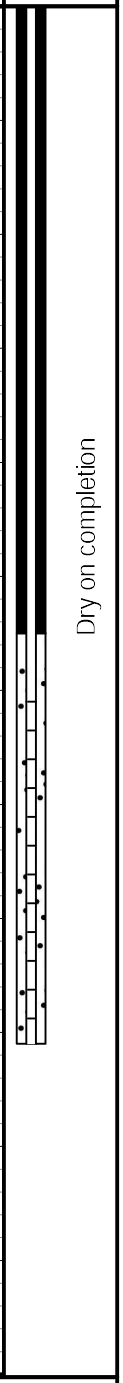
PROJECT LOCATION: Hunsden Sideroad, Town of Caledon (Bolton)

DRILLING DATE: March 9, 2022

El. (m) / Depth (m)	SOIL DESCRIPTION	SAMPLES Number	Type	N-Value	Depth Scale (m)
296.0	Ground Surface				
0.0	**15 cm TOPSOIL**				0
	Brown, loose	1	DO	9	
	SAND fine grained, some silt weathered	2	DO	8	1
294.6					
1.4	Brown, compact to dense	3	DO	15	2
		4	DO	12	
		5	DO	18	3
	SAND				4
		6	DO	33	
	well-graded, gravelly some silt to silty occ. silt layers				5
		7	DO	34	6
288.9					7
7.1	Brown, dense				
	SILT some sand to sandy, a trace of fine gravel occ. sand seams	8	DO	48	8
	water seepage at 9.1 m	9	DO	37	9
286.4					
9.6	**END OF BOREHOLE**				10
	Installed 51 mm Ø monitoring well to 9.1 m completed with 3.0 m screen Sand backfill from 5.5 to 9.1 m Bentonite seal from 0.0 m to 5.5 m Provided with a monument steel casing.				11
					12







Soil Engineers Ltd.

JOB NO.: 2202-S079

LOG OF BOREHOLE NO.: 2

FIGURE NO.: 2

PROJECT DESCRIPTION: Proposed Residential Development

METHOD OF BORING: Flight-Auger

PROJECT LOCATION: Hunsden Sideroad, Town of Caledon (Bolton)

DRILLING DATE: March 10, 2022

El. (m) / Depth (m)	SOIL DESCRIPTION	SAMPLES Number	Type	N-Value	Depth Scale (m)	Dynamic Cone (blows/30 cm) 10 30 50 70 90 / Shear Strength (kN/m²) 50 100 150 200 / Penetration Resistance (blows/30 cm) 10 30 50 70 90	Atterberg Limits PL LL / Moisture Content (%) 10 20 30 40	WATER LEVEL
295.9	Ground Surface							
0.0	**18 cm TOPSOIL**				0			
	Brown, compact to dense	1	DO	10			24	
	weathered	2	DO	15	1		19	
		3	DO	16	2		21	
	SILT	4	DO	20			19	
		5	DO	22	3		16	
	some sand to sandy	6	DO	37	4 5		13	
289.3		7	DO	20	6		10	
6.6	**END OF BOREHOLE**				7 8 9 10 11 12			

Installed 51 mm Ø monitoring well to 6.1 m
completed with 3.0 m screen
Sand backfill from 2.4 to 6.1 m
Bentonite seal from 0.0 m to 2.4 m
Provided with a monument steel casing.

Dry on completion

JOB NO.: 2202-S079

LOG OF BOREHOLE NO.: 3

FIGURE NO.: 3

PROJECT DESCRIPTION: Proposed Residential Development

METHOD OF BORING: Flight-Auger

PROJECT LOCATION: Hunsden Sideroad, Town of Caledon (Bolton)

DRILLING DATE: March 9, 2022

El. (m) / Depth (m)	SOIL DESCRIPTION	SAMPLES Number	Type	N-Value	Depth Scale (m)	Dynamic Cone (blows/30 cm) 10 30 50 70 90 / Shear Strength (kN/m²) 50 100 150 200 / Penetration Resistance (blows/30 cm) 10 30 50 70 90	Atterberg Limits PL LL / Moisture Content (%) 10 20 30 40	WATER LEVEL
298.2	Ground Surface							
0.0	**23 cm TOPSOIL**				0			
	Brown, loose to very dense	1	DO	14			25	
		2	DO	6	1		10	
	weathered	3	DO	18	2		19	
	SILT	4	DO	22			16	
		5	DO	48	3		19	
	some sand to sandy a trace of fine gravel below 7.6 m	6	DO	18	4 5		14	
		7	DO	41	6		11	
290.1		8	DO	64	7 8		17	
8.1	**END OF BOREHOLE**				9 10 11 12			

Installed 51 mm Ø monitoring well to 7.6 m
completed with 3.0 m screen
Sand backfill from 4.0 to 7.6 m
Bentonite seal from 0.0 m to 4.0 m
Provided with a monument steel casing.

Dry on completion

JOB NO.: 2202-S079

LOG OF BOREHOLE NO.: 4

FIGURE NO.: 4

PROJECT DESCRIPTION: Proposed Residential Development

METHOD OF BORING: Flight-Auger

PROJECT LOCATION: Hunsden Sideroad, Town of Caledon (Bolton)

DRILLING DATE: March 10, 2022

El. (m) / Depth (m)	SOIL DESCRIPTION	SAMPLES Number	Type	N-Value	Depth Scale (m)
293.2 / 0.0	Ground Surface				
	30 cm TOPSOIL	1	DO	6	0
	Brown, loose to very dense				
	weathered	2	DO	9	1
	SILT	3	DO	14	2
	some sand to sandy	4	DO	22	
		5	DO	31	3
289.2 / 4.0	Brown, dense to very dense				4
	SAND	6	DO	40	5
	fine grained some silt				6
286.6 / 6.6		7	DO	63	
	END OF BOREHOLE				7
	Installed 51 mm Ø monitoring well to 6.1 m completed with 3.0 m screen Sand backfill from 2.4 to 6.1 m Bentonite seal from 0.0 m to 2.4 m Provided with a monument steel casing.				8
					9
					10
					11
					12

Dynamic Cone (blows/30 cm) 10 30 50 70 90

Shear Strength (kN/m²) 50 100 150 200

Penetration Resistance (blows/30 cm) 10 30 50 70 90

Atterberg Limits PL LL

Moisture Content (%) 10 20 30 40

Moisture Content values: 17, 19, 20, 12, 17, 3, 4

WATER LEVEL: Dry on completion

Soil Engineers Ltd.

JOB NO.: 2202-S079

LOG OF BOREHOLE NO.: 5

FIGURE NO.: 5

PROJECT DESCRIPTION: Proposed Residential Development

METHOD OF BORING: Flight-Auger

PROJECT LOCATION: Hunsden Sideroad, Town of Caledon (Bolton)

DRILLING DATE: March 10, 2022

El. (m) / Depth (m)	SOIL DESCRIPTION	SAMPLES Number	Type	N-Value	Depth Scale (m)	Dynamic Cone (blows/30 cm) 10 30 50 70 90 / Shear Strength (kN/m²) 50 100 150 200 / Penetration Resistance (blows/30 cm) 10 30 50 70 90	Atterberg Limits PL LL / Moisture Content (%) 10 20 30 40	WATER LEVEL
301.5	Ground Surface							
0.0	**23 cm TOPSOIL**				0			
	Brown, loose to very dense	1	DO	6			22	
		2	DO	9	1		20	
	weathered							
		3	DO	16			22	
					2			
	SILT	4	DO	22			24	
		5	DO	14	3		20	
					4			
	some sand to sandy occ. clay layers	6	DO	50			18	
					5			
	seepages below 1.4 m							
					6			
294.9		7	DO	37			21	
6.6	**END OF BOREHOLE**				7			
	Installed 51 mm Ø monitoring well to 6.1 m completed with 3.0 m screen Sand backfill from 2.4 to 6.1 m Bentonite seal from 0.0 m to 2.4 m Provided with a monument steel casing.				8			Dry on completion
					9			
					10			
					11			
					12			

JOB NO.: 2202-S079

LOG OF BOREHOLE NO.: 6

FIGURE NO.: 6

PROJECT DESCRIPTION: Proposed Residential Development

METHOD OF BORING: Flight-Auger

PROJECT LOCATION: Hunsden Sideroad, Town of Caledon (Bolton)

DRILLING DATE: March 10, 2022

El. (m) / Depth (m)	SOIL DESCRIPTION	SAMPLES Number	Type	N-Value	Depth Scale (m)	Dynamic Cone (blows/30 cm) / Shear Strength (kN/m²) / Penetration Resistance (blows/30 cm)	Atterberg Limits PL LL / Moisture Content (%)	WATER LEVEL
294.4	Ground Surface							
0.0	**23 cm TOPSOIL**							
	Brown, loose to very dense	1	DO	5				
	weathered	2	DO	13				
		3	DO	23				
	SILT	4	DO	21				
	some sand to sandy occ. clay layers seepage at 3.0 m	5	DO	46				
288.8		6	DO	34				
5.6	Brown, very dense **SAND** fine grained some silt	7	DO	76				
287.8								
6.6	**END OF BOREHOLE**							
	Installed 51 mm Ø monitoring well to 6.1 m completed with 3.0 m screen Sand backfill from 2.4 to 6.1 m Bentonite seal from 0.0 m to 2.4 m Provided with a monument steel casing.							

Dynamic Cone (blows/30 cm): 10 30 50 70 90

Shear Strength (kN/m²): 50 100 150 200

Penetration Resistance (blows/30 cm): 10 30 50 70 90

Atterberg Limits: PL LL

Moisture Content (%): 10 20 30 40

Depth Scale (m): 0 1 2 3 4 5 6 7 8 9 10 11 12

Moisture Content values: 19, 15, 13, 19, 20, 17, 1

WATER LEVEL: Dry on completion

APPENDIX B

MECP Well Records Summary

MECP WATER WELL RECORDS

Project Number: 0952-6305 | Address: 10249 Hunsden Sideroad, Caledon

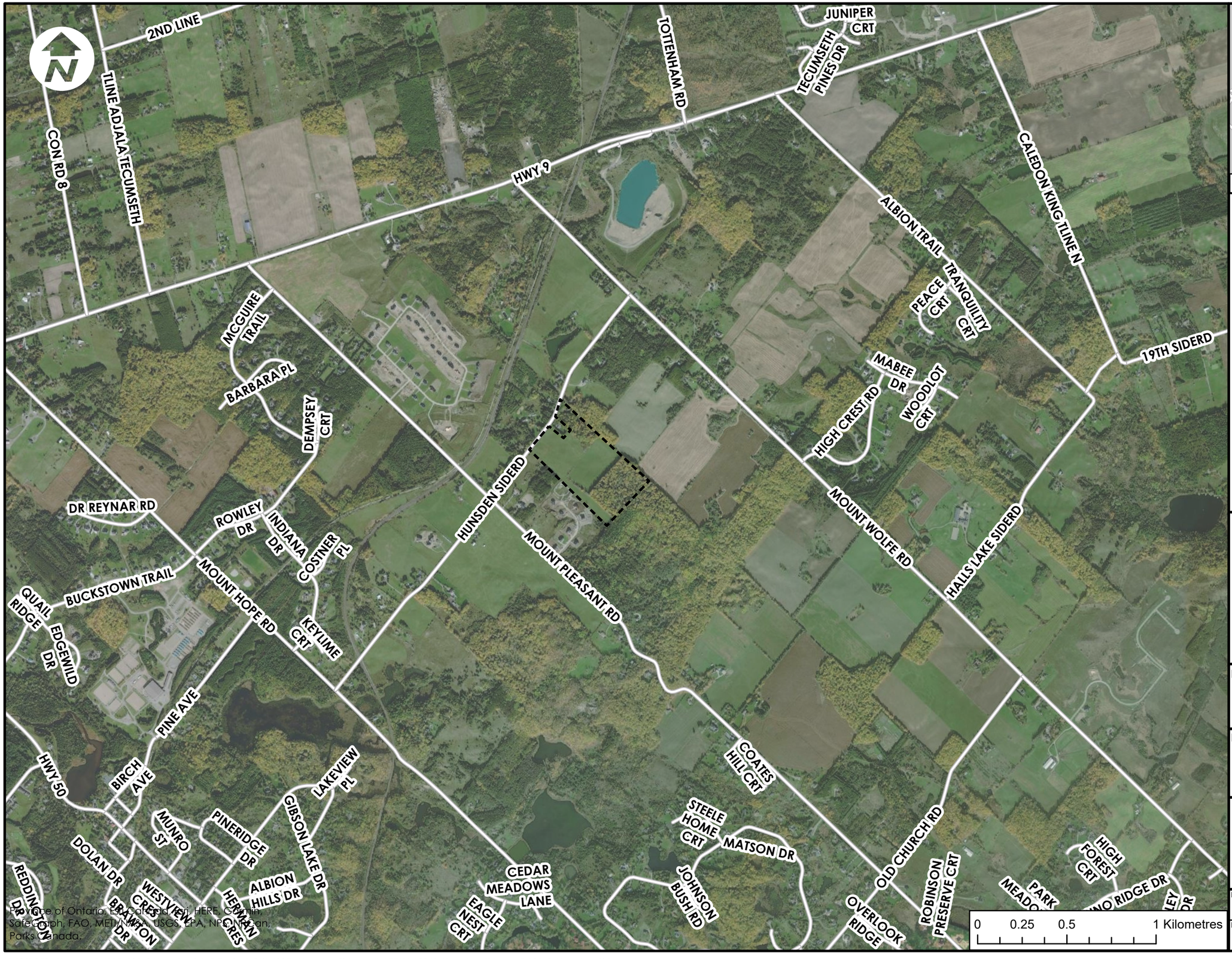
Prepared by: MD | Date completed: 2022.06.27

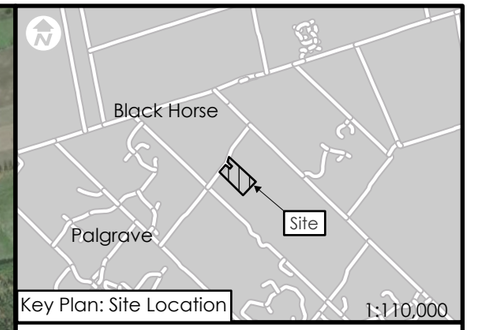
Well ID	Diameter (cm)	Depth (m)	Static Level (m)	Materials	Aquifer[1]	Use	Date Completed
4900485	76.2	19.8	16.76	fine sand	OB	domestic	10/18/1959
4900487	10.2	21.9	6.71	sand and boulders, sand	OB	domestic	10/14/1964
4900488	16.5	20.7	7.92	sandy clay, sand	OB	domestic	05/18/1967
4904466	12.7	22.9	10.67	sand	OB	domestic	04/30/1974
4904876	12.7	38.1	9.14	sand, clay	OB	domestic	05/13/1976
4904877	12.7	38.1	8.23	sand, clay	OB	domestic	05/14/1976
4904953	12.7	38.7	12.80	sand	OB	domestic	08/23/1976
4905294	76.2	14.6	8.23	sand, clay	OB	livestock/domestic	06/23/1976
4907137	15.2	29.3	22.86	gravelly sand, sand	OB	domestic	07/18/1989
4908537	15.2	24.7	6.40	clay, gravelly sand, sand	OB	domestic	11/27/1999
4908984	16.5	36.0	2.74	sand, sandy clay	OB	domestic	03/20/2001
4909008	91.4	-	-	-	-	abandoned	05/02/2002
4909009	106.7	-	-	-	-	abandoned	05/02/2002
7175042	15.9	38.1	-	silty sand	OB	domestic	12/02/2011
7268505	12.7	-	-	-	-	abandoned	06/24/2016
7362013	-	-	-	-	-	abandoned	06/01/2020
7362014	-	-	-	-	-	abandoned	06/01/2020
4900471	12.7	26.50	10.67	silty sand, sand	OB	livestock/domestic	07/25/1964
4902958	12.7	30.50	23.16	sand	OB	domestic	05/21/1968
4903027	16.5	44.8	13.72	sand, clayey sand	OB	domestic	04/11/1968
4903459	12.7	56.40	18.29	clay, sand	OB	domestic	06/03/1970
4904040	12.7	39.0	21.95	sand	OB	domestic	02/03/1972
4904049	15.2	41.1	27.43	sand, gravel, clay	OB	domestic	03/02/1973
4904166	76.2	10.10	5.49	sand	OB	domestic	08/10/1973
4904186	15.2	37.8	27.43	sand, clay	OB	domestic	06/26/1973
4904187	15.2	34.70	25.91	sand, clay	OB	domestic	06/27/1973
4905307	12.7	36.90	28.04	clay, sand	OB	domestic	09/08/1977
4905471	12.7	29.60	23.77	sand, gravel, sandy clay	OB	domestic	04/10/1979
4905519	15.2	44.2	27.43	sandy clay, sand, silty sand	OB	domestic	08/14/1979
4905699	15.2	34.7	29.26	sand, gravelly sand, clay	OB	domestic	11/14/1980
4907028	15.9	47.2	27.43	gravelly sand, sandy clay, sand	OB	domestic	04/18/1988
4907237	15.2	37.5	6.10	silty sand, silty clay, sand	OB	livestock/domestic	11/10/1989
4907251	15.2	34.1	8.53	silty sand, clay, sand	OB	livestock/domestic	02/23/1990
4907754	15.9	23.2	2.44	gravelly sand, clay, sand	OB	domestic	05/18/1993
4908075	15.9	34.10	65.53	silty clay, gravel, silt, silty sand	OB	domestic	10/04/1995
4909207	76.2	-	-	-	-	abandoned	07/01/2003
7145135	15.2	-	-	-	-	updated well	01/01/2009
7276774	-	-	-	-	-	-	08/26/2016
7279646	5.1	25.9	-	silty clay, silty sand	OB	monitoring	11/22/2016
7282272	-	-	-	-	-	-	04/18/2016
7344608	-	-	-	-	-	monitoring	09/19/2019
7344609	-	-	-	-	-	monitoring	09/19/2019
7344610	-	-	-	-	-	abandoned	09/19/2019
7344611	-	-	-	-	-	abandoned	09/19/2019

Data Source: Ministry of the Environment, Conservation, and Parks, retrieved June 27, 2022.

1. OB = Overburden Aquifer, BR = Bedrock Aquifer

FIGURES





Legend

- Property Limits
- Roads

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ALL EXISTING UNDERGROUND UTILITIES TO BE VERIFIED IN THE FIELD BY THE CONTRACTOR PRIOR TO CONSTRUCTION.

Project:

10249 Hunsden Sideroad

Drawing:

Site Plan Location

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Drawn:	Design:	Project No.	
J.M	J.M	6305 - 10249	
Date:	GCS:	Scale:	Dwg.
2022-06-30	WGS 1984	1:20,000	FIG. 1

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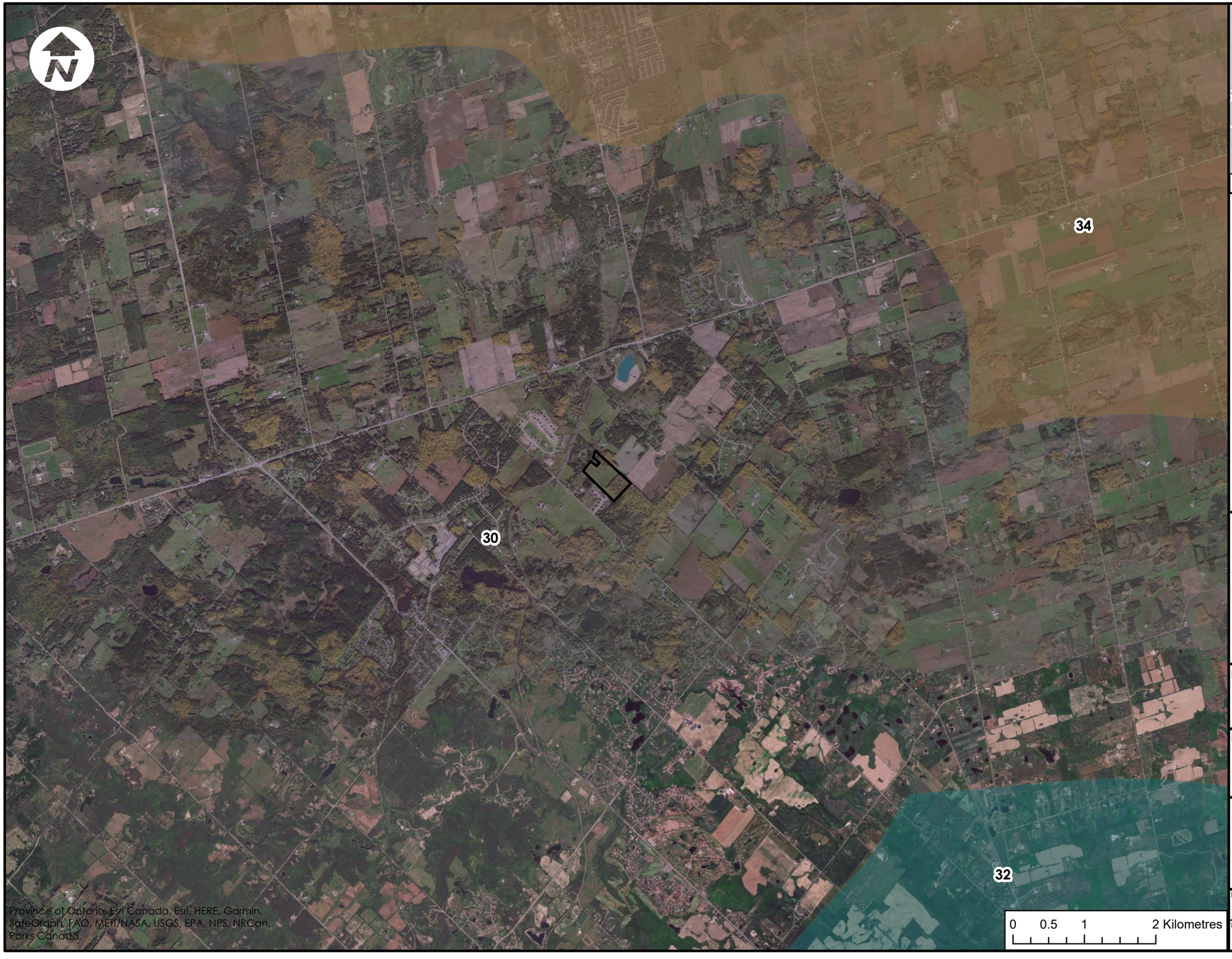

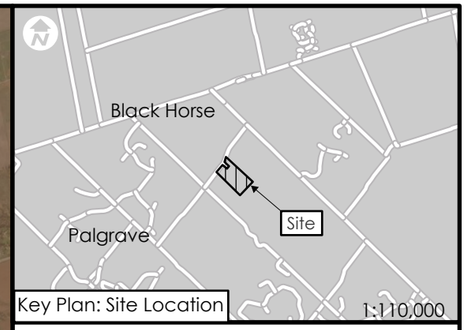

Legend

- Property Limits

Physiographic Region

- 30: Oak Ridges Moraine
- 32: South Slope
- 34: Schomberg Clay Plains

Project:

10249 Hunsden Sideroad

Drawing:

Physiography

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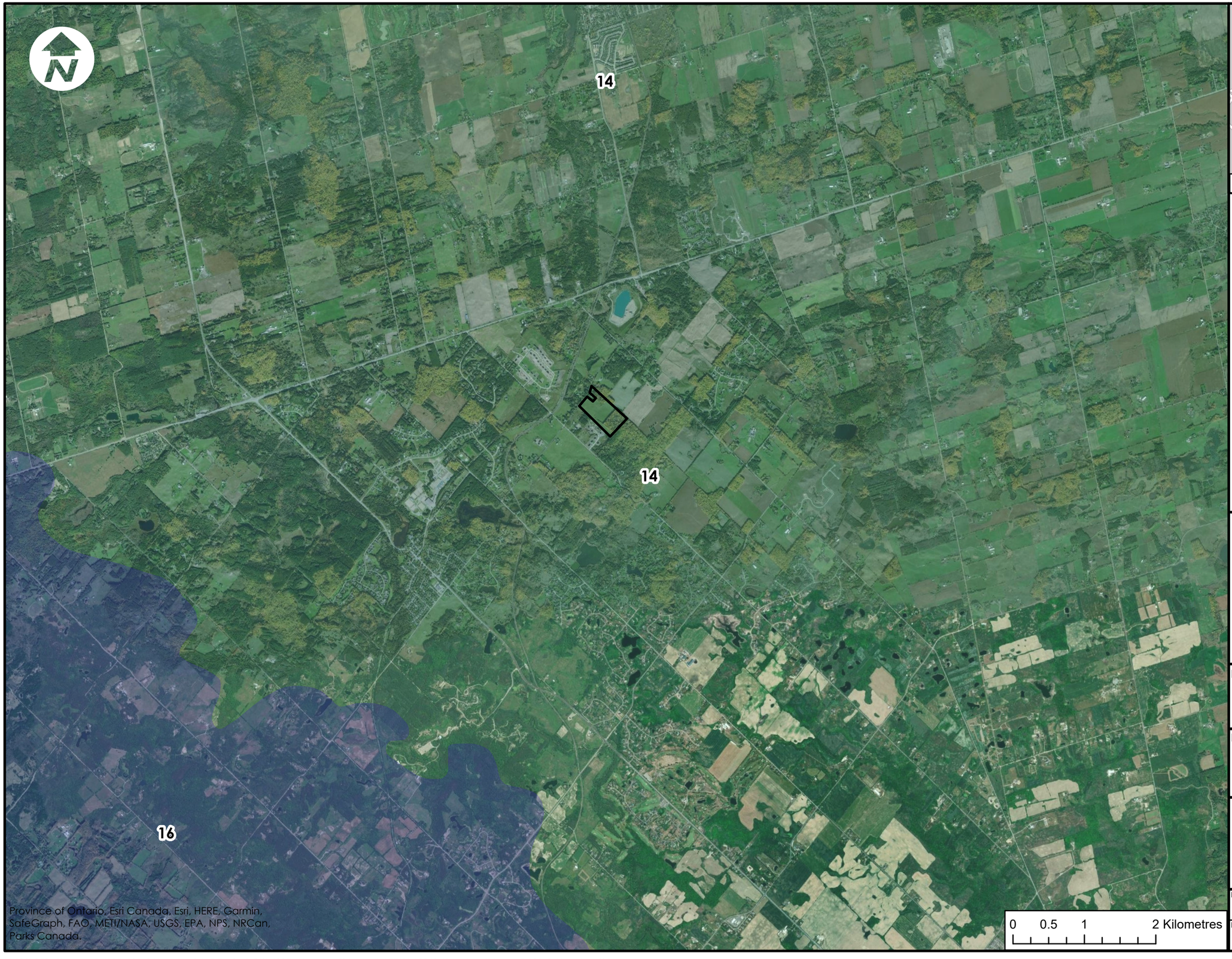

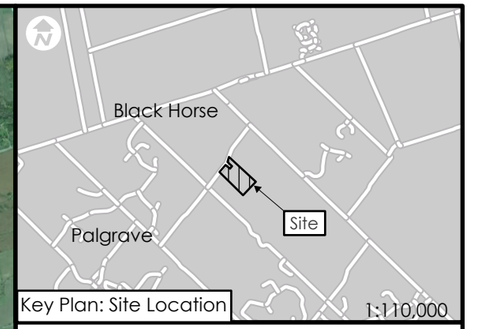

Legend

Property Limits

Bedrock Geology

16: Queenston Formation
shale, siltstone, minor limestone and sandstone

14: Georgian Bay Formation
blue gray shale with thin limestone interbeds

Project:

10249 Hunsden Sideroad

Drawing:

Bedrock Geology

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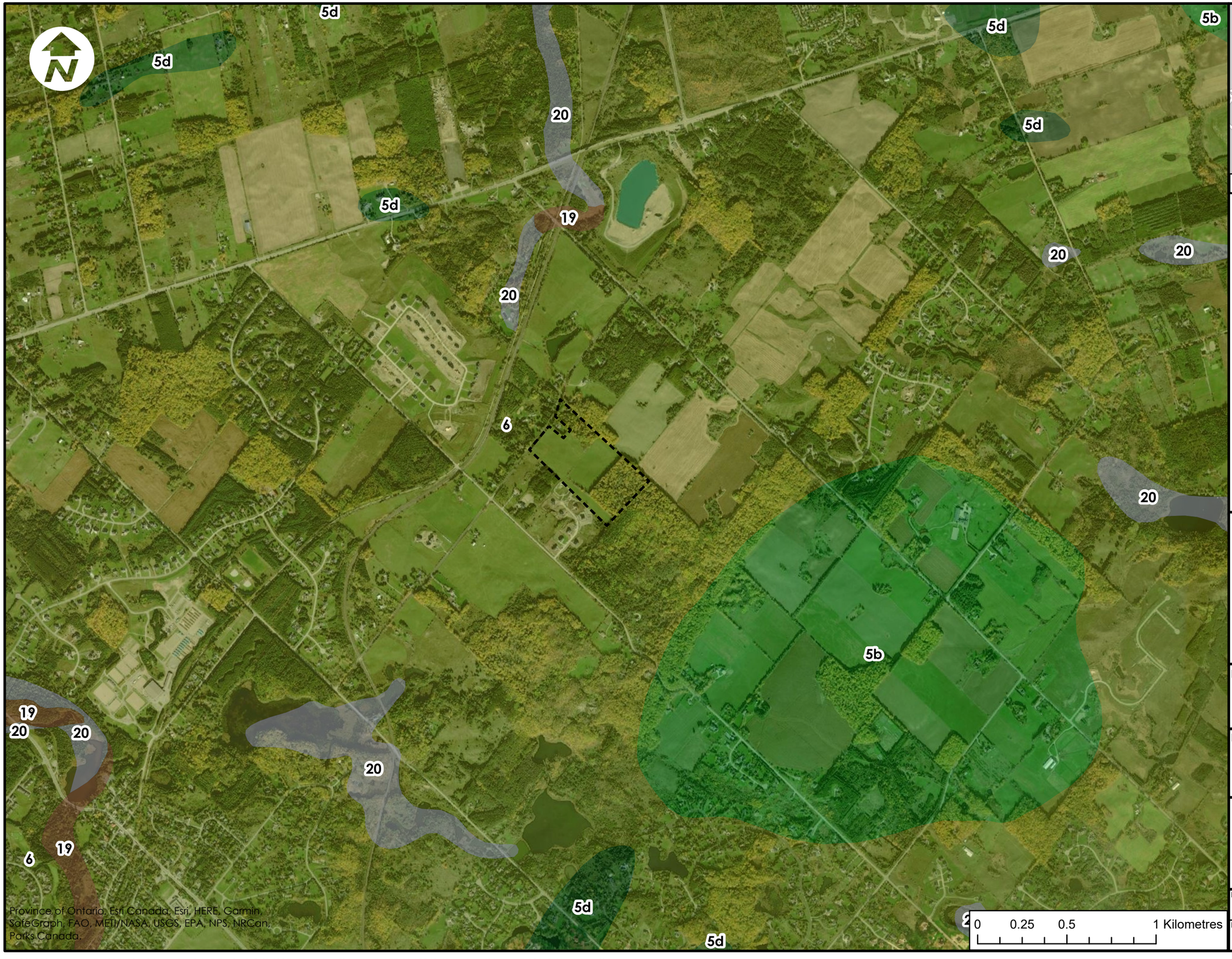

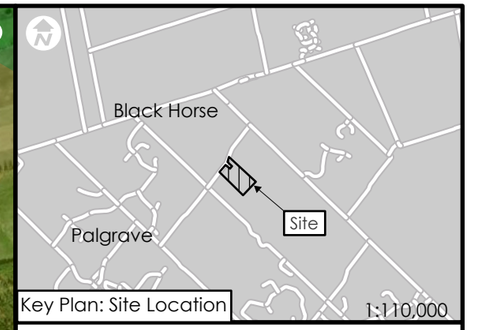

Legend

- Property Limits
- Surficial Geology
  - 5b: Stone-poor, carbonate-derived silty to sandy till
  - 5d: Glaciolacustrine-derived silty to clayey till
  - 6: Ice-contact stratified deposits
  - 19: Modern alluvial deposits
  - 20: Organic deposits

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Project:

10249 Hunsden Sideroad

Drawing:

Surficial Geology

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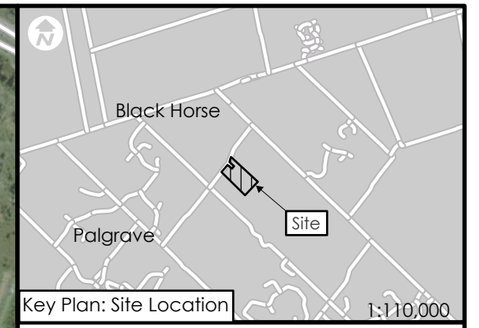

Legend

- Property Limits
- Roads
- MECP Well

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Project:

10249 Hunsden Sideroad

Drawing:

MECP Well Plan

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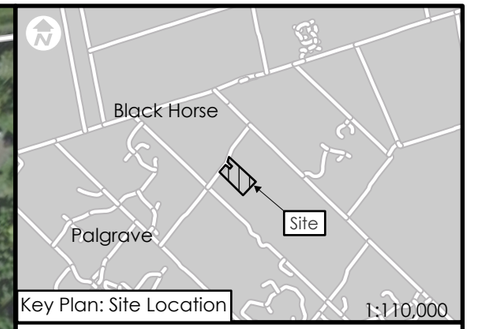

Legend

- Property Limits
- Roads
- Monitoring Well

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Project:

10249 Hunsden Sideroad

Drawing:

Monitoring Well Plan

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0 0.04 0.09 0.18 Kilometres

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