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A REPORT TO
BEACHCROFT INVESTMENTS INC. (BALLANTRY HOMES)

A PRELIMINARY HYDROGEOLOGICAL ASSESSMENT FOR PROPOSED RESIDENTIAL DEVELOPMENT

63 AND 63A TRAFALGAR ROAD
TOWN OF ERIN

REFERENCE NO. 2206-W054

FEBRUARY 2023

DISTRIBUTION

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1.0 EXECUTIVE SUMMARY

Soil Engineers Ltd. has conducted a preliminary hydrogeological assessment for a proposed development site, located at 63 and 63A Trafalgar Road in the Town of Erin.

Surrounding land use includes; an existing residential subdivision to the northwest, farmlands to the northeast, farmlands and Wellington Road 22 to the southeast, along with Trafalgar Road and residential properties to the southwest.

The subject site currently consists of farmlands with an existing house. Based on the draft plan of subdivision, prepared by KLM Planning Partners Inc., the subject site will be developed into low-rise residential dwellings with basement structures, having full municipal services and roadways meeting the current municipal standards.

The site lies within the Physiographic Region of Southern Ontario known as the Hillsburgh Sandhills and is within a former spillway. The subject site is partially underlain by the Glaciofluvial, ice-contact deposits within its northwest portion, and the Glaciofluvial outwash deposits within its southeast portion. The Glaciofluvial ice-contact deposits consist of gravel and sand, which includes eskers, kames, end moraine, ice-marginal delta and subaqueous fan deposits. The Glaciofluvial outwash deposits consist of gravel and sand, which includes proglacial river and deltaic deposits.

The subject site is located within the Credit River Watershed. Wooded areas are located within the northern and northeastern portions of the subject site. Water bodies with Provincially Significant classified wetlands are located, approximately 200 m to the east of, and 100 m south/southwest of the subject site. A watercourse (a tributary of the Credit River Erin Branch) is located, approximately 100 m to the south/southwest of the subject site.

Based on review of the topographic map for the area, and from review of the ground surface elevations at the borehole and monitoring well locations, the subject site generally descends towards to the southwest, towards Trafalgar Road.

The findings of this study confirm that the groundwater table level elevations range from <421.51 to 440.74 masl, The measured groundwater levels at the BH/MWs indicate that shallow groundwater is interpreted to be flowing in southwesterly directions, away from interpreted, localized groundwater high areas, located beneath the northwestern and eastern portions of the subject site. Shallow groundwater is interpreted to flow in the direction of the tributary for Credit River that is located southwest of the subject site.

The monitoring wells with sufficient groundwater volumes within them underwent single well response tests (SWRTs) to estimate the hydraulic conductivity at the depths for the monitoring well screens. The results for the SWRT's will be presented in the final hydrogeological assessment report. The single well response tests yielded hydraulic conductivity (K estimate) for the underlying sub-soils for gravelly sand/sandy gravel unit ranges from 5.2×10^{-7} to 5.7×10^{-7} m/s, and the K estimate for the silt and sand unit is 3.6×10^{-6} m/s. The results of the SWRT provide an indication of the yield capacity for the groundwater-bearing subsoil strata at the depths of the monitoring well screens. The above results suggest that the K estimate for the groundwater-bearing subsoils at the depths of the well screen is low to moderate with corresponding low to moderate anticipated groundwater seepage rates into open excavations, below the groundwater table.

Hazen Equation calculated permeability results indicate that the K estimate for the sub-soil units beneath the subject site ranges from 5.63×10^{-5} to 1.22×10^{-5} m/sec. The above result suggests that the K estimate for the groundwater-bearing subsoils are moderate with corresponding moderate anticipated groundwater seepage rates into open excavations, below the groundwater table.

The measured groundwater levels at the BH/MWs indicate that shallow groundwater is interpreted to be flowing in southwesterly directions. Shallow groundwater is interpreted to flow in the direction of the tributary for Credit River that is located southwest of the subject site.

The groundwater at the subject site is approximately 0.14 to 2.67 m below the base elevation for the proposed basement structures for portions of the residential housing buildings. It is therefore not anticipated that any construction dewatering will be required for earthworks and construction of the proposed houses.

The groundwater levels in the vicinity of Block 508, where the stormwater management detention tank is located is approximately 0.5 m below the estimated proposed bottom levels, and, as such, it is not anticipated that dewatering for groundwater control will be required for the construction of this stormwater management, within this area of the proposed development.

The dewatering flow estimates for construction of the proposed stormwater management detention tank located within the vicinity of Block 506 of the site, suggests that it could reach an estimated daily rate of 20,504.3 L/day; by applying a safety factor of three (3), it could reach a maximum of 61,512.8 L/day. This dewatering flow rate for excavation, is below the PTTW threshold limit of 400,000 L/day but is above 50,000 L/day threshold limit

for requiring an approval, with the approval for the proposed groundwater takings for construction being required to be registered through an Environmental Activity and Sector Registry (EASR) with the EASR filing through the MECP

The highest estimated temporary dewatering flow rates for installation of the underground services could reach a maximum daily rate of 131,806.1 L/day; by considering a 3x safety factor, it could reach an approximate daily maximum of 395,418.3 L/day. Since the estimated dewatering flow rate exceeds 50,000 L/day but is below the 400,000 L/day PTTW threshold limit, the approval for any proposed temporary groundwater-taking for construction is by means of applying for an EASR approval with the MECP.

The estimated zone of influence for any conceptual dewatering wells or dewatering array around excavation footprints could reach maximums of 47.0 m away from the conceptual dewatering array around the servicing trenches.

The surficial shallow soil beneath the subject site consists, predominantly of sand and gravel. Opportunities may exist to infiltrate collected runoff to the subsurface at the developed site, using appropriate Low Impact Development Infrastructure, which could include infiltration galleries or underground storage/exfiltration tanks.

2.0 INTRODUCTION

2.1 Project Description

In accordance with the authorization, dated June 15, 2022, from Ms. Uzo Rossouw of Beachcroft Investments Inc., Soil Engineers Ltd. (SEL) has conducted a preliminary hydrogeological assessment for a proposed residential development site, located at 63 and 63A Trafalgar Road in the Town of Erin. The location of the subject site is shown on Drawing No. 1. The surrounding land use includes; an existing residential subdivision to the northwest, farmlands to the northeast, farmlands and Wellington Road 22 to the southeast, along with Trafalgar Road and residential properties to the southwest.

The subject site currently consists of farmlands with an existing house. Based on the preliminary concept plan, prepared by KLM Planning Partners Inc., the subject site will be developed into low-rise residential dwellings, having basement structures being provided with full municipal services and roadways meeting the current municipal standards.

The purpose of this preliminary hydrogeological assessment is to summarize the findings of the field study and the associated groundwater monitoring and testing programs, to provide a description and characterization of the interpreted hydro-geo-stratigraphic setting for the subject site and the local surrounding area. In addition, this study provides preliminary recommendations for any construction, related dewatering needs, prior to detailed design. The current study provides preliminary recommendations for any construction- related, or permanent foundation drainage needs prior to detailed design.

2.2 Project Objectives

The major objectives of this Hydrogeological Assessment Report are as follows:

1. Establish the local hydrogeological setting for the subject site and the local surrounding area;
2. Interpretation of the shallow groundwater flow and runoff patterns;
3. Identify zones of higher groundwater yield as potential sources for any ongoing shallow groundwater seepage;
4. Characterizing the hydraulic conductivity (K) for the shallow groundwater-bearing sub-soil strata;
5. Review of Ontario Water Well Records for the subject site and for the surrounding areas;

6. Preparation of an interpreted hydro-geo-stratigraphic cross-section across the subject site and proposed development footprint;
7. Estimation for the anticipated temporary dewatering flows that may be required to lower the groundwater table to facilitate earth works and construction, or for any anticipated long-term, permanent, foundation drainage needs, following construction, if required;
8. Describing the groundwater function for the site area, evaluating potential impacts to nearby groundwater receptors within the anticipated zones of influence for any temporary construction dewatering; and development of preliminary estimates for any anticipated dewatering flow rates to facilitate excavation and construction, if required;
9. Provide comments regarding any need to file for an Environmental Activity and Sector Registry (EASR), or to acquire a Permit-To-Take Water (PTTW) as groundwater taking approvals to facilitate a construction dewatering program in support of proposed earthworks for housing building construction, and for installation of the associated underground services;
10. Comment on the feasibility of the site to accommodate the implementation of Low Impact Development (LID) stormwater management infrastructure to address future storm water management planning and design for the proposed development.

2.3 **Scope of Work**

The scope of work for the Hydrogeological Study is summarized below:

1. Borehole drilling and installation of eleven (11) monitoring wells within the site's development footprint;
2. Monitoring well development and groundwater level measurements at the eleven (11) installed monitoring wells;
3. Performance of Single Well Response Tests (SWRTs) at the installed monitoring wells to estimate the hydraulic conductivity (K) for the groundwater-bearing subsoil strata at the depths of the monitoring well screens;
4. Describing the geological and hydrogeological setting for the subject site, and the local surrounding area;
5. Estimating the hydraulic conductivity (K) for the groundwater bearing subsoil strata, based on the SWRT results, and from a review of the subsoil sample grain size analyses findings;
6. Reviewing and plotting of Ministry of the Environment, Conservation, and Parks (MECP) water well records within the subject site and with 500 m of the development site;
7. Review of the findings of the previous geotechnical soil investigation study; review of

available engineering development plans and profiles for the proposed residential building/housing structures; assessing the preliminary dewatering needs, and estimation of any anticipated dewatering flows to lower local groundwater levels to facilitate earthworks and construction, and completing an assessment for any anticipated long-term foundation drainage needs for the completed housing basement/foundation structures;

8. Providing comments regarding any need to register any proposed groundwater-taking through an Environmental Activity and Sector Registry (EASR), or to apply for a Permit-To-Take Water (PTTW) as groundwater taking approvals to facilitate a construction dewatering program;
9. Commenting on the feasibility of the site's soil and groundwater conditions for implementing of LID stormwater management infrastructure to address future stormwater management planning and design for the proposed development.

3.0 METHODOLOGY

3.1 Borehole Advancement and Monitoring Well Installation

Borehole drilling and monitoring well construction were conducted, between November 18 and 25, 2022. Eleven (11) boreholes (BHs) were drilled and eleven (11) monitoring wells (MW) were installed, one within, or adjacent to each of the advanced boreholes. The approximated borehole and monitoring well locations are shown on Drawing No. 2.

The borehole drilling and monitoring well construction were completed by the licensed water well contractor, DBW, under the full-time supervision of a geotechnical technician from SEL, who also logged the subsoil strata, encountered during borehole advancement, and collected representative subsoil samples for textural classification. The boreholes were drilled using continuous flight power auger machine. Selected subsoil samples, retrieved from the borehole drilling program underwent laboratory grain size analysis to confirm the subsoil texture. Detailed descriptions of the encountered subsurface soil and groundwater conditions are presented on the borehole and monitoring well logs, on Figures 1 to 11, inclusive.

The monitoring wells were constructed, using 50 mm diameter PVC riser pipes and screen sections, which were installed in the open boreholes in accordance with Ontario Regulation (O. Reg.) 903. The monitoring wells were provided with a monument-type, steel protective casings at the ground surface. Details for monitoring well construction are provided on the enclosed Borehole Logs (Figures 1 to 11, inclusive).

The ground surface elevations and horizontal coordinates at the monitoring well locations were determined at the time of the investigation, using a handheld Global Navigation Satellite System survey equipment (Trimble Geoexplorer unit TSC3) which has an accuracy of 0.05± m. The UTM coordinates and ground surface elevations at the borehole/monitoring well locations, together with the summary of the monitoring well installation details, are provided in Table 3-1.

Table 3-1 - Monitoring Well Installation Details

Well ID	Installation Date	UTM Coordinates		Ground El. (masl)	Borehole Depth (mbgs)	Well Screen Interval (mbgs)	Casing Dia. (mm)
		East (m)	North (m)				
BH/MW 1	November 23, 2022	569441	4848910	439.63	6.6	3.1-6.2	50
BH/MW 2	November 22, 2022	569341	4849156	436.26	6.6	3.1-6.2	50
BH/MW 3	November 24, 2022	569311	4848713	434.05	6.6	3.1-6.2	50
BH/MW 4	November 18, 2022	569583	4848323	427.61	6.4	3.0-6.1	50
BH/MW 5	November 24, 2022	569516	4848679	433.83	6.6	3.1-6.2	50
BH/MW 6	November 21, 2022	569575	4849180	443.49	5.0	1.5-4.6	50
BH/MW 7	November 23, 2022	569667	4848861	442.32	6.6	3.1-6.2	50
BH/MW 8	November 22, 2022	569294	4848839	434.15	6.6	3.1-6.2	50
BH/MW 9	November 24, 2022	569738	4848573	437.71	4.7	1.3-4.4	50
BH/MW 10	November 25, 2022	569584	4848493	437.92	6.7	3.0-6.1	50
BH/MW 11	November 25, 2022	569862	4848478	435.49	6.6	3.0-6.1	50

Notes: *mbgs -- metres below ground surface* *masl -- metres above sea level*

3.2 Groundwater Monitoring

The groundwater levels in the monitoring wells were measured on December 1, 2022, January 5 and February 8, 2023, to record the fluctuation of the stabilized shallow groundwater levels beneath the subject site, with details discussed in the section 6.3 of this report.

3.3 Mapping of Ontario Water Well Records

SEL received the Ministry of Environment, Conservation and Parks (MECP) Water Well Records (WWRs) for registered wells located on the subject site, and within 500 m of the subject site boundaries (study area). The records indicate that one hundred and forty (140) registered wells are located within the study area relative to the site boundaries. The well locations are shown on Drawing No. 3, and the WWRs reviewed for this study are listed in Appendix with a discussion for the records review, provided within Section 6.2.

3.4 Monitoring Well Development and Single Well Response Tests

BH/MWs 4, 6 and 11 underwent purging and development in preparation for single well response testing (SWRT) to assess the hydraulic conductivity (K) for the saturated subsoil strata at the depths of the monitoring well screens. Monitoring well development involves of the purging and removal of several casing volumes of groundwater from each monitoring well to remove remnants of clay, silt and other debris introduced into the monitoring wells during construction, and to induce the flow of formation groundwater through the monitoring well thereby improving the transmissivity of the groundwater bearing strata the wells screen depth interval. The K values estimated from the SWRTs provide an indication of the yield capacity for the groundwater-bearing subsoil strata, and can be used to estimate the flow of groundwater through the groundwater-bearing subsoil strata.

The SWRT involves the placement of a slug of known volume into the monitoring well, below the water table, to displace the groundwater level upward. The rate at which the groundwater level recovers to static conditions (falling head) is tracked using a data logger/ pressure transducer, and/or manually, using an electronic water level tape. The rate at which the groundwater table recovers to static conditions is used to estimate the K value for the groundwater-bearing subsoil strata formation at the monitoring well screen depth interval. The Bower and Rice Method was used to interpret the SWRT data to estimate the K values.

The SWRT could not be performed on BH/MW 2 as the groundwater levels were consistently below the depths of the monitoring well during every monitoring event performed over the initial study period. Furthermore, the SWRT could not be performed on BH/MWs 1, 3, 5, 7, 8, 9 and 10 due to insufficient groundwater volume within the monitoring wells. The SWRTs were completed on January 5, 2023.

3.5 Review Summary of Concurrent Report

The following, concurrent geotechnical report, prepared by SEL was reviewed in preparation of this hydrogeological study:

“Preliminary Geotechnical Assessment for Proposed Residential Development, Reference No. 2206-S054, dated February 13, 2023.

4.0 REGIONAL AND LOCAL SETTING

4.1 Regional Geology

The subject site lies within the Physiographic Region of Southern Ontario known as the Hillsburgh Sandhills and is within a former glacial meltwater spillway. The Hillsburgh sandhills are a natural boundary on the southeastern flank of the Dundalk till plain which cover an approximate area of 16,576 hectares. The region is characterised by rough topography, sandy materials and a flat-bottomed, swampy valley intersection within the moraine. Fine sand is the prevalent soil type. (Chapman and Putnam, 1984).

Review of the surface soil, geological map of Ontario shows that the subject site is partially located on the Glaciofluvial ice-contact deposits within its northwest portion, and partially on the Glaciofluvial outwash deposits within its the southeast portion. The Glaciofluvial ice-contact deposits consist of gravel and sand, minor till, and includes eskers, kames, end moraines, along with ice-marginal delta and subaqueous fan deposits. The Glaciofluvial outwash deposits consist of gravel and sand, also includes proglacial river and deltaic deposits. Drawing No. 4, as reproduced from Ontario Geological Survey (OGS) mapping, illustrates the Quaternary surface soil geology for the subject site and surrounding area.

The bedrock underlying the site is comprised of the Middle and Lower Silurian Armabel Formation, which consists of sandstone, shale, dolostone and siltstone. Bedrock was not contacted within any of the bottoms of the boreholes advanced beneath the site. The top of bedrock, beneath the site is at elevations, ranging from approximately 408 to 420.5 masl. (www.oakridgeswater.ca).

4.2 Physical Topography

Based on review of the topographic map for the area, and from review of the ground surface elevations at the borehole and monitoring well locations, that the subject site is generally descending towards Trafalgar Road. The total elevation relief across the subject site is about 15.0 m. Drawing No. 5 shows the mapped topographical contours for the subject site and for the surrounding area.

4.3 **Watershed Setting**

The subject site is located within the Credit River Watershed. The Watershed covers an area of approximately 1,000 km^2 and extends from the Town of Orangeville in the north to the City of Mississauga and Lake Ontario in the south. The watershed covers an area west and northwest of the City of Toronto, and includes portions of the Cities of Brampton, Mississauga and Oakville, which are some of the most densely populated regions in Canada. The main channel of the Credit River is 90 km long and is supported by over 1,500 km of tributary streams and creeks that are organized into 22 sub-watersheds. The most significant physiographic feature in the Credit River Watershed is the north-south trending Niagara Escarpment. The Niagara Escarpment subdivides the watershed into three generalized physiographic regions; the Upper Watershed (i.e. the area west of the Niagara Escarpment); the Niagara Escarpment (Middle); and the Lower Watershed (i.e. the area east of the Niagara Escarpment). The Oak Ridges Moraine, the Orangeville Moraine and the Paris Moraine are also significant physiographic and hydrogeologic features within this watershed.

Land use in the Credit Valley Watershed consists, primarily of agricultural land (34%) and developed land (30%). The population within the watershed is expected to increase over the coming decades, with much of this growth taking place east of the Escarpment. There are some forest and plantation areas (16%), and aquatic and wetland areas (7%) that are generally located west of, and at the east base of, the Escarpment. Groundwater within the Credit River Watershed is important for potable water supply for many of the residents, and it is also a requirement for healthy ecosystems within the watershed. The groundwater system discharges to surface water features such as rivers and streams that support various cold-water and fish/aquatic communities, and it also provides streamflow for wastewater assimilation during low streamflow periods.

Drawing No. 6 shows the location of the subject site within the Credit River Watershed.

4.4 **Local Surface Water and Natural Features**

Wooded areas are located within the northern and northeastern portions of the subject site. Water bodies with Provincially Significant, classified wetlands are also located, approximately 200 m to the east of and 125 m south/southwest of the subject site. A watercourse (a tributary of the Credit River Erin Branch) is located, approximately 125 m to the south/southwest of the subject site. The locations of the site and the noted natural features are shown on Drawing No. 7.

5.0 SOIL LITHOLOGY

The investigation has revealed that beneath the topsoil and ploughed soil horizons at the ground surface, the subject site is underlain, predominantly by sand and gravelly sand deposits. Sandy silt to silty sand till or silt deposits were generally contacted within the lower stratigraphy in some of the boreholes. A localized sandy silt deposit was also contacted near the ground surface, below the ploughed soil layer in Borehole 6.

5.1 **Topsoil/Ploughed Soil** (All BH/MWs)

The thickness of the revealed topsoil horizon is approximately 36 cm where it extends to depths of 0.5 to 0.9 mbgs. The ploughed soil layer consists of dark brown sand with occasionally rootlets inclusions. The moisture contents for the retrieved subsoil samples ranges from 13.6 to 19.3%. High moisture contents are attributed to the topsoil and its organic inclusions.

5.2 **Sand** (All BH/MWs except BH/MWs 4, 6 and 8)

Sand was contacted below the ploughed soil layer within all the boreholes, except BH/MWs 4, 6 and 8. It extends to depths, ranging from 1.0 to 6.6 mbgs. Its relative density varies from very loose to very dense, being generally compact. It is mostly fine to medium grained with occasional gravel inclusions. The moisture contents for the retrieved subsoil samples ranges from 4.2 to 11.4%, indicating moist to very moist conditions. Its colour remains brown. Grain size analysis on one subsoil sample from BH/MW 7 at a depth of 4.8 mbgs indicates the estimated permeability is about 10^{-3} m/sec, with the soil gradation being plotted on Figure 12.

5.3 **Gravelly Sand/Sandy Gravel** (All BH/MWs except BH/MWs 7 and 11)

Gravelly sand/sandy gravel deposits were encountered in the lower soil stratigraphy, below the sand or sandy silt layer. The relative density for t he gravelly varies from compact to very dense. The soil colour remains brown and includes occasionally cobbles and boulders. The moisture contents for the retrieved subsoil samples ranges from 2.6 to 12.4%, indicating damp to saturated conditions. The saturated samples were found at lower depths, generally about 5 mbgs. Grain size analysis on one subsoil sample from BH/MW 1 at a depth of 3.3 mbgs indicates the estimated permeability is about 10^{-3} m/sec with the subsoil sample gradation being plotted on Figure 13.

5.4 **Silty Sand Till and Sandy Silt Till** (BH/MWs 1 and 5)

Silty sand till and sandy silt till deposits were contacted locally at the bottoms of BH/MWs 1 and 5 below gravelly sand deposit. The relative density varies from dense to very dense. They contain traces of gravel and clay, become gravelly in places with occasionally cobbles and boulders. The silty sand till becomes grey at a depth of 4.5 mbgs in BH/MW 1. Grain size analysis on four subsoil samples indicates the estimated permeability ranges from 10^{-4} m/sec to 10^{-5} m/sec with the subsoil sample gradation being plotted on Figures 14 to 16.

5.5 **Sandy Silt/Silt** (BH/MWs 6, 8 and 11)

A layer of sandy silt was encountered within the upper zone of BH/MW 6, where it extends to a depth of 2.2 m. The silt deposit was found at the bottom of BH/MWs 8 and 11. The sandy silt is compact and moist, and remains brown. The silt is dense to very dense and becomes grey at a depth of 6.4 mbgs within BH/MW 11.

6.0 GROUNDWATER STUDY

6.1 Review Summary of Concurrent Report

A review of the findings from the concurrent geotechnical soil investigation report (SEL Reference No. 2206-S054) has disclosed that beneath a layer of topsoil/ploughed soil horizons, the subject site is underlain, predominantly by sand and gravelly sand deposits. Sandy silt to silty sand till, or silt was contacted within the lower stratigraphy within some of the boreholes. A local sandy silt deposit was also encountered near the ground surface, below the ploughed soil horizon in BH/MW 6.

6.2 Review of Ontario Water Well Records

The Ministry of the Environment, Conservation and Parks (MECP) water well records for the subject site, and for the properties within a 500 m radius of the boundaries of the subject site (study area) were reviewed.

The records indicate that one hundred and forty (140) well records are located within the study area relative to the subject site boundaries. The locations of these well records, based on the UTM coordinates provided by the records, are shown on Drawing No. 3. Details for the MECP water well records that were reviewed are provided in Appendix A.

A review of the final status and of the well records within the study area reveals that ninety-six (96) are registered as water supply wells, two (2) are registered as test hole wells, one (1) well is registered as having other status, ten (10) are registered as observation wells, three (3) are registered as monitoring and test hole wells, two (2) are registered as abandoned-supply wells, twenty-one (21) are registered as abandoned-other wells, and five (5) wells are registered as having unknown statuses.

A review of the first use of the well records reveals that five (5) are registered as test hole wells, seven (7) are registered as public supply wells, six (6) wells are registered as not being used, one (1) is registered as a municipal well, eight (8) are registered as monitoring wells, one (1) is registered as a livestock well, eighty-two (82) are registered as domestic wells, two (2) are registered as commercial wells, and twenty-eight (28) wells are registered as having unknown statuses.

Should there be any water supply wells discovered during the future site grading operations, we recommend that they be properly decommissioned in accordance with the Ontario Water resources Act, Regulation 903.

6.3 **Groundwater Monitoring**

The groundwater levels in the monitoring wells were measured, manually on December 1, 2022, January 5 and February 8, 2023, to record the fluctuation of the shallow groundwater table beneath the site. The recorded groundwater levels and their corresponding elevations are given in Table 6-1.

Table 6-1 - Groundwater Level Measurements

Well ID		December 1, 2022	January 5, 2023	February 8, 2023	Fluctuation (m)
BH/MW 1	mbgs	3.91	5.47	5.84	1.9
	masl	435.72	434.16	433.79	
BH/MW 2	mbgs	DRY	DRY	DRY	-
	masl	<430.06	<430.06	<430.06	
BH/MW 3	mbgs	5.88	5.84	5.85	0.04
	masl	428.17	428.21	428.20	
BH/MW 4	mbgs	DRY	3.88	3.90	2.20
	masl	<421.51	423.73	423.71	
BH/MW 5	mbgs	4.94	4.90	4.80	0.14
	masl	428.89	428.93	429.03	
BH/MW 6	mbgs	3.17	2.75	2.96	0.42
	masl	440.32	440.74	440.53	
BH/MW 7	mbgs	DRY	DRY	6.17	0.03
	masl	<436.12	<436.12	436.15	
BH/MW 8	mbgs	DRY	5.54	5.93	0.66
	masl	<427.95	428.61	428.22	
BH/MW 9	mbgs	DRY	DRY	4.35	0.05
	masl	<433.31	<433.31	433.36	
BH/MW 10	mbgs	5.83	DRY	DRY	0.27
	masl	432.09	<431.82	<431.82	
BH/MW 11	mbgs	3.85	3.88	3.68	0.20
	masl	431.64	431.61	431.81	

Notes *mbgs -- metres below ground surface* *masl -- metres above sea level*

As shown above, the groundwater table levels are generally consistent with minor fluctuation. The groundwater level at BH/MW 2 was consistently below the bottom of the well, in which the well was interpreted as being dry, throughout the monitoring period. BH/MWs 4, 7 and 8 exhibited an increasing trend over the monitoring period. BH/MWs 1 and 10 exhibited a decreasing trend over the monitoring period.

6.4 Shallow Groundwater Flow Pattern

The shallow groundwater flow pattern beneath the subject site were interpreted from the highest groundwater level measurements, recorded at all of the BH/MWs locations. The groundwater levels for wells which were reported a being dry, were interpreted to be at the bottom elevation of the monitoring well. The measured groundwater levels at the BH/MWs records indicate that it is interpreted to flow in a southernly- southwesterly direction, away from interpreted, localized higher groundwater areas. Shallow groundwater is interpreted to flow in the direction of the tributary for Credit River that is located southwest of the subject site. The interpreted shallow groundwater flow pattern for the subject site area is illustrated on Drawing No. 9.

6.5 Single Well Response Test Analysis

BH/MWs 4, 6 and 11 underwent single well response tests (SWRTs) to assess the hydraulic conductivity (K) for saturated subsoil strata at the depths for the monitoring well screens. The SWRT could not be performed on BH/MW 2 as the groundwater levels were consistently below the depths of the monitoring well during every monitoring event performed over the initial study period. Furthermore, the SWRT could not be performed on BH/MWs 1, 3, 5, 7, 8, 9 and 10 due to insufficient groundwater volume within the monitoring wells. The results of the SWRTs are presented in Appendix 'B', with a summary of the findings shown in Table 6-2.

Table 6-2 - Summary of SWRT Results

Well ID	Ground El. (masl)	Monitoring Well Depth (mbgs)	Borehole Depth (mbgs)	Screen Interval (mbgs)	Screened Sub-Soil Strata	Hydraulic Conductivity (K) (m/sec)
BH/MW 4	427.61	6.1	6.4	3.0-6.1	Gravelly Sand	5.2×10^{-7}
BH/MW 6	443.49	4.6	5.0	1.5-4.6	Sandy Gravel	5.7×10^{-7}
BH/MW 11	435.49	6.1	6.6	3.0-6.1	Silt and Sand	3.6×10^{-6}

Notes: mbgs -- metres below ground surface masl -- metres above sea level

As shown in Table 6-2, the estimated K for the underlying sub-soils for gravelly sand/sandy gravel unit ranges from 5.2×10^{-7} to 5.7×10^{-7} m/s, and the K estimate for the silt and sand unit is 3.6×10^{-6} m/s. The results for the SWRT provide an indication of the yield capacity for the shallow groundwater-bearing sub-soil strata at the depths of the monitoring well screens. The above results suggest that the hydraulic conductivity for the groundwater-bearing subsoils at the depths of the well screens is low to moderate, with corresponding low to moderate groundwater seepage rates being anticipated into open excavations, below the shallow groundwater table.

6.6 Assessment of Hydraulic Conductivity Based on the Hazen Equation

The Hazen Equation method was also adopted to estimate the hydraulic conductivity (K) for different subsoil layers which may contain high groundwater levels during the seasonal (spring) season, or if encountered within the deeper excavations.

The Hazen Equation method relies on the interrelationship between hydraulic conductivity and effective soil particle grain size, d_{10}, (mm) for the sub-soil media. This empirical relation predicts a power-law relation with K, as follow:

$$K = Ad_{10}^2$$

where;

d_{10}: Particle diameter of the soil grain size gradation curve (mm) as determined by sieve analysis, whereby 10% by weight of the soil particles are finer and 90% by weight of the soil particles are coarser.

A: Coefficient; it is equal to 1 when K is in m/sec and d_{10} is in mm

The Hazen Equation K estimation method provides an indication for the yield capacity for groundwater-bearing subsoil strata at the depths where the soil samples that underwent grain size analyses were collected. The calculated results indicate that the K estimate for the sub-soil units beneath the subject site ranges from 1.22×10^{-5} to 5.63×10^{-5} m/sec. The results of the Hazen method, determined K estimates are provided in Table 6-3 below. The K estimates determined from the Hazen Method suggests moderate hydraulic conductivity (K) estimates for the groundwater bearing sub-soil layers beneath the subject site.

Table 6-3 - Summary of Hazen Equation Estimated K Results

Well ID	Sample Depth (mbgs)	Sample El. (masl)	Description of Soil Strata	Sieve Analysis Particle Diameter D_{10} (mm)	Hydraulic Conductivity (K) (m/sec)
BH/MW 1	5.0	434.60	Silty Sand Till, some gravel to gravelly and a trace of clay	0.0075	5.63×10^{-5}
BH/MW 5	6.3	427.5	Sandy Silt Till, traces of gravel and clay	0.0035	1.22×10^{-5}

Notes: mbgs -- metres below ground surface *masl -- metres above sea level*

7.0 GROUNDWATER CONTROL DURING CONSTRUCTION

The estimated hydraulic conductivity (K) for the screened subsoil strata comprised mainly of sand, gravelly sand/sandy gravel, silty sand to sandy silt till, sandy silt and silt, suggests that the groundwater seepage rates into open excavations below the groundwater table will be moderate. To provide safe, dry and stable subsoil conditions for proposed earthworks and excavations, for construction of the proposed stormwater management, underground housing foundation structures and for the associated underground services, the groundwater table may need to be lowered in advance of, or during construction, in which temporary limited groundwater control may be required. The preliminary estimates for construction dewatering flows required to locally lower the groundwater table, based on the K test estimates, are discussed in the following sections.

7.1 Groundwater Construction Dewatering Rates

A Draft Plan of Subdivision, prepared by KLM Planning Partners Inc, Project No. P-3304, Drawing No. 23:1, dated February 9, 2023, was reviewed for this construction dewatering needs assessment. The grading and development plans, showing the proposed finished grade elevations, and invert elevations for the proposed underground services were not available for review at the time of this report preparation. However, it is understood that the proposed development will comprise a mixed-use residential; including detached dwelling, along with town housing, having basement structures, a mixed-use senior housing, parks, stormwater management blocks, a heritage house, and a future water tower, along with the associated underground services.

An assumed excavation depth of up to 2.5 m has been considered for the construction of the proposed housing basement foundation and footings.

The details for each portion of the developed subject site are discussed in the following sections:

7.1.1 Estimated Construction Dewatering Rates for Proposed Underground Basement Structures

Construction for a Single-Detached House Lot Size (11.8 m x 30.5 m) at an estimated grade elevation of 434.15 masl, Located within the West Portion of the Subject site, in the Vicinity Lot No 81:

For a typical single detached house constriction, in the vicinity of Lot No 81, the dewatering

calculations, an estimated area for excavation for the average for the average construction footprint is 359.9 square meters. The anticipated grade elevation, is estimated at grade elevation of 434.15 masl. An assumed excavation depth of up to 2.5 m (to an elevation, of 431.65 masl) was considered for the construction of the proposed basement foundation and footings. The subsoil comprises gravelly sand and silt, extending to the maximum proposed depths for excavation. To facilitate excavation and construction in dry and stable subsoil conditions, it is proposed that the shallow groundwater table be lowered to an excavation of 430.65 masl, which is about 1.0 m below the lowest proposed excavation depths. Comparison of the lowest proposed excavation depth with the highest, measured shallow groundwater level elevation of 428.61 masl, at BH/MW 8 indicated that the lowest proposed excavation depth elevation is 2.04 m above the highest groundwater elevation. As such, it is not anticipated that construction dewatering for groundwater control will be required for the proposed earthworks for this section of the proposed housing development.

Construction for a Single-Detached House Lot Size (13.7 m x 30.5 m) at an estimated grade elevations ranging from 436.26 and 439.63 masl, Located within the Northwest Portion of the Subject site, in the Vicinity Lot No's. 37 and 99:

For a typical single detached house constriction, in the vicinity of Lot No. 37 and 99, the dewatering calculations, an estimated area for excavation for the average for the average construction footprint is 417.85 square meters. The estimated grade elevation ranges from 436.26 masl and 439.63 masl. An assumed excavation depth of up to 2.5 m (to an elevation, ranging from 433.76 to 437.13 masl) was considered for the construction of the proposed basement foundation and footings. The subsoil comprises sand, gravelly sand and silty sand till, extending to the maximum proposed depths for excavation. To facilitate excavation and construction in dry and stable subsoil conditions, it is proposed that the shallow groundwater table be lowered to an excavation ranging from 432.76 masl to 436.13, which is about 1.0 m below the lowest proposed excavation depths. Comparison of the lowest proposed excavation depth with the highest, measured shallow groundwater level elevation of 435.72 masl, at BH/MW 1, and <430.6 masl at BH/MW 2 indicated that the lowest proposed excavation depth elevation is 0.41 m above the highest groundwater elevation. As such, it is not anticipated that construction dewatering for groundwater control will be required for the proposed earthworks for this section of the proposed housing development.

Construction for a Single-Detached House Lot Size (13.7 m x 30.5 m) at an estimated grade elevation of 442.32 masl, Located within the North Central Portion of the Subject site, in the Vicinity Lot No 249:

For a typical single detached house constriction, in the vicinity of Lot No 249, the dewatering calculations, an estimated area for excavation for the average for the average

construction footprint is 417.85 square meters. The anticipated grade elevation, is estimated at grade elevation of 442.32 masl. An assumed excavation depth of up to 2.5 m (to an elevation, of 439.82 masl) was considered for the construction of the proposed basement foundation and footings. The subsoil comprises sand, extending to the maximum proposed depths for excavation. To facilitate excavation and construction in dry and stable subsoil conditions, it is proposed that the shallow groundwater table be lowered to an excavation of 438.82 masl, which is about 1.0 m below the lowest proposed excavation depths. Comparison of the lowest proposed excavation depth with the highest, measured shallow groundwater level elevation of 436.15 masl, at BH/MW 7 indicated that the lowest proposed excavation depth elevation is 2.67 m above the highest groundwater elevation. As such, it is not anticipated that construction dewatering for groundwater control will be required for the proposed earthworks for this section of the proposed housing development.

Construction for an Average Townhouse House Lot Size (39.3 m x 30.5 m) at an estimated grade elevation of 435.49 masl, Located within the East Portion of the Subject site, in the Vicinity Lot No 434:

For a typical single detached house constriction, in the vicinity of Lot No 434, the dewatering calculations, an estimated area for excavation for the average for the average construction footprint is 1,198.65 square meters. The anticipated grade elevation, is estimated at grade elevation of 435.49 masl. An assumed excavation depth of up to 2.5 m (to an elevation, of 432.99 masl) was considered for the construction of the proposed basement foundation and footings. The subsoil comprises sand, extending to the maximum proposed depths for excavation. To facilitate excavation and construction in dry and stable subsoil conditions, it is proposed that the shallow groundwater table be lowered to an excavation of 431.99 masl, which is about 1.0 m below the lowest proposed excavation depths. Comparison of the lowest proposed excavation depth with the highest, measured shallow groundwater level elevation of 431.81 masl, at BH/MW 11 indicated that the lowest proposed excavation depth elevation is 0.18 m above the highest groundwater elevation. As such, it is not anticipated that construction dewatering for groundwater control will be required for the proposed earthworks for this section of the proposed housing development.

Construction for an Average Townhouse House Lot Size (35.3 m x 28 m) at an estimated grade elevation of 437.92 masl, Located within the Southeast Portion of the Subject site, in the Vicinity Lot No 450:

For a typical single detached house constriction, in the vicinity of Lot No 450, the dewatering calculations, an estimated area for excavation for the average for the average construction footprint is 988.4 square meters. The anticipated grade elevation, is estimated at grade elevation of 437.92 masl. An assumed excavation depth of up to 2.5 m (to an

elevation, of 435.42 masl) was considered for the construction of the proposed basement foundation and footings. The subsoil comprises sand, extending to the maximum proposed depths for excavation. To facilitate excavation and construction in dry and stable subsoil conditions, it is proposed that the shallow groundwater table be lowered to an excavation of 434.32 masl, which is about 1.0 m below the lowest proposed excavation depths. Comparison of the lowest proposed excavation depth with the highest, measured shallow groundwater level elevation of 432.09 masl, at BH/MW 10 indicated that the lowest proposed excavation depth elevation is 2.33 m above the highest groundwater elevation. As such, it is not anticipated that construction dewatering for groundwater control will be required for the proposed earthworks for this section of the proposed housing development.

Construction for an Average Single-Detached House Lot Size (11.7 m x 30.5 m) at an estimated grade elevation of 437.71 masl, Located within the South Center Portion of the Subject site, in the Vicinity Lot No 387:

For a typical single detached house constriction, in the vicinity of Lot No 387, the dewatering calculations, an estimated area for excavation for the average for the average construction footprint is 356.85 square meters. The anticipated grade elevation, is estimated at grade elevation of 437.71 masl. An assumed excavation depth of up to 2.5 m (to an elevation, of 435.21 masl) was considered for the construction of the proposed basement foundation and footings. The subsoil comprises sand, extending to the maximum proposed depths for excavation. To facilitate excavation and construction in dry and stable subsoil conditions, it is proposed that the shallow groundwater table be lowered to an excavation of 434.21 masl, which is about 1.0 m below the lowest proposed excavation depths. Comparison of the lowest proposed excavation depth with the highest, measured shallow groundwater level elevation of 433.36 masl, at BH/MW 9 indicated that the lowest proposed excavation depth elevation is 0.85 m above the highest groundwater elevation. As such, it is not anticipated that construction dewatering for groundwater control will be required for the proposed earthworks for this section of the proposed housing development.

Construction for an Average Single-Detached House Lot Size (11.6 m x 30.5 m) at an estimated grade elevation of 433.83 masl, Located within the South Center Portion of the Subject site, in the Vicinity Lot No 266:

For a typical single detached house constriction, in the vicinity of Lot No 266, the dewatering calculations, an estimated area for excavation for the average for the average construction footprint is 353.80 square meters. The anticipated grade elevation, is estimated at grade elevation of 433.83 masl. An assumed excavation depth of up to 2.5 m (to an elevation, of 431.33masl) was considered for the construction of the proposed basement foundation and footings. The subsoil comprises sand, extending to the maximum proposed

depths for excavation. To facilitate excavation and construction in dry and stable subsoil conditions, it is proposed that the shallow groundwater table be lowered to an excavation of 430.33 masl, which is about 1.0 m below the lowest proposed excavation depths. Comparison of the lowest proposed excavation depth with the highest, measured shallow groundwater level elevation of 429.03 masl, at BH/MW 5 indicated that the lowest proposed excavation depth elevation is 1.30 m above the highest groundwater elevation. As such, it is not anticipated that construction dewatering for groundwater control will be required for the proposed earthworks for this section of the proposed housing development.

7.1.2 Groundwater Construction Dewatering Rates for the Installation of Proposed Underground Services

Installation of Underground Services Beneath Street 2, in the Vicinity of BH/MW 101 at an Estimated Grade Elevation of 210.06 masl

The proposed invert elevations for installation of underground services alignments were not available for our review at the time of the current report preparation. As such, the dewatering needs assessment was based on the lowest proposed servicing invert depth elevation considered at a maximum depth of about 5 m beneath the existing surface elevations, where the invert elevation would be ranging from 427.61 to 443.49 masl at the BH/MWs locations for the current dewatering needs assessment for the subject site. The estimated installation excavation depth elevation ranging from 422.61 to 438.49 masl was utilized for underground services. To facilitate excavation and construction in dry and stable subsoil conditions, it is proposed that the groundwater table be lowered to an elevation ranging from 421.61 to 437.49 masl which is about 1 m below the lowest considered excavation depth. The subsoil profile consists of sand, gravelly sand/sandy gravel, silty sand to sandy silt till, sandy silt and extending to the maximum anticipated excavated depths. As such, the estimated dewatering flow is anticipated to reach a daily rate ranging from 12,459.5 to 131,806.01 L/day; by considering a 3x safety factor, it could reach an approximate daily maximum of 37,378.5 to 395,418.3 L/day. It should be noted that an active dewatering array for an underground servicing trench length of 50 m was considered for the current dewatering needs assessment. The zone of influence is anticipated to be 47.0 m away from the servicing trench excavation.

In accordance with the current policy of the Ministry of the Environment, Conservation and Parks (MECP), where the construction dewatering flow rate is between 50,000 L/day and 400,000 L/day, the approval for proposed groundwater taking for construction is by means of the registering for proposed groundwater-taking for construction by means of the filing an Environmental Activity and Sector Registry (EASR) with its filing through the MECP. Since the estimated dewatering flow rate exceeds 50,000 L/day, and is below the 400.000

L/day PTTW threshold limit, the registering for any proposed groundwater-taking for construction would be through an EASR, and its filing through the MECP. It is recommended that the EASR be filed for the maximum allowable construction dewatering flow rate of 400,000 L/day to also account for the management and removal of any accumulated runoff within the construction excavations following high rainfall events. It is anticipated that, following the lowering of the localized groundwater table, groundwater seepage removed via dewatering from the open excavation will be a fraction of the above estimate. If construction is completed during the dry season (Summer), there may be only minimal, or negligible construction dewatering required as the shallow perched groundwater conditions may not be present during the dry season, typically expected between mid-July through mid-October.

7.1.3 Estimated Construction Dewatering Rates for Construction of the Proposed Stormwater Detention Tanks

For the dewatering needs assessment for the construction of the proposed SWM Detention Tanks, the pond bottom was estimated to be a maximum of 5 m below the existing ground elevation.

Construction for the Proposed Stormwater Management at Block 508 with Size (50 m x 62.5) m) at a Grade Elevation of 427.61 masl, Located Within the Southeastern Portion of the Subject Site:

For the dewatering needs assessment for the construction of the proposed SWM Detention Tank within Block 508, the bottom was estimated to be a maximum of 4 m below the existing ground elevation (423.6 masl), where it has been assumed that the entire proposed area of 2,240 square meters, will be utilized for the proposed SWM pond (s) footprint.

The anticipated grade elevation, is estimated at 427.6 masl. An assumed excavation depth of up to 4.0 m (to an elevation of 423.6 masl) was considered for the lowest proposed pond bottom base elevation to complete the dewatering needs assessment. The shallow groundwater elevation of 423.7 masl, as recorded at BH/MW 4, was compared to the lowest proposed pond base elevations to complete the dewatering needs assessment. To facilitate excavation and construction in dry and stable subsoil conditions, it is proposed that the groundwater table be lowered to an elevation of 422.6 masl, which is about 1.0 m below the lowest proposed pond excavation depth. A maximum anticipated groundwater level drawdown of 1.1 m will be needed to facilitate construction for the SWM pond earthworks within this area of the proposed subdivision. Based on the current assessment, the subsoil underlying the pond footprint area consists of topsoil, underlain by gravelly sand, occasional cobbles and boulders extending to the lowest considered excavation depths for the proposed

Assuming an excavation, being approximately 56 m long by 40 wide for the proposed SWM detention tank, having a perimeter of about 192.0 m, the anticipated dewatering flow rate could reach an estimated daily rate of 20,504.3 L/day; by applying a safety factor of three (3), it could reach a maximum of 61,512.8 L/day. This dewatering flow rate for excavation, is below the PTTW threshold limit of 400,000 L/day but is above 50,000 L/day threshold limit for requiring an approval, with the approval for the proposed groundwater takings being required to be registered through an Environmental Activity and Sector Registry (EASR) with the EASR filing through the MECP. This higher dewatering flow estimates may only occur at the beginning of the construction dewatering process, and includes any rapid removal of collected runoff within the excavation footprint, following a high intensity storm. It is anticipated that, following the lowering of the localized groundwater table, groundwater seepage removed via dewatering from the open excavation will be a fraction of the above estimate, since much of the groundwater in the proposed underground SWM footprint area will have been removed from local storage. Furthermore, upon excavation for, any encountered perched groundwater within the shallow fill horizons is expected to dissipate relatively quickly following commencement of earthworks. If construction is completed during the dry season (Summer), there may be only minimal, or negligible construction dewatering required as the shallow perched groundwater conditions may not be present during the dry season, typically expected between mid-July through mid-October.

Construction for the Proposed Stormwater Management at Block 506 with Size (60m x 125) m) at a Grade Elevation of 434.15 masl, Located Within the western Portion of the Subject Site:

For the dewatering needs assessment for the construction of the proposed SWM Detention Tank within Block 506, the bottom was estimated to be a maximum of 4 m below the existing ground elevation (434.15 masl), where it has been assumed that the entire proposed area of 7,500 square meters, will be utilized for the proposed SWM pond (s) footprint.

The anticipated grade elevation, is estimated at 434.15 masl. An assumed excavation depth of up to 4.0 m (to an elevation of 430.15 masl) was considered for the lowest proposed pond bottom base elevation to complete the dewatering needs assessment. To facilitate excavation and construction in dry and stable subsoil conditions, it is proposed that the groundwater table be lowered to an elevation of 429.15 masl, which is about 1.0 m below the lowest proposed pond excavation depth. Based on the current assessment, the subsoil underlying the footprint area consists of topsoil, underlain by gravelly sand, occasional cobbles and boulders, and silt extending to the maximum proposed depth for excavation. Comparison of the lowest proposed excavation depth with the highest measured shallow

groundwater level elevation of 428.6 masl at BH/MW 8 indicated that he lowest proposed excavation elevation is about 1.2 m above the groundwater table elevation. As such, it is not anticipated that construction dewatering for groundwater control will be required for the proposed SWM Detention Tank.

It is recommended to record the stabilized groundwater levels again over the spring season, from March to June, when groundwater levels are typically at their highest.

7.2 **Groundwater Control Methodology**

Groundwater seepage rates into open excavations below the groundwater table may be controllable by occasional pumping from sump pits when and where needed during earthworks. However due to the unstable nature of sand and gravelly sand below the water table, the shallow groundwater table should be lowered in advanced of excavations, if required. The final designs for the dewatering system will be the responsibility of the construction contractors.

Tables 7-1, which follows, summarizes dewatering flow estimates for the proposed residential structures and for the proposed the SWM area.

Table 7-1 - Summary of Dewatering Flow Estimates-Proposed Residential Structures and SWM

Development Area	Estimated Dimensions (L x W) m	Estimated Grade Elevation/ Minimum Base Elevation (masl)	Depth Elevation for Basement/SWMP (masl)	Highest Measured/Interpreted Water Level Elevation (masl)	Estimated Zone of Influence (m)	Anticipated Maximum Drawdown (m)	Dewatering Flow Estimates (L/day)	Flow Estimates with x 3 Safety Factor (L/day)
Single Detached Housing Lot No. 81	11.8 * 30.5	434.15	431.65	428.61 (BH/MW 8)	No Dewatering Anticipated			
Single Detached Housing Lot No. 37	9.8 * 30.5	439.63	437.13	435.72 (BH/MW 1)				
Single Detached Housing Lot No. 99	9.8 * 30.5	436.26	433.76	430.60 (BH/MW 2)				
Single-Detached Housing Unit Lot No. 249	13.7 * 30.5	442.32	439.82	436.15 (BH/MW 7)				
Townhouse Unit Housing Block No. 434.	(39.3 * 30.5)	435.49	432.99	431.81 (BH/MW 11)				
Townhouse Unit Housing Block No. 450	(35.3 * 28)	437.92	435.42	432.09 (BH/MW 10)				
Single-Detached Housing Unit Lot No. 387	11.7 * 30.5	437.71	435.41	433.36 (BH/MW 9)				
Single-Detached Housing Unit Lot No. 266	11.6 * 30.5	433.83	431.33	429.03 (BH/MW 5)				
Stormwater Management Block No. 508	40 * 56	434.15	430.2	428.60 (BH/MW 4)				
Stormwater Management Block No. 506	60 * 125	427.61	423.6	423.7 (BH/MW 8)	3.7	1.1	20,504.3	61,512.8

Notes: masl -- metres above sea level

7.3 **Mitigation of Potential Impacts Associated with Dewatering**

The zone of influence for any temporary construction dewatering wells or dewatering array used during construction could reach distances of up to 47.0 m away from the conceptual dewatering array wells used around the excavation footprint areas.
The subject site is located within an existing, agricultural area; where the surrounding land use includes existing residential buildings that could be potentially affected by ground settlement associated with the zone of influence for any temporary construction dewatering. It is recommended that a geotechnical engineer be consulted to review potential ground settlement concerns prior to earthworks and construction.

Given that the subject site is underlain by permeable subsoil, the zone of influence from any temporary groundwater control is anticipated to range to moderate distances. As such, any potential impacts from any temporary dewatering on site is anticipated to be minor to negligible, which no long-term impacts being anticipated.

There is an existing house on-site. It is our understood that the housing building will be not be demolished and will remain as a Heritage House.

The very minor wetland is located within the northern portion of the site where it comprises less than 0.5% the total site area. It is recommended to set a buffer around the wetland area, by providing a setback in excess of 30 m from the wetland feature. Given that the wetland and the surrounded wooded area will remain in its natural pre-development state, having an adequate setback should protect it from future impacts. Furthermore, there is no anticipated long-term foundation drainage needs following construction for the proposed housing development. As such there will be no risk of interference to the groundwater function of the area surrounding the wetland. The Hydrological Change Risk Classification for this proposed development area is considered to be minimal for future maintenance of the wetland feature. Since the magnitude of the hydrological change is low, the overall risk to the future maintenance of this wetland feature from the proposed development is considered to be minimal to negligible if that.

7.3 **Groundwater Function for the Subject Site**

The subject site is located within an existing, partially developed residential neighbourhood, and within an agricultural area. There are no waterbodies and water courses on the subject property. The closest water waterbody is situated west of the site. Tributaries of Credit River flow in a general northeast to southwest direction, with other tributaries flowing towards the southeast. Since that the water level monitoring program is still ongoing, a

more detailed discussion for the groundwater function for the subject site will be provided in the final report once the monitoring program is completed.

7.4 **Low Impact Development**

The surficial shallow soil beneath the subject site consists, predominantly of sand and gravel. Opportunities may exist to infiltrate collected runoff to the subsurface at the developed subject site, using appropriate Low Impact Development Infrastructure, which might include infiltration galleries or underground storage/exfiltration tanks.

LID infrastructure can be implemented in areas where the shallow groundwater is deeper than 1.0 m below the ground surface and where it is possible to maintain a minimum of 1.0 m separation between the bases of any proposed LID stormwater management infiltration infrastructure and the high groundwater table.

8.0 CONCLUSIONS

1. The site lies within the Physiographic Region of Southern Ontario known as the Hillsburgh Sandhills and is within a former spillway.
2. Based on review of the surface geological map of Ontario, the subject site is underlain by the Glaciofluvial ice-contact deposits at the northwest portion and the Glaciofluvial outwash deposits within the southeast portion. The Glaciofluvial ice-contact deposits consist of gravel and sand, includes esker, kame, end moraine, ice-marginal delta and subaqueous fan deposits. The Glaciofluvial outwash deposits consist of gravel and sand, includes also proglacial river and deltaic deposits.
3. The subject site is located within the Credit River Watershed.
4. A review of the topography map for the area, and from review of the ground surface elevations at the borehole and monitoring well locations, indicates that the subject site is generally descending towards the southwest, towards Trafalgar Road.
5. The findings from the current study reveal that beneath the topsoil and ploughed soil horizons, beneath the ground surface, the subject site is underlain, predominantly by sand and gravelly sand deposits. Sandy silt to silty sand till or silt deposits were generally contacted in the lower stratigraphy in some of the boreholes. A localized sandy silt deposit was contacted near the ground surface below the ploughed soil in Borehole 6.
6. The findings of this study confirm that the groundwater table level elevations range from <421.51 to 440.74 masl, The measured groundwater levels at the BH/MWs indicate that shallow groundwater is interpreted to be flowing in southwesterly directions, away from interpreted, localized groundwater high areas, located beneath the northwestern and eastern portions of the subject site. Shallow groundwater is interpreted to flow in the direction of the tributary for Credit River that is located southwest of the subject site.
7. The monitoring wells with sufficient groundwater volumes within them underwent single well response tests (SWRTs) to estimate the hydraulic conductivity at the depths for the monitoring well screens. The results for the SWRT's will be presented in the final hydrogeological assessment report. The single well response tests yielded hydraulic conductivity (K estimate) for the underlying sub-soils for gravelly sand/sandy gravel unit ranges from 5.2×10^{-7} to 5.7×10^{-7} m/s, and the K estimate for the silt and sand unit is 3.6×10^{-6} m/s. The results of the SWRT provide an indication of the yield capacity for the groundwater-bearing subsoil strata at the depths of the monitoring well screens. The above results suggest that the K estimate for the groundwater-bearing subsoils at the depths of the well screen is low to moderate with corresponding low to moderate anticipated groundwater seepage rates

into open excavations, below the groundwater table.

8. Hazen Equation calculated permeability results indicate that the the K estimate for the sub-soil units beneath the subject site ranges from 5.63×10^{-5} to 1.22×10^{-5} m/sec. The results of the SWRT provide an indication of the yield capacity for the groundwater-bearing subsoil strata primarily above the depths of the monitoring wells screens. The above result suggests that the K estimate for the groundwater-bearing subsoils ranges from low to high with corresponding moderate anticipated groundwater seepage rates into open excavations, below the groundwater table.
9. The measured groundwater levels at the BH/MWs indicate that shallow groundwater is interpreted to be flowing in southwesterly directions, away from interpreted, localized groundwater high areas, located beneath the northwestern and eastern portions of the subject site. Shallow groundwater is interpreted to flow in the direction of the tributary for Credit River that is located southwest of the subject site.
10. The groundwater at the subject site is approximately 0.14 to 2.67 m below the base elevation for the proposed basement structures for portions of the residential housing buildings. It is therefore not anticipated that any construction dewatering will be required for earthworks and construction of the proposed houses.
11. The groundwater levels in the vicinity of Block 508, where the stormwater management detention tank is located is approximately 0.5 m below the estimated proposed bottom levels, and, as such, it is not anticipated that dewatering for groundwater control will be required for the construction of this stormwater management, within this area of the proposed development.
12. The dewatering flow estimates for construction of the proposed stormwater management detention tank located within the vicinity of Block 506 of the site, suggests that it could reach an estimated daily rate of 20,504.3 L/day; by applying a safety factor of three (3), it could reach a maximum of 61,512.8 L/day. This dewatering flow rate for excavation, is below the PTTW threshold limit of 400,000 L/day but is above 50,000 L/day threshold limit for requiring an approval, with the approval for the proposed groundwater takings for construction being required to be registered through an Environmental Activity and Sector Registry (EASR) with the EASR filing through the MECP.
13. The highest estimated temporary dewatering flow rates for installation of the underground services could reach a maximum daily rate of 131,806.1 L/day; by considering a 3x safety factor, it could reach an approximate daily maximum of 395,418.3 L/day. Since the estimated dewatering flow rate exceeds 50,000 L/day but is below the 400,000 L/day PTTW threshold limit, the approval for any proposed temporary groundwater-taking for construction is by means of applying for an EASR approval with the MECP.
14. The estimated zone of influence for any conceptual dewatering wells or dewatering array around excavation footprints could reach maximums of 47.0 m away from the

conceptual dewatering array around the servicing trenches.

15. The surficial shallow soil beneath the subject site consists, predominantly of sand and gravel. Opportunities may exist to infiltrate collected runoff to the subsurface at the developed subject site, using appropriate Low Impact Development Infrastructure, which could include infiltration galleries or underground storage/exfiltration tanks. LID infrastructure can be implemented in areas where the shallow groundwater is deeper than 1.0 m below the ground surface and where it is possible to maintain a minimum of 1.0 m separation between the bases of any proposed LID stormwater management infiltration infrastructure and the high groundwater table.

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9.0 REFERENCES

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2. Bedrock Geology of Ontario, 1993, Data set 6, Ministry of Northern Development
3. D.P. Rogers, R.C. Ostry and P.F. Karrow, 1961, Metropolitan Toronto Bedrock Contours, Ontario Department of Mines, Preliminary Map 102.
4. Oakridges Moraine Groundwater Program (https://www.oakridgeswater.ca/)
5. Rising to the Challenge: A Handbook for Understanding and Protecting the Credit River Watershed, 2009, Credit Valley Conservation.

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FIGURES 1 to 16

BOREHOLE LOGS/MONITORING WELL LOGS
AND
GRAIN SIZE ANALYSIS

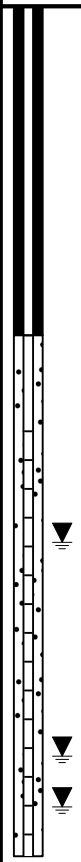
REFERENCE NO. 2206-W054

JOB NO.: 2206-W054 # LOG OF BOREHOLE: BH/MW 1 **FIGURE NO.:** 1

PROJECT DESCRIPTION: Proposed Residential Development **METHOD OF BORING:** Flight Auger

PROJECT LOCATION: 63 and 63A Trafalgar Road, Town of Erin **DRILLING DATE:** November 23, 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
439.6	Ground Surface							
0.0	**36 cm Topsoil**	1	DO	12	0		16	
439.1 / 0.5	**PLOUGHED SOIL** Dark brown sand, occ. rootlets; Brown, compact							
438.6 / 1.0	**SAND** fine to medium grained; Brown, very dense	2	DO	50/15	1			
	GRAVELLY SAND occ. cobbles and boulders	3	DO	72			4	
		4	DO	50/10	2			
		5	DO	88	3		5	
435.9 / 3.7	Very dense to dense	6	DO	50	4		8	
	SILTY SAND TILL some gravel to gravelly, a trace of clay, occ. cobbles and boulders — — brown / grey	7	DO	66	5		6	
		8	DO	35	6		7	
433.0 / 6.6	**END OF BOREHOLE** Installed 50 mm Ø monitoring well to 6.2 m completed with 3.1 m screen. Sand backfill from 2.4 to 6.2 m. Bentonite seal from 0.0 m to 2.4 m. Provided with a monument casing	9	DO	36	7		8	
					8			
					9			
					10			



W.L. @ El. 435.72 masl on Dec 01, 2022
W.L. @ El. 434.16 masl on Jan 05, 2023
W.L. @ El. 433.79 masl on Feb 08, 2023

Soil Engineers Ltd.

JOB NO.: 2206-W054 # LOG OF BOREHOLE: BH/MW 2 **FIGURE NO.:** 2

PROJECT DESCRIPTION: Proposed Residential Development **METHOD OF BORING:** Flight Auger

PROJECT LOCATION: 63 and 63A Trafalgar Road, Town of Erin **DRILLING DATE:** November 22, 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
436.3	Ground Surface							
0.0	**36 cm Topsoil**				0			
	PLOUGHED SOIL Dark brown sand, occ. rootlets	1	DO	6			14	
435.6								
0.7	Brown, loose							
	SAND fine to medium grained	2	DO	5	1		6	
		3	DO	7	2		9	
433.9								
2.4	Brown, dense to very dense	4	DO	45			5	
	GRAVELLY SAND occ. cobbles and boulders	5	DO	50/15	3		4	
		6	DO	50/15	4		5	
		7	DO	60	5		3	
429.7					6			
6.6	**END OF BOREHOLE** Installed 50 mm Ø monitoring well to 6.2 m completed with 3.1 m screen Sand backfill from 2.4 to 6.2 m Bentonite seal from 0.0 m to 2.4 m Provided with a monument casing				7			Dry on Dec 01, 2022 Dry on Jan 05, 2023 Dry on Feb 08, 2023
					8			
					9			
					10			

Soil Engineers Ltd.

JOB NO.: 2206-W054 **LOG OF BOREHOLE: BH/MW 3** **FIGURE NO.:** 3

PROJECT DESCRIPTION: Proposed Residential Development **METHOD OF BORING:** Flight Auger

PROJECT LOCATION: 63 and 63A Trafalgar Road, Town of Erin **DRILLING DATE:** November 24, 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
434.1	Ground Surface							
0.0	**36 cm Topsoil**	1	DO	7	0		18	
	PLOUGHED SOIL Dark brown sand, occ. rootlets							
433.4								
0.7	Brown, compact	2	DO	12	1		10	
	SAND fine to medium grained							
432.7								
1.4	Brown, dense to very dense	3	DO	60	2		3	
	GRAVELLY SAND occ. cobbles and boulders wet below 5.5 m	4	DO	52			3	
		5	DO	39	3		3	
		6	DO	50/15	4		2	
		7	DO	54	5		10	
427.5					6			
6.6	**END OF BOREHOLE** Installed 50 mm Ø monitoring well to 6.2 m completed with 3.1 m screen Sand backfill from 2.4 to 6.2 m Bentonite seal from 0.0 m to 2.4 m Provided with a monument casing				7			
					8			
					9			
					10			

W.L. @ El. 428.17 masl on Dec 01, 2022
W.L. @ El. 428.21 masl on Jan 05, 2023
W.L. @ El. 428.20 masl on Feb 08, 2023

Soil Engineers Ltd.

JOB NO.: 2206-W054 **LOG OF BOREHOLE: BH/MW 4** ***FIGURE NO.:*** **4**

PROJECT DESCRIPTION: Proposed Residential Development ***METHOD OF BORING:*** Flight Auger

PROJECT LOCATION: 63 and 63A Trafalgar Road, Town of Erin ***DRILLING DATE:*** November 18, 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
427.6	Ground Surface							
0.0	**36 cm Topsoil**	1	DO	11	0		16	
	PLOUGHED SOIL Dark brown sand, occ. rootlets							
426.7		2	DO	50/5	1		16	
0.9	Brown, dense to very dense							
	GRAVELLY SAND occ. cobbles and boulders	3	DO	50/15			4	
					2			
		4	DO	34			4	
		5	DO	38	3		2	
		6	DO	50/15	4		3	
					5			
					6			
421.2		7	DO	50/10			3	
6.4	**END OF BOREHOLE**				7			
	Installed 50 mm Ø monitoring well to 6.1 m completed with 3.1 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 casing				8			
					9			
					10			

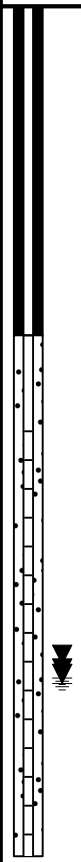
Dry on Dec 01, 2022
W.L. @ El. 423.73 masl on Jan 05, 2023
W.L. @ El. 423.71 masl on Feb 08, 2023

JOB NO.: 2206-W054 # LOG OF BOREHOLE: BH/MW 5 **FIGURE NO.:** 5

PROJECT DESCRIPTION: Proposed Residential Development **METHOD OF BORING:** Flight Auger

PROJECT LOCATION: 63 and 63A Trafalgar Road, Town of Erin **DRILLING DATE:** November 24, 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
433.8	Ground Surface							
0.0	**36 cm Topsoil**				0			
	PLOUGHED SOIL Dark brown sand, occ. rootlets	1	DO	4			16	
433.1								
0.7	Brown, compact							
	SAND fine grained some silt	2	DO	7	1		5	
		3	DO	4	2		6	
		4	DO	21			5	
		5	DO	27	3		11	
429.7					4			
4.1	Brown, dense							
	GRAVELLY SAND occ. cobbles and boulders	6	DO	42	5		9	
428.2								
5.6	Brown, dense				6			
	SANDY SILT TILL traces of gravel and clay occ. cobbles and boulders	7	DO	40			19	
427.2								
6.6	**END OF BOREHOLE**				7			
	Installed 50 mm Ø monitoring well to 6.2 m completed with 3.1 m screen Sand backfill from 2.4 to 6.2 m Bentonite seal from 0.0 m to 2.4 m Provided with a monument casing				8			
					9			
					10			



W.L. @ El. 428.89 masl on Dec 01, 2022
W.L. @ El. 428.93 masl on Jan 05, 2023
W.L. @ El. 429.03 masl on Feb 08, 2023

Soil Engineers Ltd.

JOB NO.: 2206-W054 # LOG OF BOREHOLE: BH/MW 6 **FIGURE NO.:** 6

PROJECT DESCRIPTION: Proposed Residential Development **METHOD OF BORING:** Flight Auger

PROJECT LOCATION: 63 and 63A Trafalgar Road, Town of Erin **DRILLING DATE:** November 21, 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
443.5	Ground Surface							
0.0	**36 cm Topsoil**				0			
	PLOUGHED SOIL Dark brown sand, occ. rootlets	1	DO	10			14	
442.8								
0.7	Brown, compact							
	SANDY SILT some gravel	2	DO	12	1		11	
		3	DO	10			12	
441.3					2			
2.2	Brown, compact to very dense							
	SANDY GRAVEL occ. cobbles and boulders	4	DO	25			12	
		5	DO	38	3		11	
		6	DO	24	4		12	
		7	DO	50/28			8	
438.5					5			
5.0	**END OF BOREHOLE**							
	Installed 50 mm Ø monitoring well to 4.6 m completed with 3.1 m screen Sand backfill from 0.9 to 4.6 m Bentonite seal from 0.0 m to 0.9 m Provided with a monument casing				6			
					7			
					8			
					9			
					10			

W.L. @ El. 440.32 masl on Dec 01, 2022
W.L. @ El. 440.74 masl on Jan 05, 2023
W.L. @ El. 440.53 masl on Feb 08, 2023

Soil Engineers Ltd.

JOB NO.: 2206-W054 **LOG OF BOREHOLE: BH/MW 7** **FIGURE NO.:** 7

PROJECT DESCRIPTION: Proposed Residential Development **METHOD OF BORING:** Flight Auger

PROJECT LOCATION: 63 and 63A Trafalgar Road, Town of Erin **DRILLING DATE:** November 23, 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
442.3	Ground Surface							
0.0	**36 cm Topsoil**				0			
	PLOUGHED SOIL Dark brown sand, occ. rootlets	1	DO	6			13	
441.6								
0.7	Brown, very loose to very dense							
	SAND fine to well graded a trace to some gravel	2	DO	3	1		12	
		3	DO	18	2		3	
		4	DO	48			3	
		5	DO	34	3		3	
		6	DO	50/23	5		3	
		7	DO	45	6		3	
435.7								
6.6	**END OF BOREHOLE** Installed 50 mm Ø monitoring well to 6.2 m completed with 3.1 m screen Sand backfill from 2.4 to 6.2 m Bentonite seal from 0.0 m to 2.4 m Provided with a monument casing				7 8 9 10			

Dry on Dec 01, 2022
Dry on Jan 05, 2023
W.L. @ El. 436.15 masl on Feb 08, 2023

JOB NO.: 2206-W054 **LOG OF BOREHOLE: BH/MW 8** **FIGURE NO.:** 8

PROJECT DESCRIPTION: Proposed Residential Development **METHOD OF BORING:** Flight Auger

PROJECT LOCATION: 63 and 63A Trafalgar Road, Town of Erin **DRILLING DATE:** November 22, 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
434.3	Ground Surface							
0.0	**36 cm Topsoil**				0			
433.8	**PLOUGHED SOIL**	1	DO	9			14	
0.5	Dark brown sand, occ. rootlets Brown, dense to very dense							
	GRAVELLY SAND occ. cobbles and boulders	2	DO	37	1		4	
		3	DO	58	2		4	
		4	DO	50/10			3	
		5	DO	50/15	3		5	
		6	DO	50/15	4		5	
428.8					5			
5.5	Brown, very dense							
	SILT fine grained	7	DO	56	6		19	
427.7								
6.6	**END OF BOREHOLE**				7			
	Installed 50 mm Ø monitoring well to 6.2 m completed with 3.1 m screen Sand backfill from 2.4 to 6.2 m Bentonite seal from 0.0 m to 2.4 m Provided with a monument casing				8			
					9			
					10			

Dry on Dec 01, 2022
W.L. @ El. 428.61 masl on Jan 05, 2023
W.L. @ El. 428.22 masl on Feb 08, 2023

Soil Engineers Ltd.

JOB NO.: 2206-W054 **LOG OF BOREHOLE: BH/MW 9** **FIGURE NO.:** 9

PROJECT DESCRIPTION: Proposed Residential Development **METHOD OF BORING:** Flight Auger

PROJECT LOCATION: 63 and 63A Trafalgar Road, Town of Erin **DRILLING DATE:** November 24, 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
437.7	Ground Surface							
0.0	**36 cm Topsoil**				0			
	PLOUGHED SOIL Dark brown sand, occ. rootlets	1	DO	5			19	
437.0								
0.7	Brown, compact							
	SAND fine to medium grained	2	DO	4	1		15	
435.9		3	DO	31			9	
1.8	Brown, dense to very dense				2			
	GRAVELLY SAND occ. cobbles and boulders	4	DO	50/15			3	
		5	DO	50/10	3		5	
					4			
433.0		6	DO	50/3			5	
4.7	**END OF BOREHOLE**				5			
	Installed 50 mm Ø monitoring well to 4.4 m completed with 3.1 m screen Sand backfill from 0.9 to 4.4 m Bentonite seal from 0.0 m to 0.9 m Provided with a monument casing				6			
					7			
					8			
					9			
					10			

Dry on Dec 01, 2022
Dry on Jan 05, 2023
W.L. @ El. 433.36 masl on Feb 08, 2023

Soil Engineers Ltd.

JOB NO.: 2206-W054 # LOG OF BOREHOLE: BH/MW 10 **FIGURE NO.:** 10

PROJECT DESCRIPTION: Proposed Residential Development

METHOD OF BORING: Flight Auger

PROJECT LOCATION: 63 and 63A Trafalgar Road, Town of Erin

DRILLING DATE: November 25, 2022

El. (m) / Depth (m)	SOIL DESCRIPTION	SAMPLES Number	Type	N-Value	Depth Scale (m)
437.9 / 0.0	Ground Surface				0
	36 cm Topsoil	1	DO	4	
	PLOUGHED SOIL Dark brown sand, occ. rootlets				
437.2 / 0.7	Brown, compact	2	DO	17	1
	SAND fine to medium grained				
436.4 / 1.5	Brown, dense to very dense	3	DO	50/28	
	GRAVELLY SAND occ. cobbles and boulders wet below 5.1 m				2
		4	DO	26	
		5	DO	46	3
		6	DO	22	4
		7	DO	50/15	5
		8	DO	42	6
431.2 / 6.7		9	DO	32	
	END OF BOREHOLE				7
	Installed 50 mm Ø monitoring well to 6.1 m completed with 3.1 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 casing				8
					9
					10

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

17 7 7 4 6 3 4 12 12

WATER LEVEL

W.L. @ El. 432.09 masl on Dec 01, 2022
Dry on Jan 05, 2023
Dry on Feb 08, 2023

Soil Engineers Ltd.

JOB NO.: 2206-W054 # LOG OF BOREHOLE: BH/MW 11 **FIGURE NO.:** 11

PROJECT DESCRIPTION: Proposed Residential Development

METHOD OF BORING: Flight Auger

PROJECT LOCATION: 63 and 63A Trafalgar Road, Town of Erin

DRILLING DATE: November 25, 2022

El. (m) / Depth (m)	SOIL DESCRIPTION	SAMPLES Number	Type	N-Value	Depth Scale (m)
435.5 / 0.0	Ground Surface				
	36 cm Topsoil	1	DO	12	0
	PLOUGHED SOIL Dark brown sand, occ. rootlets				
434.8 / 0.7	Brown, dense to very dense	2	DO	40	1
	SAND well graded trace to some gravel	3	DO	74	2
		4	DO	62	
		5	DO	46	3
431.4 / 4.1	Dense				4
	SILT fine grained occ. clay seams	6	DO	38	5
	brown / grey	7	DO	38	6
428.9 / 6.6	**END OF BOREHOLE** Installed 50 mm Ø monitoring well to 6.1 m completed with 3.1 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 casing				7 8 9 10

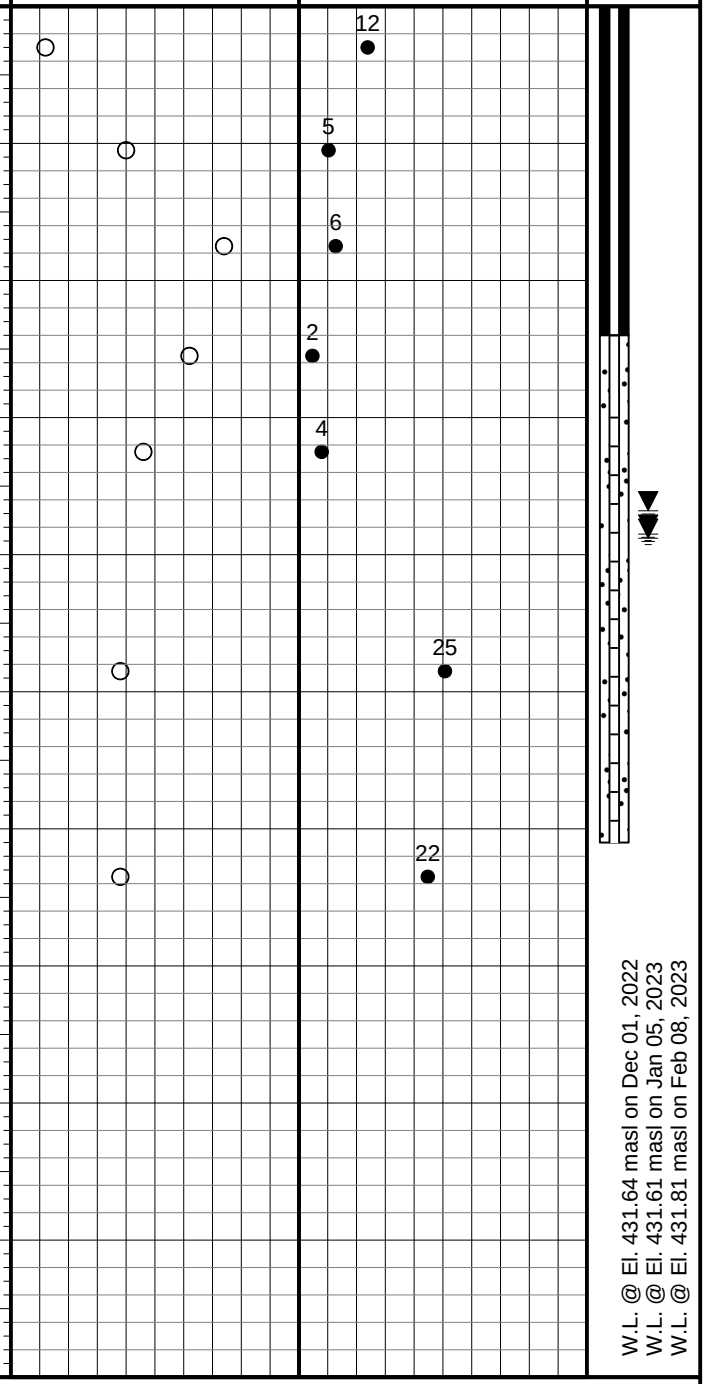
Dynamic Cone (blows/30 cm) 10 30 50 70 90

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

W.L. @ El. 431.64 masl on Dec 01, 2022
W.L. @ El. 431.61 masl on Jan 05, 2023
W.L. @ El. 431.81 masl on Feb 08, 2023

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GRAIN SIZE DISTRIBUTION

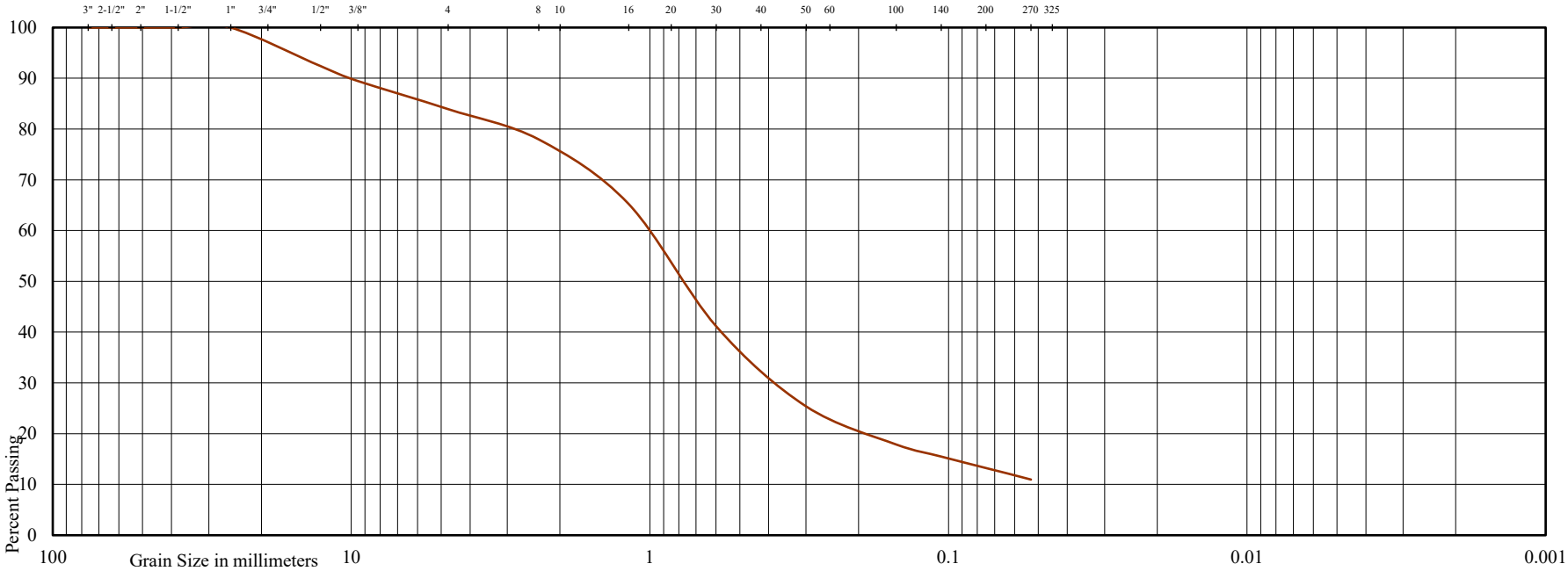
Reference No: 2206-S054

U.S. BUREAU OF SOILS CLASSIFICATION

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

UNIFIED SOIL CLASSIFICATION

GRAVEL		SAND			SILT & CLAY
COARSE	FINE	COARSE	MEDIUM	FINE	



Project: Somewhere

Location: Someplace

Borehole No: 7

Sample No: 6

Depth (m): 4.8

Elevation (m):

Liquid Limit (%) = -

Plastic Limit (%) = -

Plasticity Index (%) = -

Moisture Content (%) = -

Estimated Permeability (cm./sec.) = 10^{-3}

Classification of Sample [& Group Symbol]:	FINE TO MEDIUM SAND some silt and gravel, a trace of coarse sand

Figure: 12

Soil Engineers Ltd.

GRAIN SIZE DISTRIBUTION

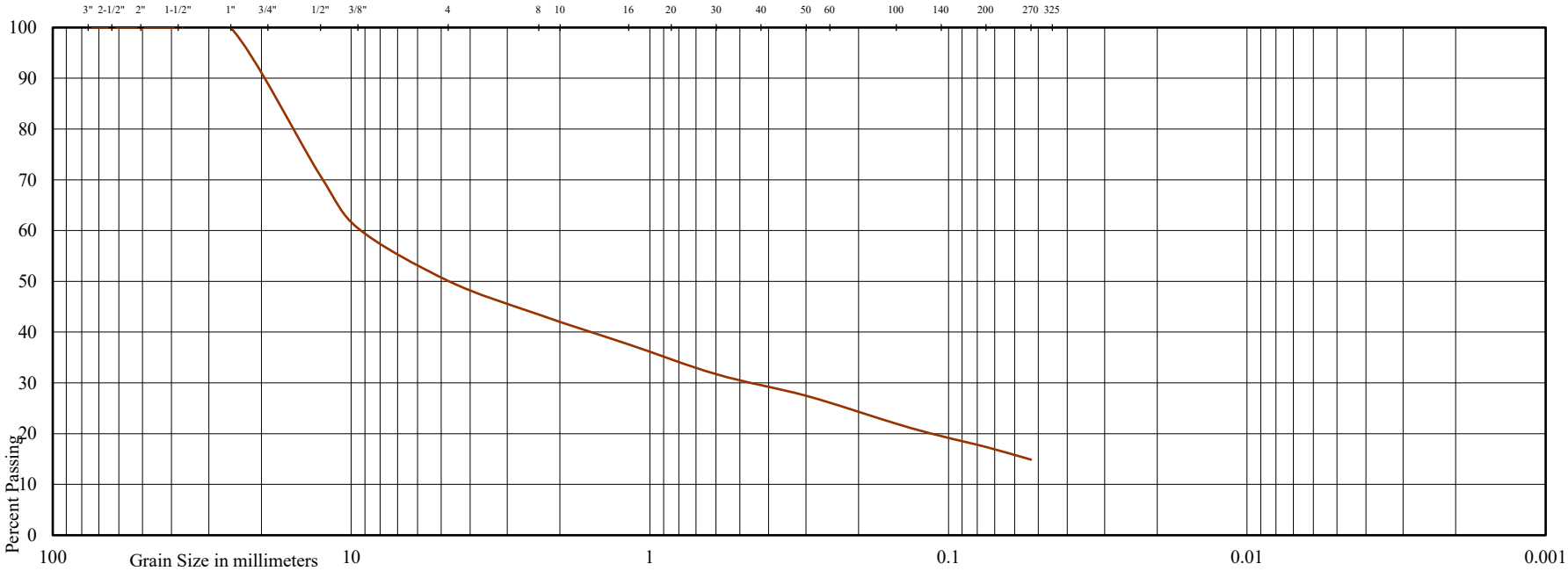
Reference No: 2206-S054

U.S. BUREAU OF SOILS CLASSIFICATION

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

UNIFIED SOIL CLASSIFICATION

GRAVEL		SAND			SILT & CLAY
COARSE	FINE	COARSE	MEDIUM	FINE	



Project: Somewhere

Location: Someplace

Borehole No: 1

Sample No: 5

Depth (m): 3.3

Elevation (m):

Liquid Limit (%) = -

Plastic Limit (%) = -

Plasticity Index (%) = -

Moisture Content (%) = -

Estimated Permeability (cm./sec.) = 10^{-3}

Classification of Sample [& Group Symbol]:	SANDY GRAVEL some silt

Figure: 13

Soil Engineers Ltd.

GRAIN SIZE DISTRIBUTION

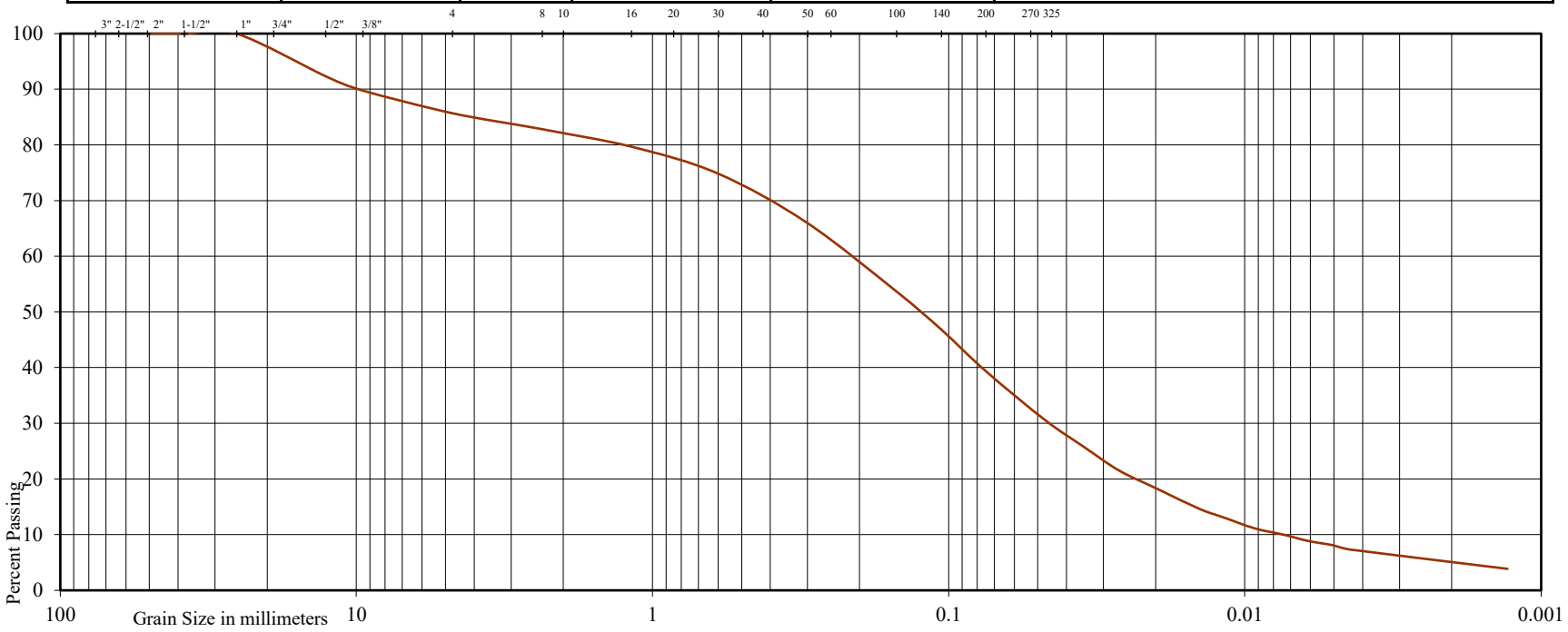
Reference No: 2206-S054

U.S. BUREAU OF SOILS CLASSIFICATION

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

UNIFIED SOIL CLASSIFICATION

GRAVEL		SAND			SILT & CLAY
COARSE	FINE	COARSE	MEDIUM	FINE	



Project: JOB NAME

Location: JOB LOCATION

Borehole No: 5

Sample No: 4

Depth (m): 4.5

Elevation (m):

Liquid Limit (%) = -

Plastic Limit (%) = -

Plasticity Index (%) = -

Moisture Content (%) = -

Estimated Permeability (cm./sec.) = 10^{-4}

Classification of Sample [& Group Symbol]: SILTY SAND, TILL

some gravel, a trace of clay

Figure: 14

Soil Engineers Ltd.

GRAIN SIZE DISTRIBUTION

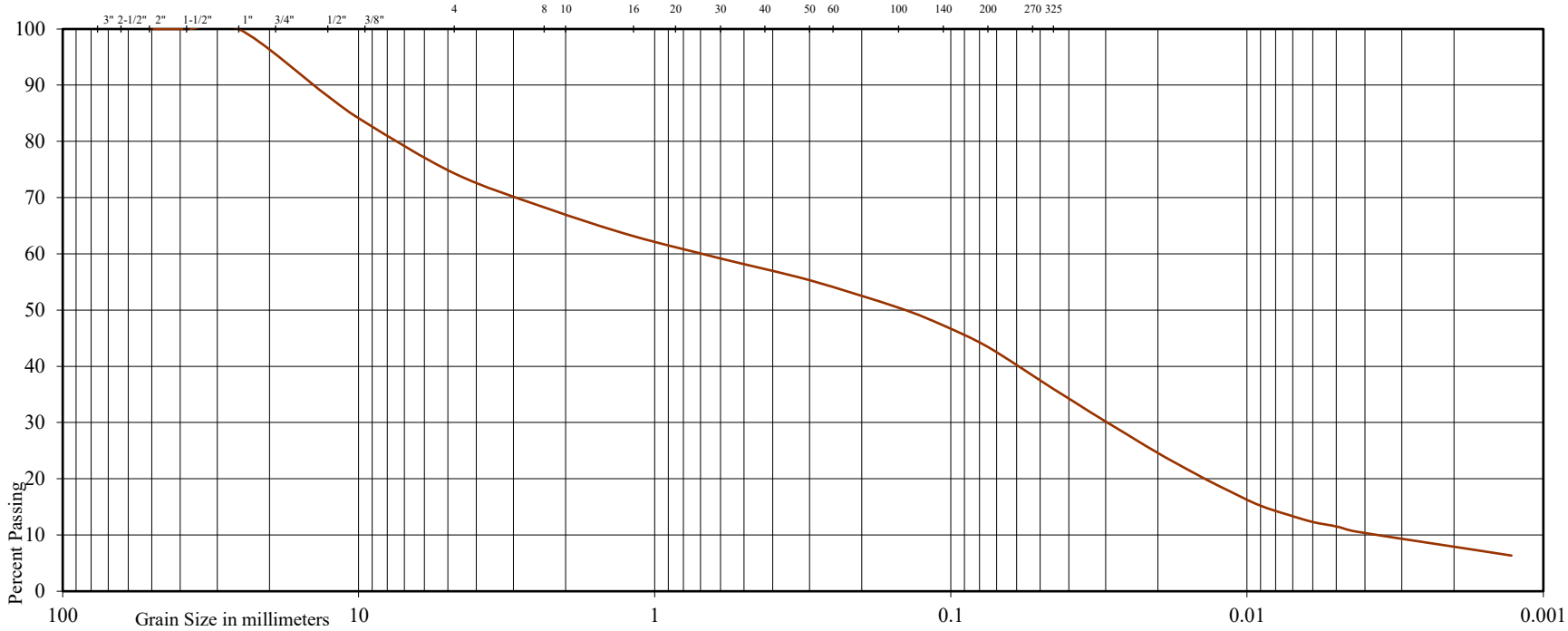
Reference No: 2206-S054

U.S. BUREAU OF SOILS CLASSIFICATION

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

UNIFIED SOIL CLASSIFICATION

GRAVEL		SAND			SILT & CLAY
COARSE	FINE	COARSE	MEDIUM	FINE	



Project: JOB NAME

Location: JOB LOCATION

Borehole No: 5

Sample No: 7

Depth (m): ?

Elevation (m): ?

Liquid Limit (%) = -

Plastic Limit (%) = -

Plasticity Index (%) = -

Moisture Content (%) = -

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

Classification of Sample [& Group Symbol]: SANDY SILT, TILL
gravelly, a trace of clay

Figure 15

Soil Engineers Ltd.

GRAIN SIZE DISTRIBUTION

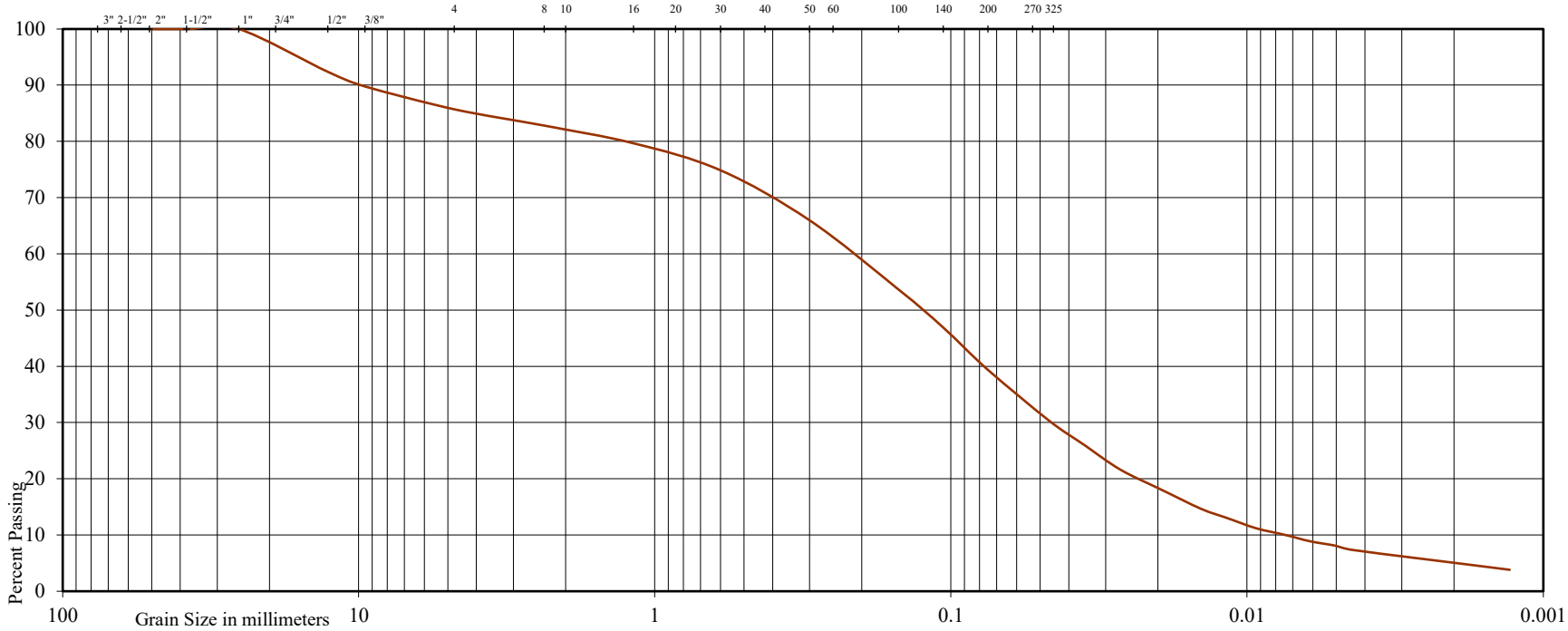
Reference No: 2206-S054

U.S. BUREAU OF SOILS CLASSIFICATION

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

UNIFIED SOIL CLASSIFICATION

GRAVEL		SAND			SILT & CLAY
COARSE	FINE	COARSE	MEDIUM	FINE	



Project: JOB NAME

Location: JOB LOCATION

Borehole No: 1

Sample No: 5

Depth (m): ?

Elevation (m): ?

Liquid Limit (%) = -

Plastic Limit (%) = -

Plasticity Index (%) = -

Moisture Content (%) = -

Estimated Permeability (cm./sec.) = 10^{-4}

Classification of Sample [& Group Symbol]: SILTY SAND, TILL

some gravel, a trace of clay

Figure 16

Soil Engineers Ltd.
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BARRIE	MISSISSAUGA	OSHAWA	NEWMARKET	GRAVENHURST	HAMILTON
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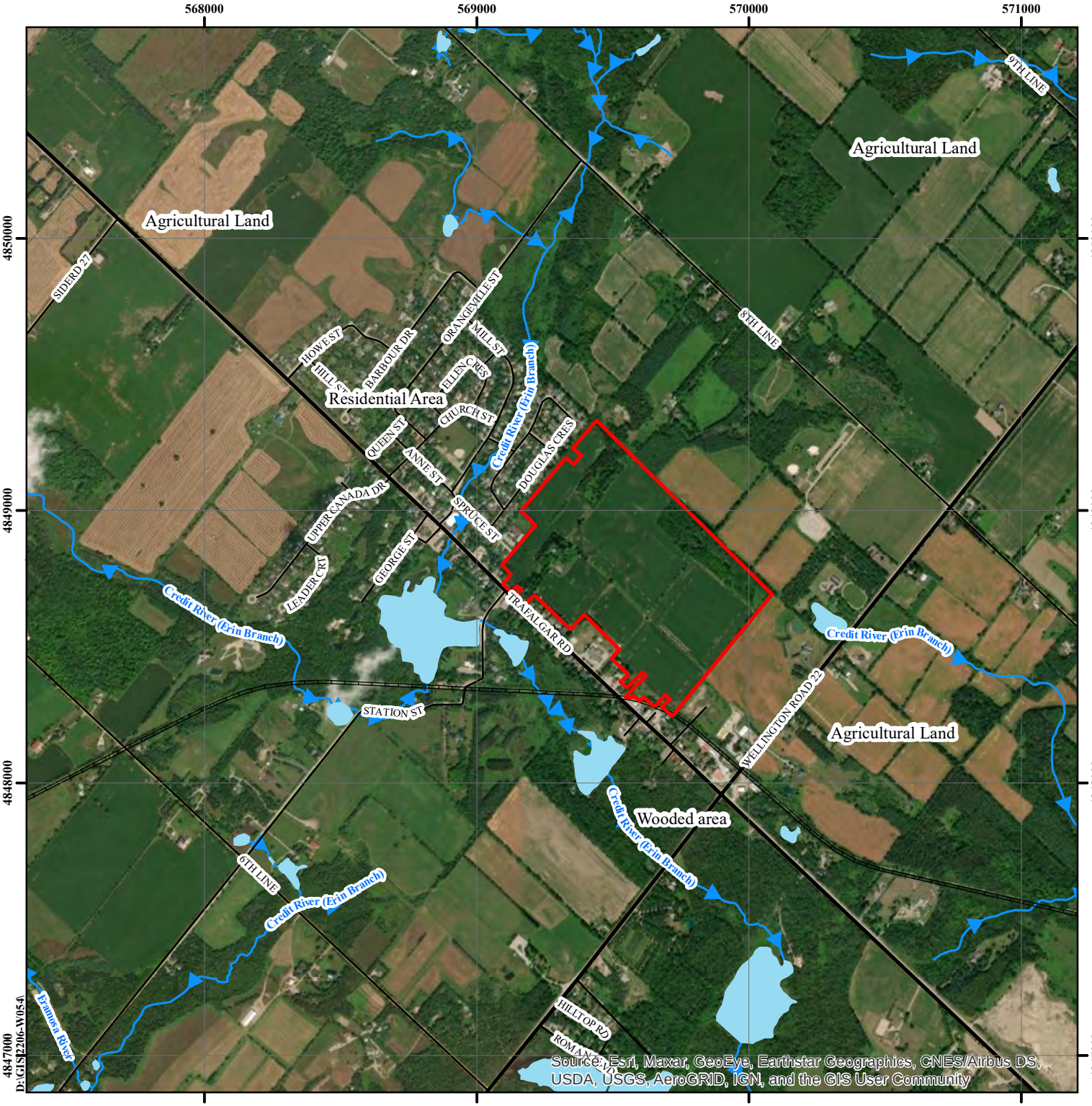
FAX: (705) 721-7864	FAX: (905) 542-2769	FAX: (905) 725-1315	FAX: (905) 881-8335	FAX: (705) 684-8522	FAX: (905) 542-2769

DRAWINGS 1 to 9

REFERENCE NO. 2206-W054



N

Legend

- Approximate Boundary of Subject Site
- waterbody
- Watercourse
- Major Road
- Local Road
- Railway

Soil Engineers Ltd.

Title: Site Location Plan

Project:

Hydrogeological Assessment
Proposed Residential Development
Address: 63 and 63A Trafalgar Road,
Town of Erin, ON

Reference No. 2206-W054

Date: December 21, 2022

Scale:

0 85 170 340 510 680 850
Metres

Drawing No. 1

N

Legend

- Approximate Boundary of Subject Site
- Road
- Railway
- Borehole with Monitoring Well
- Waterbody
- Watercourse

Soil Engineers Ltd.

Title: Borehole and Monitoring Well Location Plan

Project:

Hydrogeological Assessment
Proposed Residential Development
Address: 63 and 63A Trafalgar Road,
Town of Erin, ON

Reference No. 2206-W054

Date: December 21, 2022

Scale:
0 30 60 120 180 240 300
Metres

Drawing No. 1

D:\GIS\2206-W054\

Source: Ontario Ministry of Natural Resources and Forestry

N

Legend

- Approximate Boundary of Subject Site
- 500 metres from Subject Site Boundary
- Well Location from MECP Well Records (see Appendix 'A')
- Major Road
- Local Road
- Railway
- Waterbody
- Watercourse

Soil Engineers Ltd.

Title: MECP Well Location Plan

Project:

Hydrogeological Assessment
Proposed Residential Development
Address: 63 and 63A Trafalgar Road,
Town of Erin, ON

Reference No. 2206-W054

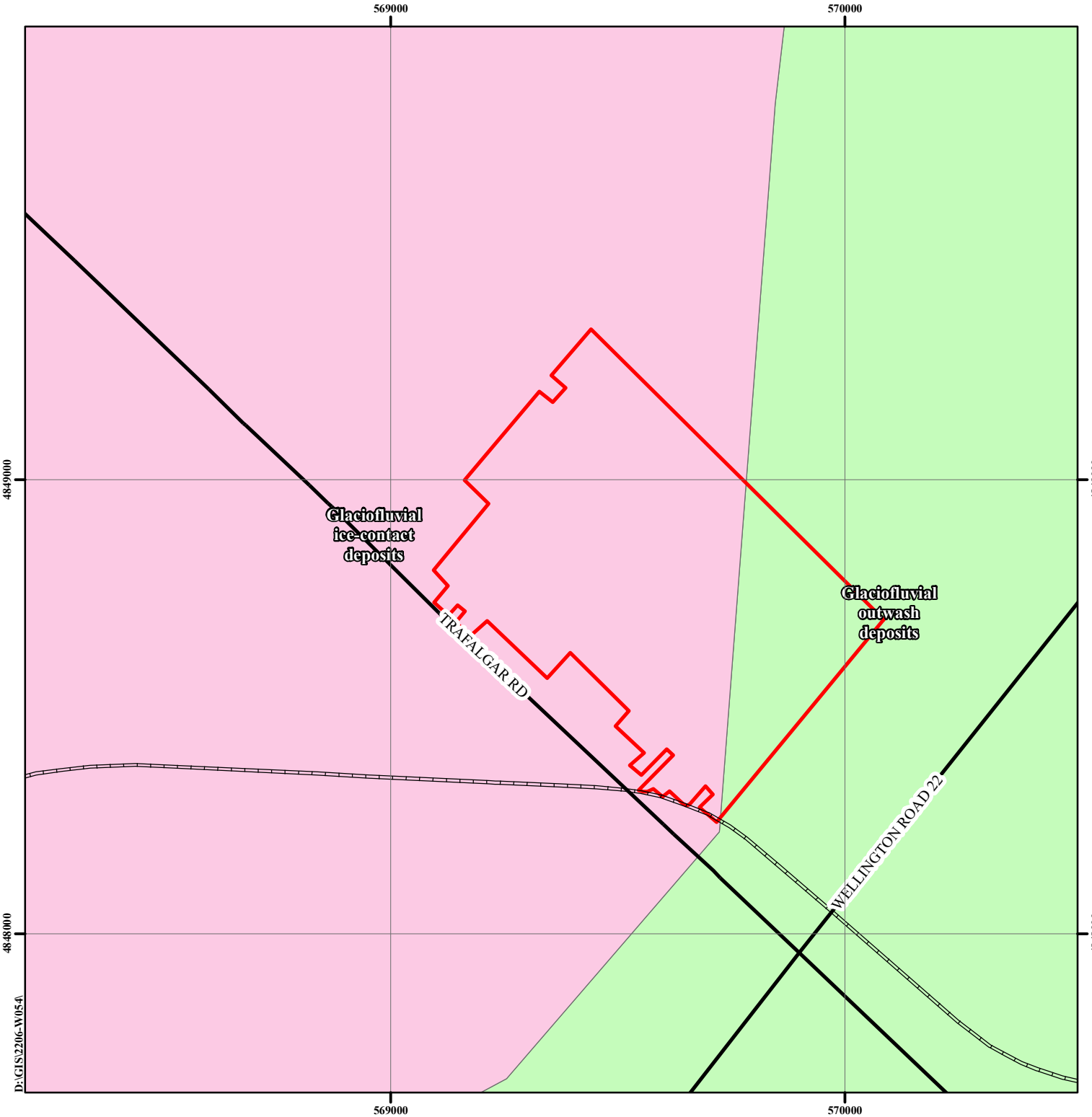
Date: December 21, 2022

Scale:

0 55 110 220 330 440 550

Metres

Drawing No. 3



N

Legend

- Approximate Boundary of Subject Site
- Glaciofluvial ice-contact deposits
  Material: gravel and sand, minor till, includes esker, kame, end moraine, ice-marginal delta and subaqueous fan deposits
- Glaciofluvial outwash deposits
  Material: gravel and sand, includes proglacial river and deltaic deposits
- Major Road
- Railway

Soil Engineers Ltd.

Title: Quarternary and Surface Geology Map

Project:

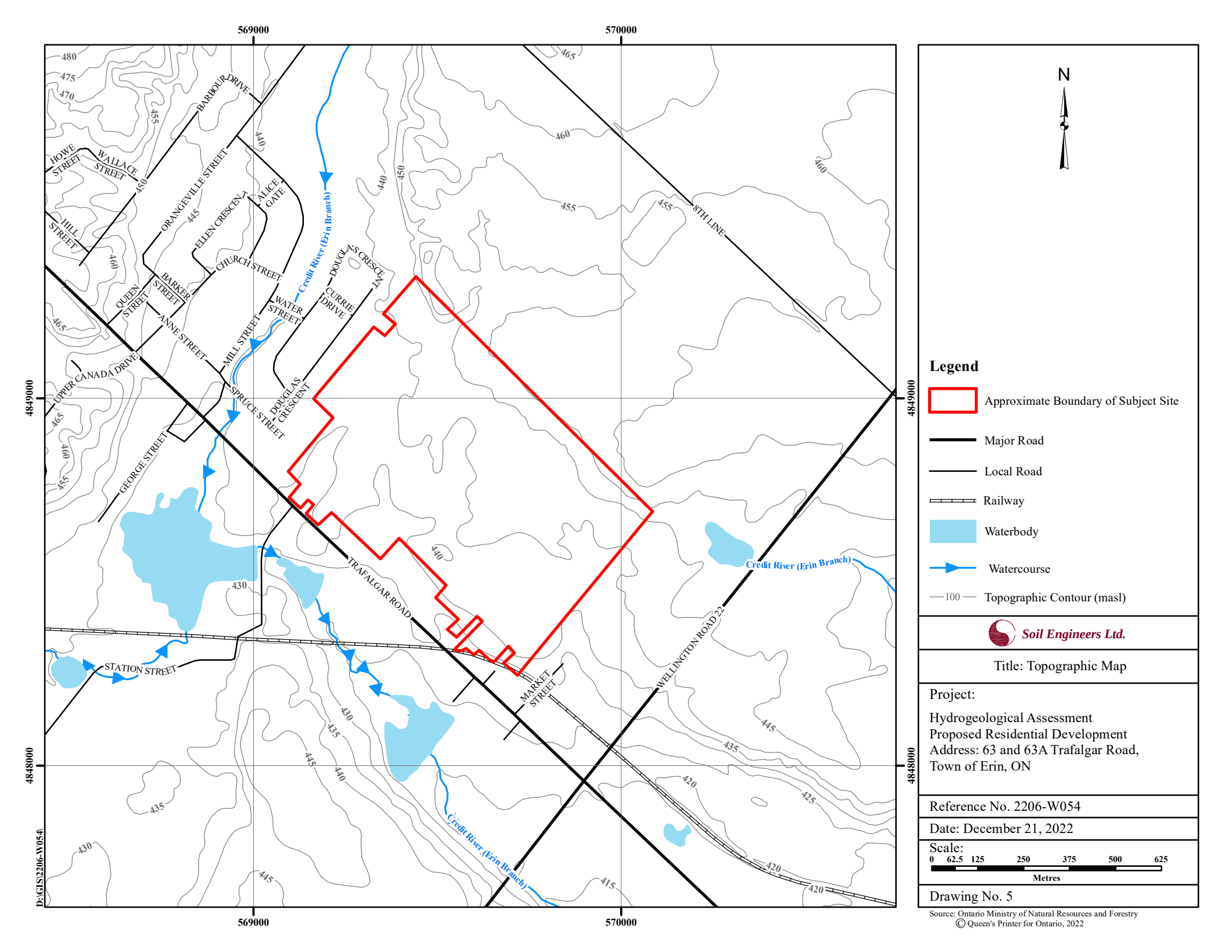
Hydrogeological Assessment
Proposed Residential Development
Address: 63 and 63A Trafalgar Road,
Town of Erin, ON

Reference No. 2206-W054

Date: December 21, 2022

Scale:
0 80 160 240 320 400
Metres

Drawing No. 4



Legend

- Approximate Boundary of Subject Site
- Major Road
- Local Road
- Railway
- Waterbody
- Watercourse
- 100 Topographic Contour (masl)

Soil Engineers Ltd.

Title: Topographic Map

Project:

Hydrogeological Assessment
Proposed Residential Development
Address: 63 and 63A Trafalgar Road,
Town of Erin, ON

Reference No. 2206-W054

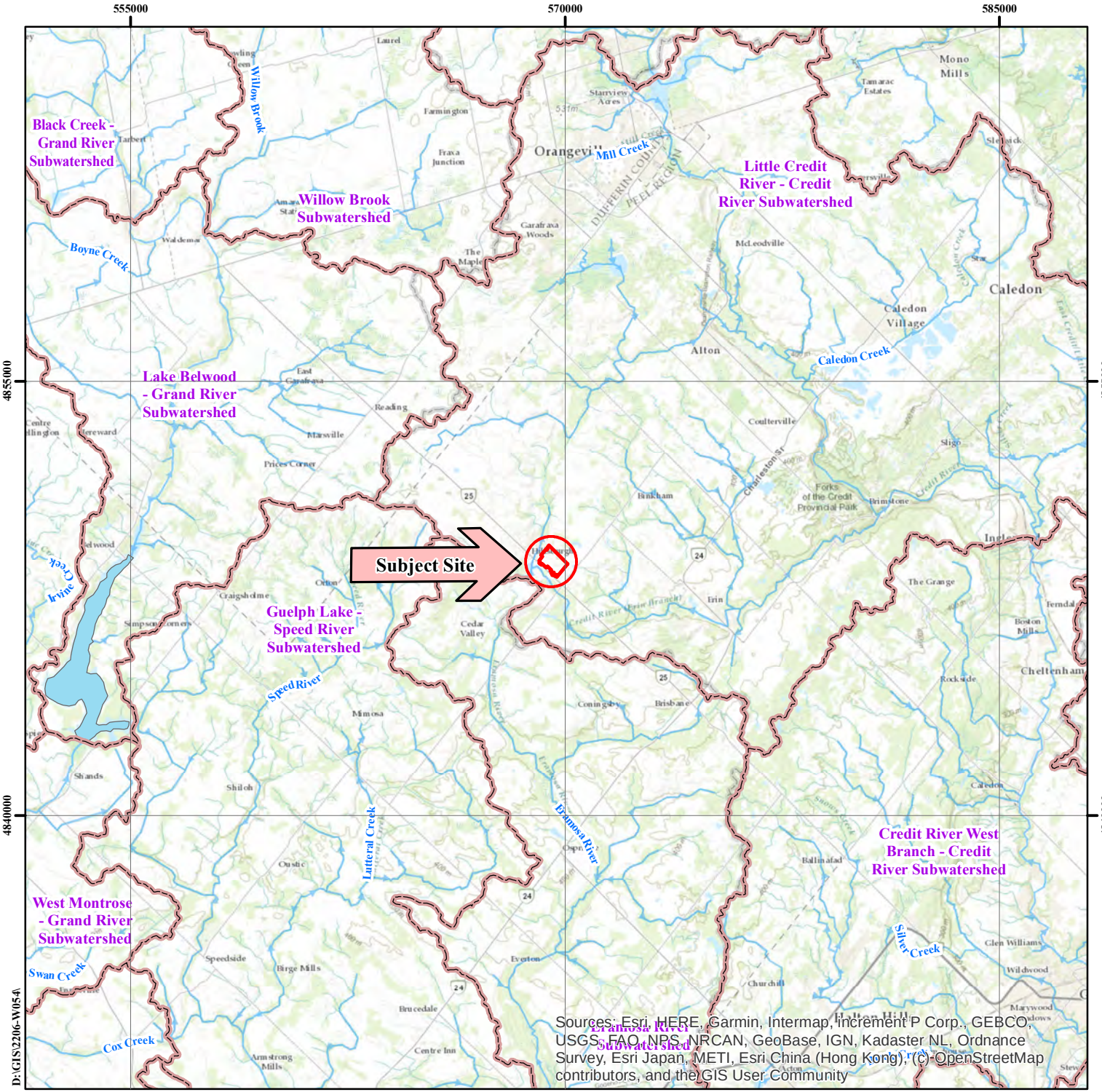
Date: December 21, 2022

Scale:

0 62.5 125 250 375 500 625
Metres

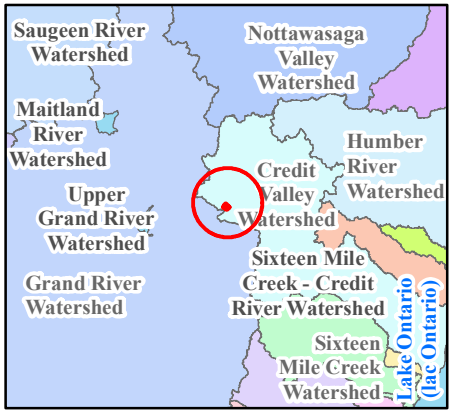
Drawing No. 5

Source: Ontario Ministry of Natural Resources and Forestry



N

Watershed:



Legend

- Approximate Boundary of the Subject Site
- Watershed Boundaries
- Waterbody
- Watercourse
- Expressway/Major Road

Soil Engineers Ltd.

Title: Watershed and Subwatershed Map

Project:

Hydrogeological Assessment
Proposed Residential Development
Address: 63 and 63A Trafalgar Road,
Town of Erin, ON

Reference No. 2206-W054

Date: December 21, 2022

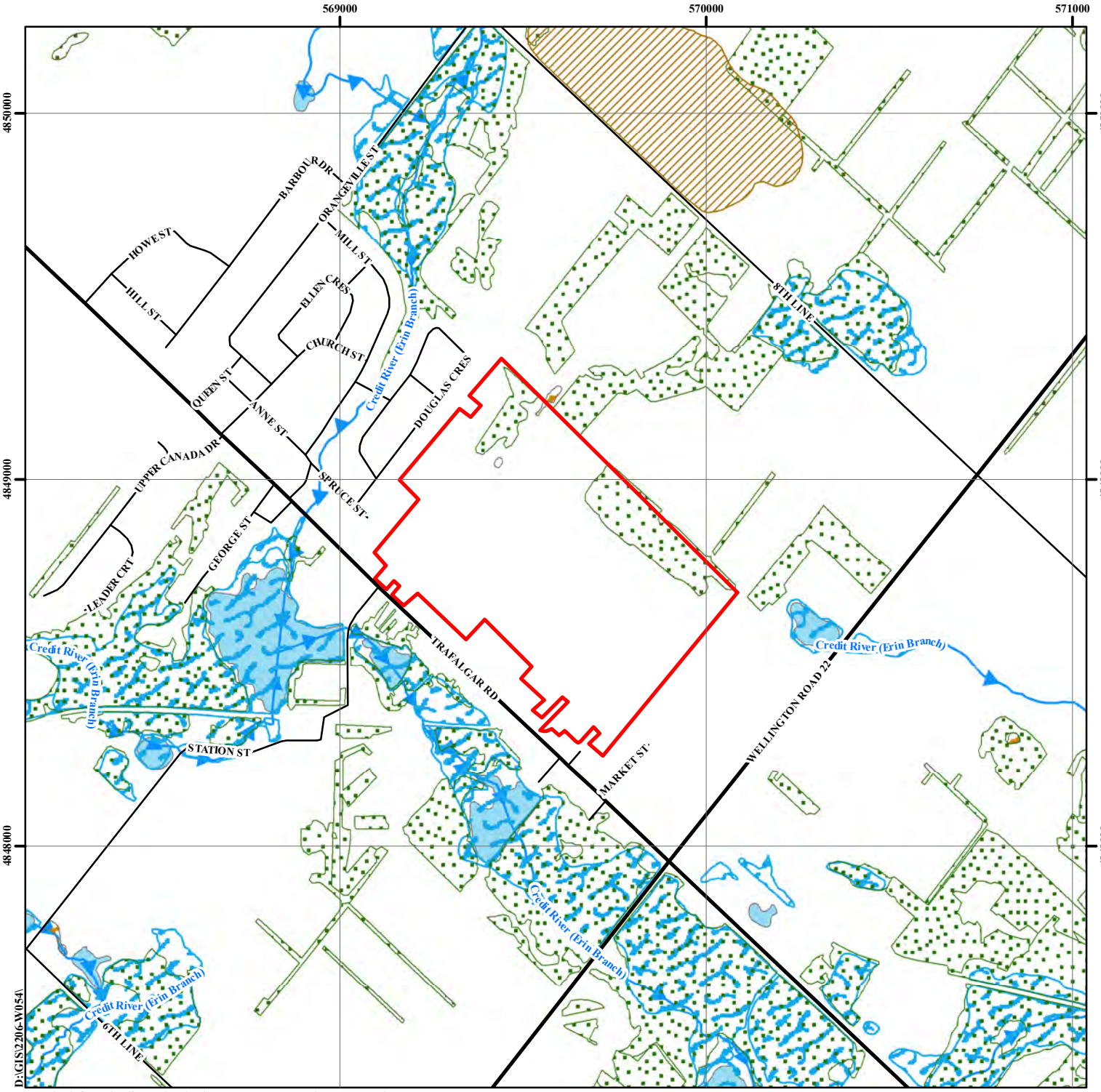
Scale:

0 2,100 4,200 6,300 8,400 10,500

Metres

Drawing No. 6

This mapping was produced by SEL and should be used for information purposes only.
Data sources used in its production are of varying quality and accuracy and all boundaries should be considered approximate.



N

Legend

- Approximate Boundary of Subject Site
- Area of Natural and Scientific Interest (ANSI)
- Wetland (classified as Provincial)
- Wetland (Not evaluated per OWES)
- Wooded Area
- Waterbody
- Watercourse
- Major Road
- Local Road

Soil Engineers Ltd.

Title: Natural Features and Protection Area Plan

Project:

Hydrogeological Assessment
Proposed Residential Development
Address: 63 and 63A Trafalgar Road,
Town of Erin, ON

Reference No. 2206-W054

Date: December 21, 2022

Scale:

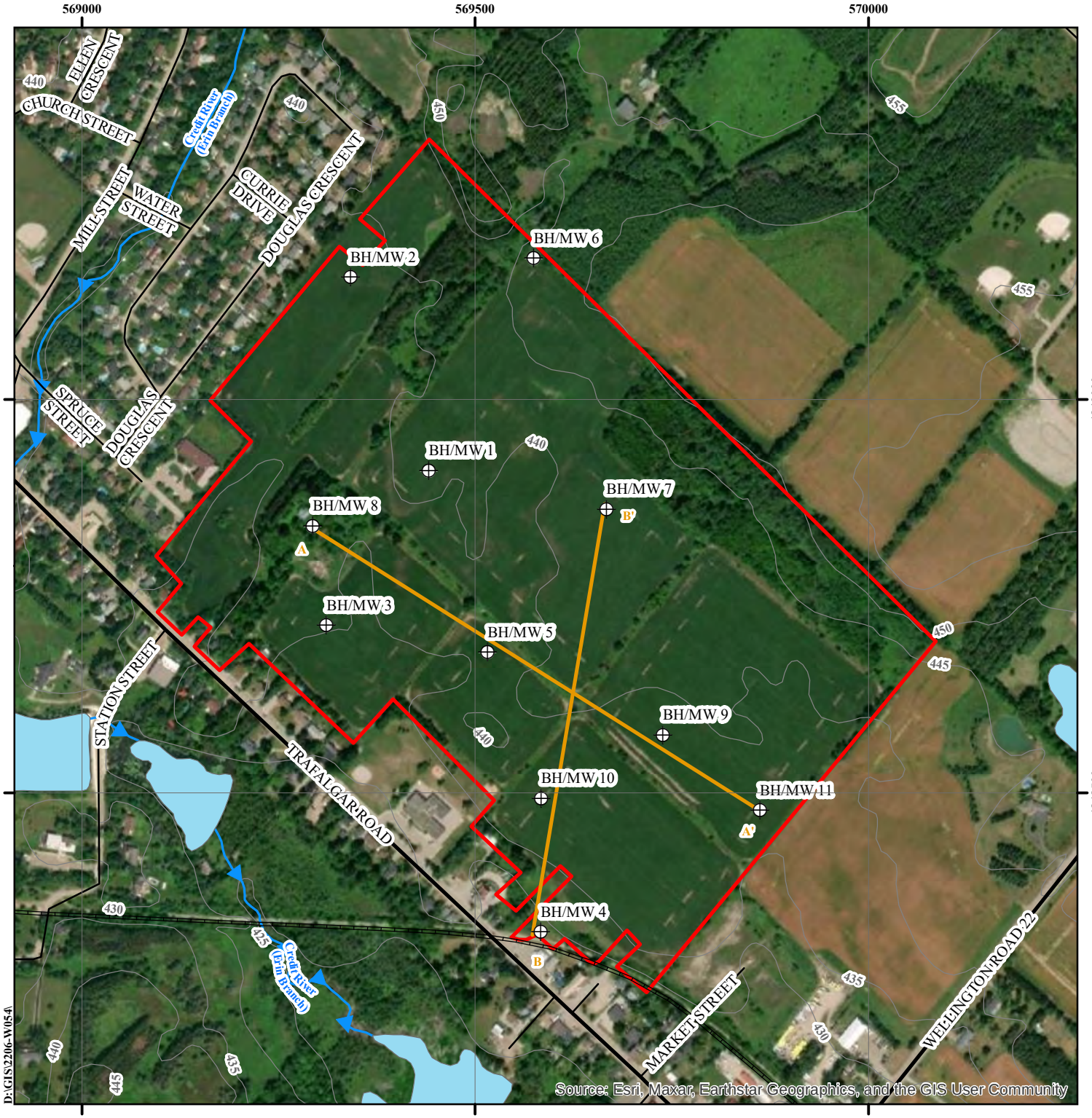
0 100 200 300 400 500

Metres

Drawing No. 7

Source: Ontario Ministry of Natural Resources and Forestry

OWES: Ontario Wetland Evaluation System



N

Legend

- Approximate Boundary of Subject Site
- Borehole with Monitoring Well
- Waterbody
- Watercourse
- Major Road
- Local Road
- Railway
- A A' Cross-Section Direction
- 100 Topographic Contour (masl)

Soil Engineers Ltd.

Title: Cross-Section Key Plan

Project:

Hydrogeological Assessment
Proposed Residential Development
Address: 63 and 63A Trafalgar Road,
Town of Erin, ON

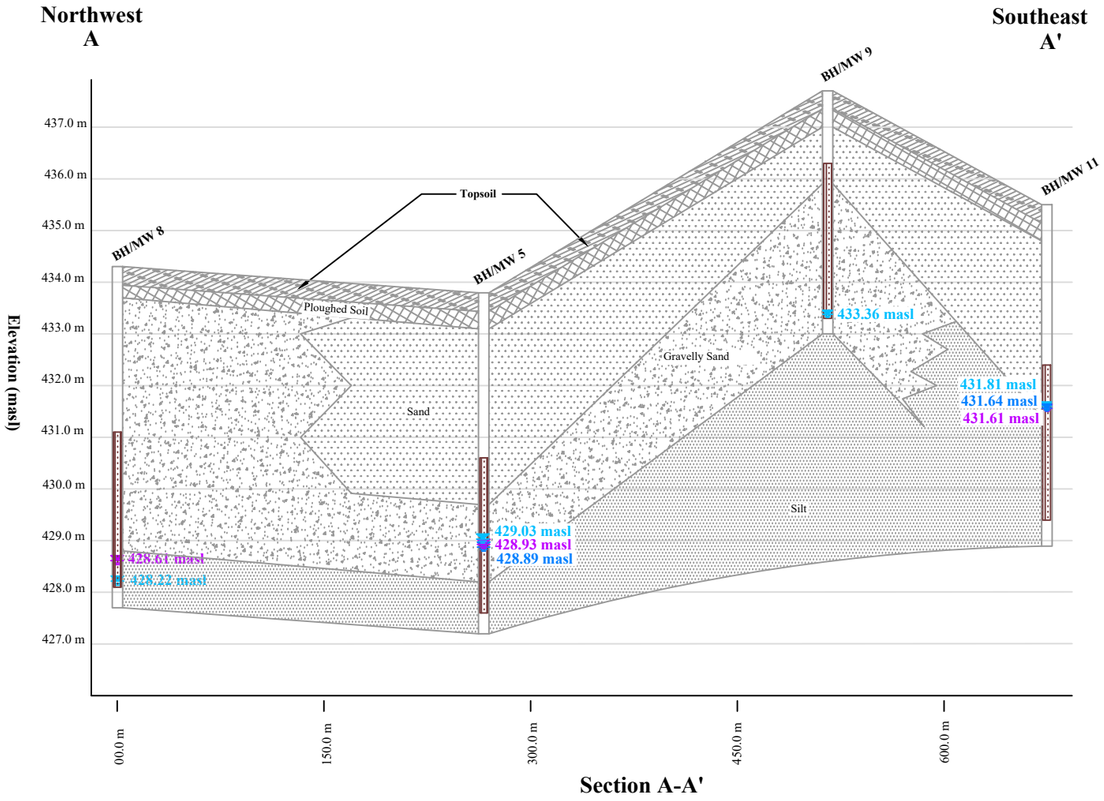
Reference No. 2206-W054

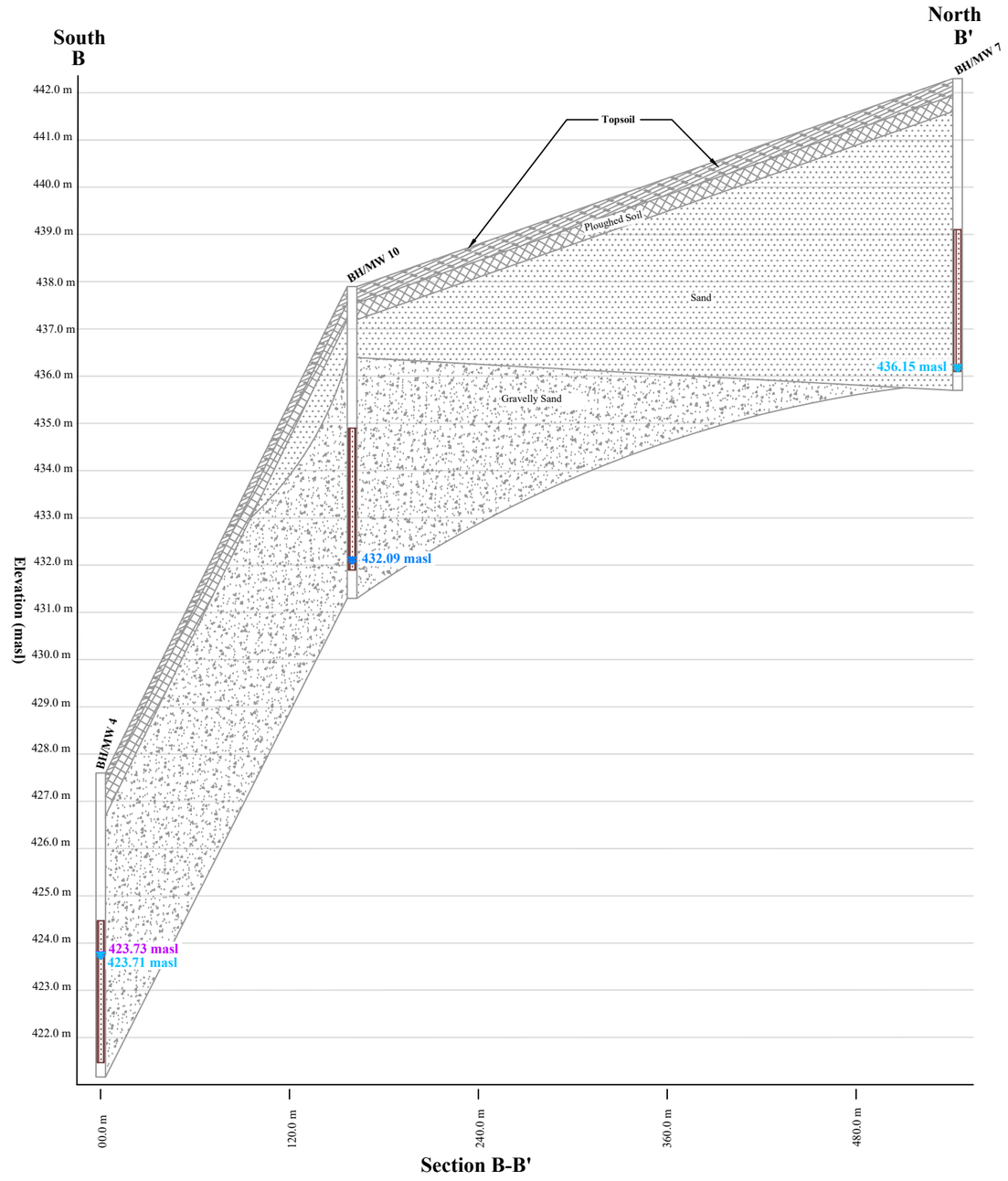
Date: December 21, 2022

Scale:

0 35 70 140 210 280 350
Metres

Drawing No. 8-1





Topsoil

Ploughed Soil

Gravelly Sand

Silt

Fine to Medium Sand

3.0 m Screen

Water Table on December 01, 2022

Water Table on January 05, 2023

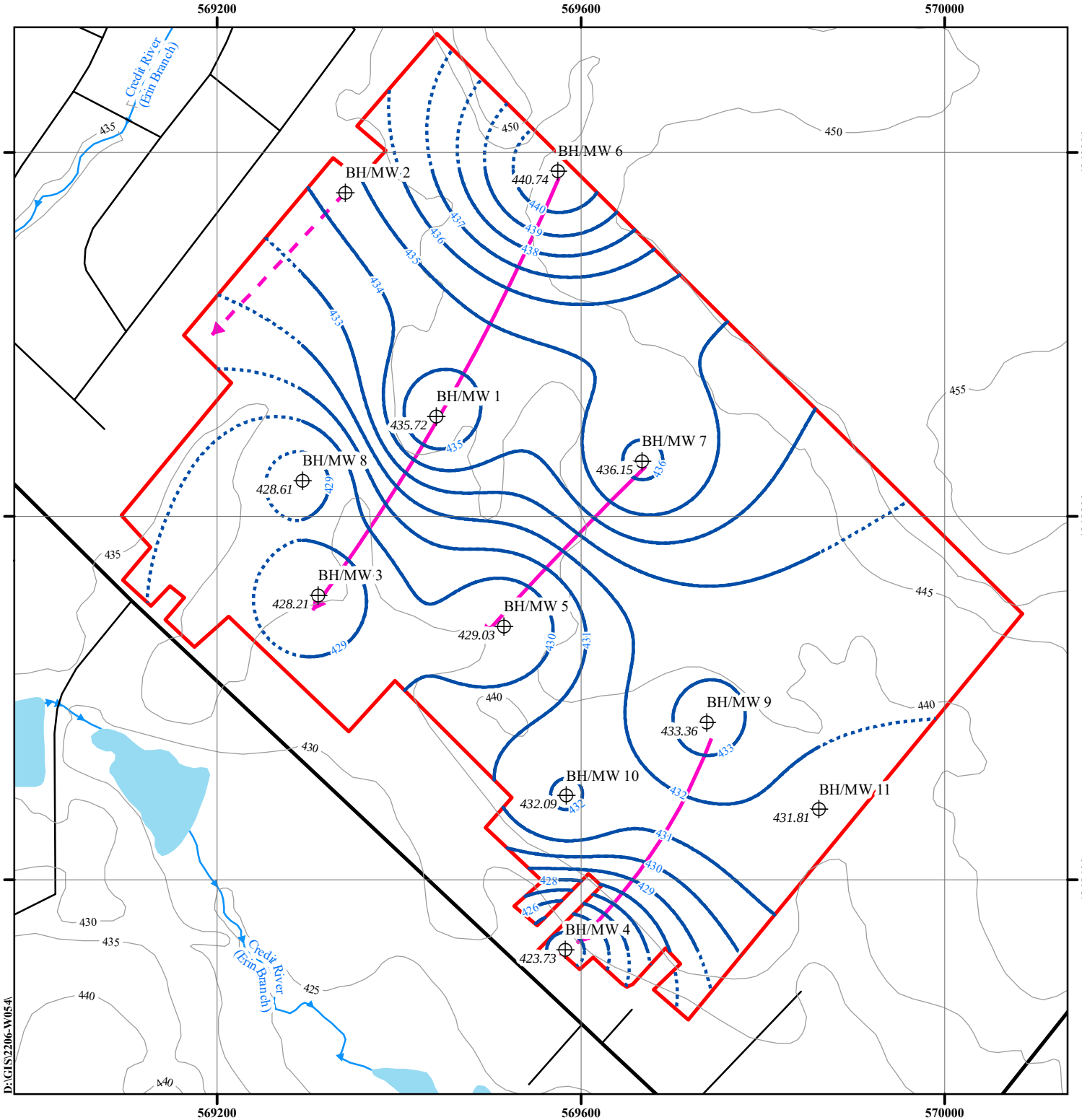
Water Table on February 08, 2023

Soil Engineers Ltd.
CONSULTING SOIL, FOUNDATION & ENVIRONMENTAL ENGINEERS

Title: Geological Cross-Section (A-A' and B-B')

Project: Hydrogeological Assessment
Proposed Residential Development
63 and 63A Trafalgar Road, Town of Erin, Ontario

Reference No:	Date:	Scale: V	Scale: H	Drawing No.
2206-W054	February, 2023	1:100	1:2500	8-2



N

Legend

- Approximate Boundary of Subject Site
- Borehole with Monitoring Well
- Interpreted Shallow Groundwater Level Elevation (masl)
- Inferred Shallow Groundwater Level Elevation (masl)
- Interpreted Shallow Groundwater Flow Direction
- Inferred Shallow Groundwater Flow Direction
- Waterbody
- Watercourse
- Road
- (440.74) Highest Shallow Groundwater Level Elevation (masl)

Soil Engineers Ltd.

Title: Shallow Groundwater Flow Pattern Plan

Project:

Hydrogeological Assessment
Proposed Residential Development
Address: 63 and 63A Trafalgar Road,
Town of Erin, ON

Reference No. 2206-W054

Date: December 21, 2022

Scale:

0 30 60 120 180 240 300
Metres

Drawing No. 9

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FAX: (705) 721-7864	FAX: (905) 542-2769	FAX: (905) 725-1315	FAX: (905) 881-8335	FAX: (705) 684-8522	FAX: (905) 542-2769

APPENDIX 'A'

MECP WATER WELL RECORDS SUMMARY

REFERENCE NO. 2206-W054

Ontario Water Well Records

WELL ID	MECP WWR ID	Construction Method	Well Depth (m)	Well Usage		Water Found (m)	Static Water Level (m)	Top of Screen Depth (m)	Bottom of Screen Depth (m)
				Final Status	First Use				
1	6700712	Cable Tool	39.60	Water Supply	Domestic	39.01	9.10	-	-
2	6700713	Cable Tool	22.90	Water Supply	Domestic	22.56	7.60	-	-
3	6700740	Cable Tool	42.70	Water Supply	Domestic	42.67	12.20	-	-
4	6700741	Cable Tool	25.90	Water Supply	Commercial	21.34	4.30	-	-
5	6700742	Cable Tool	29.90	Water Supply	Public	29.57	6.10	-	-
6	6700746	Cable Tool	30.50	Water Supply	Public	30.48	4.60	-	-
7	6703077	Cable Tool	32.00	Water Supply	Domestic	31.09	8.80	-	-
8	6703149	Cable Tool	37.20	Water Supply	Public	4.57	4.60	-	-
9	6703357	Cable Tool	46.30	Water Supply	Domestic	45.42	16.20	-	-
10	6703518	Rotary (Convent.)	59.40	Water Supply	Domestic	57.61	9.40	-	-
11	6703528	Rotary (Convent.)	54.90	Water Supply	Domestic	51.21	7.60	-	-
12	6704716	Rotary (Convent.)	45.70	Water Supply	Domestic	41.15	2.40	-	-
13	6704171	Rotary (Convent.)	25.90	Water Supply	Domestic	24.38	3.70	-	-
14	6704175	Rotary (Convent.)	42.70	Water Supply	Domestic	41.76	6.70	-	-
15	6704176	Rotary (Convent.)	42.70	Water Supply	Domestic	42.06	6.70	-	-
16	6704542	Rotary (Convent.)	24.40	Water Supply	Public	21.34	5.80	-	-
17	6704913	Rotary (Convent.)	74.70	Water Supply	Livestock	71.63	4.60	-	-
18	6705146	Rotary (Convent.)	24.40	Water Supply	Domestic	24.08	2.40	-	-
19	6705148	Rotary (Convent.)	18.30	Water Supply	Domestic	17.98	0.90	-	-
20	6705612	Rotary (Convent.)	41.10	Water Supply	Domestic	39.62	7.00	-	-
21	6705647	Rotary (Convent.)	47.50	Water Supply	Domestic	47.24	22.30	-	-
22	6706041	Rotary (Convent.)	15.80	Water Supply	Domestic	15.24	3.00	-	-
23	6706286	Rotary (Convent.)	32.00	Water Supply	Domestic	21.34	3.00	-	-
24	6706583	Rotary (Convent.)	20.70	Water Supply	Domestic	19.51	5.50	-	-
25	6706911	Rotary (Convent.)	21.30	Water Supply	Domestic	19.81	7.30	-	-
26	6707143	Rotary (Convent.)	25.00	Water Supply	Domestic	21.34	4.60	-	-
27	6707144	Rotary (Convent.)	26.50	Water Supply	Domestic	22.25	4.90	-	-

Ontario Water Well Records

WELL ID	MECP WWR ID	Construction Method	Well Depth (m)	Well Usage		Water Found (m)	Static Water Level (m)	Top of Screen Depth (m)	Bottom of Screen Depth (m)
				Final Status	First Use				
28	6707156	Rotary (Convent.)	29.60	Water Supply	Domestic	24.99	5.50	-	-
29	6707351	Rotary (Convent.)	33.80	Water Supply	Domestic	33.53	22.90	-	-
30	6707358	Rotary (Convent.)	32.90	Water Supply	Domestic	28.96	3.70	-	-
31	6707559	Rotary (Convent.)	47.20	Water Supply	Commercial	44.20	5.20	-	-
32	6707861	Rotary (Convent.)	36.60	Water Supply	Domestic	27.43	2.40	-	-
33	6708080	Rotary (Convent.)	31.10	Water Supply	Domestic	20.12	1.80	-	-
34	6708174	Rotary (Convent.)	22.90	Water Supply	Domestic	19.81	2.10	-	-
35	6708346	Rotary (Convent.)	35.40	Water Supply	Domestic	33.53	4.30	-	-
36	6708365	Rotary (Convent.)	34.10	Water Supply	Domestic	32.00	3.00	-	-
37	6708396	Rotary (Convent.)	50.30	Water Supply	Domestic	44.20	5.20	-	-
38	6708616	Rotary (Convent.)	29.60	Water Supply	Domestic	25.91	8.80	-	-
39	6708808	Rotary (Convent.)	53.30	Water Supply	Domestic	42.67	8.80	-	-
40	6708819	Rotary (Convent.)	21.30	Water Supply	Domestic	17.37	7.60	-	-
41	6709050	Rotary (Convent.)	57.00	Water Supply	Domestic	55.78	5.50	-	-
42	6709065	Rotary (Convent.)	53.00	Water Supply	Domestic	50.29	24.70	-	-
43	6709156	Rotary (Convent.)	51.80	Water Supply	Domestic	47.24	7.60	-	-
44	6709157	Rotary (Convent.)	30.20	Water Supply	Domestic	25.91	7.60	-	-
45	6709212	Rotary (Convent.)	45.10	Water Supply	Domestic	41.15	11.60	-	-
46	6709530	Rotary (Convent.)	30.50	Water Supply	Domestic	25.91	9.10	-	-
47	6709532	Rotary (Convent.)	23.50	Water Supply	Domestic	22.25	8.50	-	-
48	6709533	Rotary (Convent.)	22.90	Water Supply	Domestic	22.56	8.80	-	-
49	6709578	Rotary (Convent.)	49.70	Water Supply	Domestic	48.77	7.00	-	-
50	6709595	Rotary (Convent.)	21.30	Water Supply	Domestic	18.29	0.30	-	-
51	6709602	Rotary (Convent.)	23.20	Water Supply	Domestic	21.34	2.40	-	-
52	6709605	Rotary (Convent.)	21.30	Water Supply	Domestic	18.29	0.30	-	-
53	6709886	Rotary (Convent.)	22.90	Water Supply	Domestic	21.34	4.90	-	-
54	6710148	Rotary (Convent.)	61.00	Water Supply	Public	16.76	5.50	-	-

Ontario Water Well Records

WELL ID	MECP WWR ID	Construction Method	Well Depth (m)	Well Usage		Water Found (m)	Static Water Level (m)	Top of Screen Depth (m)	Bottom of Screen Depth (m)
				Final Status	First Use				
55	6710156	Rotary (Convent.)	42.70	Water Supply	Domestic	39.62	27.40	-	-
56	6710235	Rotary (Convent.)	32.00	Water Supply	Domestic	27.43	2.70	-	-
57	6710548	Rotary (Convent.)	26.20	Water Supply	Domestic	23.47	4.30	-	-
58	6710809	Rotary (Convent.)	34.10	Water Supply	Domestic	31.39	6.70	-	-
59	6711058	Rotary (Convent.)	21.30	Water Supply	Domestic	19.81	0.00	-	-
60	6711075	Rotary (Convent.)	57.00	Water Supply	Domestic	54.86	4.30	-	-
61	6711348	Rotary (Convent.)	48.80	Water Supply	Domestic	45.72	12.20	-	-
62	6711507	Rotary (Convent.)	76.20	Water Supply	Public	45.72	29.00	-	-
63	6712031	Rotary (Convent.)	57.90	Water Supply	Municipal	37.19	1.80	-	-
64	6712455	Not Known	-	Abandoned-Other	Not Used	-	-	-	-
65	6712833	Rotary (Convent.)	24.40	Water Supply	Domestic	24.38	4.30	-	-
66	6713227	Rotary (Convent.)	24.40	Water Supply	Domestic	23.17	5.20	-	-
67	6713603	Rotary (Convent.)	29.60	Water Supply	Domestic	1.83	3.00	-	-
68	6713762	Rotary (Convent.)	21.30	Water Supply	Domestic	18.59	3.00	-	-
69	6713886	Rotary (Convent.)	42.70	Water Supply	Domestic	39.93	21.60	-	-
70	6713887	Rotary (Convent.)	29.00	Water Supply	Domestic	27.74	8.50	-	-
71	6713888	Rotary (Convent.)	30.80	Water Supply	Domestic	27.74	5.50	-	-
72	6713900	Rotary (Convent.)	38.10	Water Supply	Domestic	29.26	4.30	-	-
73	6714187	Rotary (Convent.)	19.80	Water Supply	Domestic	17.98	4.60	-	-
74	6714235	Rotary (Convent.)	42.10	Water Supply	Domestic	41.45	6.70	-	-
75	6714664	Not Known	-	Abandoned-Other	Not Used	-	-	-	-
76	6714839	Other Method	14.30	Observation Wells	Not Used	-	-	11.28	12.80
77	6714944	-	-	Abandoned-Other	-	-	-	-	-
78	6715166	-	-	Abandoned-Other	-	-	-	-	-
79	6715250	Other Method	4.30	Abandoned-Other	-	-	-	2.74	4.27
80	6715394	Rotary (Convent.)	30.50	Water Supply	Domestic	28.96	5.20	-	-
81	6715503	-	-	Abandoned-Other	-	0.00	-	-	-

Ontario Water Well Records

WELL ID	MECP WWR ID	Construction Method	Well Depth (m)	Well Usage		Water Found (m)	Static Water Level (m)	Top of Screen Depth (m)	Bottom of Screen Depth (m)
				Final Status	First Use				
82	6715772	Rotary (Convent.)	30.50	Water Supply	Domestic	26.52	6.10	-	-
83	6715910	Rotary (Convent.)	30.50	Water Supply	Domestic	27.74	7.00	-	-
84	6715969	Other Method	13.70	Observation Wells	-	-	-	12.19	13.72
85	7050905	Rotary (Convent.)	30.50	Water Supply	Domestic	24.69	5.20	-	-
86	7104643	-	-	Water Supply	-	-	-	-	-
87	7105350	-	-	Abandoned-Other	-	-	-	-	-
88	7113491	Cable Tool	27.70	Water Supply	-	26.82	3.40	-	-
89	7118031	Rotary (Convent.)	44.80	Water Supply	Domestic	44.20	7.00	-	-
90	7125694	Other Method	25.00	Water Supply	Domestic	24.99	5.20	-	-
91	7127280	-	-	Abandoned-Other	-	-	-	-	-
92	7127282	Rotary (Convent.)	25.00	Water Supply	Domestic	23.77	2.70	-	-
93	7135171	Rotary (Convent.)	19.80	Water Supply	Domestic	18.90	2.40	-	-
94	7139080	-	-	Abandoned-Other	Not Used	-	-	-	-
95	7139081	-	-	-	Not Used	-	-	-	-
96	7153541	Rotary (Convent.)	20.70	Water Supply	Domestic	19.81	3.70	-	-
97	7160498	Rotary (Air)	18.30	Water Supply	Domestic	18.29	3.70	-	-
98	7165335	-	-	Abandoned-Other	Not Used	-	-	-	-
99	7174984	-	-	Abandoned-Other	-	-	-	-	-
100	7179274	-	-	-	-	-	-	-	-
101	7181812	Rotary (Convent.)	-	Other Status	-	-	-	-	-
102	7191665	-	-	Abandoned-Other	-	-	-	-	-
103	7194971	-	-	Abandoned-Other	-	-	-	-	-
104	7197600	-	-	Abandoned-Other	-	-	-	-	-
105	7201338	-	-	Abandoned-Other	-	-	-	-	-
106	7201342	Rotary (Convent.)	-	Abandoned-Other	Domestic	-	-	-	-
107	7204348	Rotary (Convent.)	31.10	Water Supply	Domestic	29.57	6.40	-	-
108	7221287	Air Percussion	25.30	Water Supply	Domestic	20.42	5.50	-	-

Ontario Water Well Records

WELL ID	MECP WWR ID	Construction Method	Well Depth (m)	Well Usage		Water Found (m)	Static Water Level (m)	Top of Screen Depth (m)	Bottom of Screen Depth (m)
				Final Status	First Use				
109	7221467	-	6.00	Abandoned-Other	-	-	-	-	-
110	7221469	Other Method	-	Abandoned-Other	-	-	-	-	-
111	7221471	Other Method	38.50	Abandoned-Other	-	-	6.70	-	-
112	7264117	-	-	-	-	-	-	-	-
113	7266474	Other Method	23.50	Water Supply	Domestic	21.03	6.40	-	-
114	7279241	Rotary (Convent.)	55.50	Water Supply	Domestic	53.04	15.80	-	-
115	7279242	Rotary (Convent.)	25.00	Water Supply	Domestic	23.77	7.90	-	-
116	7282682	-	-	Abandoned-Supply	-	-	-	-	-
117	7287957	-	-	Abandoned-Supply	-	-	-	-	-
118	7292103	Other Method	61.00	Water Supply	Public	60.96	21.30	-	-
119	7292603	Rotary (Convent.)	44.80	Water Supply	Domestic	44.50	21.30	-	-
120	7292608	Rotary (Convent.)	49.40	Water Supply	Domestic	47.85	23.20	-	-
121	7300378	Boring	4.60	Test Hole	Test Hole	-	-	3.05	4.57
122	7304150	Boring	4.60	Monitoring and Test Hole	Test Hole	-	-	3.05	4.57
123	7304151	Boring	4.60	Monitoring and Test Hole	Test Hole	-	-	3.05	4.57
124	7304154	Boring	7.60	Monitoring and Test Hole	Test Hole	2.44	-	6.10	7.62
125	7305135	Boring	4.60	Observation Wells	Monitoring	-	-	3.05	4.57
126	7305136	Boring	5.50	Observation Wells	Monitoring	-	-	3.96	5.49
127	7305137	Boring	4.60	Observation Wells	Monitoring	-	-	3.05	4.57
128	7305138	Boring	4.60	Observation Wells	Monitoring	-	-	3.05	4.57
129	7325517	Driving	7.60	Observation Wells	Monitoring	-	-	4.50	7.60
130	7326108	Rotary (Convent.)	97.50	Test Hole	Test Hole	86.26	11.30	-	-
131	7346374	Cable Tool	12.50	Water Supply	Domestic	12.19	2.40	-	-
132	7346759	Auger	3.70	Observation Wells	Monitoring	2.10	-	2.20	3.70
133	7346760	Auger	3.70	Observation Wells	Monitoring	2.10	-	2.20	3.70
134	7352921	Other Method	7.60	Observation Wells	Monitoring	6.10	-	9.14	10.67
135	7352922	Rotary (Convent.)	91.40	Water Supply	-	9.14	-	-	-

Ontario Water Well Records

WELL ID	MECP WWR ID	Construction Method	Well Depth (m)	Well Usage		Water Found (m)	Static Water Level (m)	Top of Screen Depth (m)	Bottom of Screen Depth (m)
				Final Status	First Use				
136	7352923	-	-	Water Supply	-	9.14	-	79.25	85.35
137	7357193	-	-	Abandoned-Other	-	-	-	-	-
138	7357194	-	-	Abandoned-Other	-	-	-	-	-
139	7372412	-	-	-	-	-	-	-	-
140	7373295	-	-	-	-	-	-	-	-

Notes:

*MECP WWID: Ministry of the Environment, Conservation and Parks Water Well Records Identification

**metres below ground surface