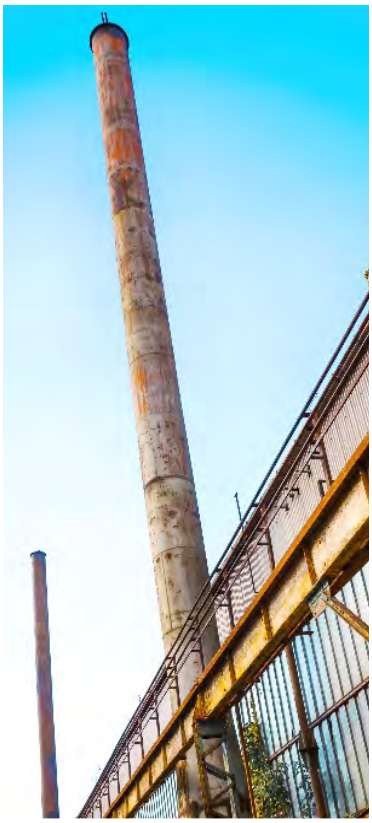
Hydrogeological Assessment Report

Proposed Subdivision Development
787 and 825 Fallis Line
Millbrook, Ontario

Prepared For:
The Bromont Group



Executive Summary

This report presents the results of a hydrogeologic assessment that was conducted in support of a proposed residential subdivision development to be constructed on the properties located at the municipal addresses of 787 and 825 Fallis Line in Millbrook, Ontario (collectively referred to as “the Site”). The Site is within the County of Peterborough in the Township of Cavan-Monaghan and includes Part of Lot 11, Concession 5. The Site encompasses an area of 49.22 ha (121.6 acres). The Site will be municipally serviced for both water and for sanitary disposal.

This hydrogeological assessment included a site inspection, advancement of test holes, groundwater and soil sampling, water level monitoring, a review of available Ministry of the Environment, Conservation and Parks well records, single well response testing, infiltration testing, and a water balance evaluation.

Based upon the work completed, the proposed development area is generally comprised of topsoil, underlain by till and underlain in some boreholes by dense to very dense sand. The till ranged in composition from sandy silt / silty sand to clayey silt / silty clay. Bedrock was not encountered in any of the boreholes. Some seepage of water was observed in the test holes; however, a permanent shallow groundwater table was not observed. It is our opinion that there will not be any constraints for the residential development from the seasonal variations of groundwater as the water levels can be handled with appropriate engineering techniques. Minimal seepage of groundwater was observed at depths of 0.9 to 6.4 m. The remaining seventeen (17) boreholes remained dry throughout drilling.

If short-term pumping of groundwater at volumes greater than 50,000 L/day and less than 400,000 L/day is required during the construction stage, the Environmental Activity Sector Registry (EASR) must be completed. If water taking in excess of 400,000 litres/day is required, a Permit to Take Water must be obtained.

The MECP well records identified twenty-six (26) drilled overburden wells and five (5) drilled bedrock wells within 500 m of the Site. A well survey conducted in the immediate vicinity of the Site identified four (4) drilled wells based upon the responses received.

Without the use of low impact development (LID) strategies, the Site’s post-development infiltration values are about 40% less than pre-development values. Post-development infiltration values can be maintained at pre-development values through the LID strategy of downspout disconnection.

No groundwater impacts are expected as a result of the future development provided that appropriate planning, mitigation measures and proper construction techniques are considered. In summary, it is GHD’s opinion that the proposed subdivision is suitable from a hydrogeological perspective.

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1. Introduction

This report presents the results of a hydrogeologic assessment that was conducted in support of a proposed residential subdivision to be constructed on the properties located at the municipal addresses of 787 and 825 Fallis Line in Millbrook, Ontario (collectively referred to as “the Site”). The Site is within the County of Peterborough in the Township of Cavan-Monaghan and includes Part of Lot 11, Concession 5. The Site encompasses an area of 49.22 ha (121.6 acres) and is generally used agriculturally with two (2) existing residential homes and forested areas. The Site will be municipally serviced for both water and for sanitary disposal. GHD Limited (GHD) was retained by The Bromont Group (the Client) to complete this investigation.

The Site is within the Otonabee River watershed with a tributary of Baxter Creek flowing through the southern forested area of the Site. The main channel of Baxter Creek is located to the southeast about 750 m from the Site at its nearest point.

The general location of the Site is illustrated on the Site Location Plan, Figure 1. A site plan was provided to GHD by the Client illustrating the proposed development layout and is provided as Figure 2. It is GHD’s understanding that this project shall include design and construction of a residential development comprised of typical 1- and 2-storey homes and townhomes, with a stormwater management pond (SWP), asphalt-paved roadways, and servicing. The forested area, referred to as the “Natural Heritage System” will remain undeveloped in the southern area of the Site. GHD has also completed a geotechnical report for this Site which is provided under separate cover.

The borehole locations are illustrated on the Test Hole Location Plan, Figure 3. Previous test hole investigations have been completed on the Site. Where applicable, GHD utilized the previous soil and groundwater information to supplement our test hole data.

Additional plans and figures can be reviewed in the Figures section of this report.

2. Scope of Assessment

The purpose of this hydrogeologic assessment was to define the prevailing hydrogeological conditions. The hydrogeologic assessment was completed to investigate the subsurface soil stratigraphy and groundwater movement, to assess groundwater supplies and evaluate potential impacts from the proposed residential development and related construction.

1. Reviewed available background information relevant to the Site such as geologic, physiographic and water resources reports and maps.
2. Carried out an inventory of available well record data on file with the Ministry of the Environment, Conservation and Parks (MECP) for the immediate area to evaluate the physical characteristics of the aquifer complexes that underlie the region. A field survey of eleven (11) homes within 500 m of the Site was carried out to supplement the MECP data. Water quality of the area was evaluated based on sampling of a local well for general chemistry parameters.

3. A walkover inspection was conducted to review surficial ground characteristics.

4. The subsurface conditions were explored by advancing, sampling and logging a total of twenty-six (26) boreholes with a track-mounted drill rig. The subsurface conditions were recorded and are summarized in detail in Appendix A. The boreholes were advanced to depths ranging from 2.2 to 6.7 m. Groundwater monitoring wells were installed in eleven (11) boreholes. Water quality below the Site was evaluated based on sampling of two (2) monitoring wells for general chemistry parameters.

5. Carried out laboratory analyses of materials encountered including grain size and moisture content.

6. Single well response testing was completed in each of the monitoring well locations to evaluate hydraulic conductivity. Infiltration rates of the upper vadose zone was completed at 825 Fallis Line in 2017; however, additional infiltration testing could not be completed at this time due to frost. If additional infiltration testing is required, it can be completed at the detailed design stage. Groundwater level monitoring with data loggers is on-going to evaluate seasonal groundwater fluctuations.

7. Completed a water balance that considers pre- and post-development conditions and evaluates groundwater baseflow conditions based on the current design plan.

8. Prepared the following detailed report using engineering analyses of the acquired data outlining our conclusions and recommendations presented herein.

3. Project Details

A conceptual plan was provided to GHD entitled “Draft Concept” prepared by The Biglieri Group Ltd., dated February 20, 2020. The plan is provided as Figure 2 in this report. Based upon this plan, the Site will consist of:

- Single detached lots – 15.86 ha:
- Townhouse lots – 3.57 ha:
- Medium density (5-storey building) lot – 0.88 ha:
- Parkland and trails – 2.10 ha;
- Right-of-ways – 7.65 ha:
- Natural heritage system – 16.43 ha;
- Easement – 0.01 ha;
- Stormwater facility – 2.57 ha; and,
- Road widening – 0.16 ha.

The information shown on the conceptual plan was used to calculate the water budget discussed in this report.

4. Site Conditions

4.1 General

The field program consisted of a site inspection, a soils exploration investigation, hydraulic conductivity testing and measurement of water levels. Data loggers are currently collecting water levels to assess seasonal fluctuations.

A site inspection was conducted initially in October 2017 and on February 24, 2021. The Site is comprised predominantly of agricultural lands with forested areas and some lawn areas. Agricultural lands occur to the north and west; a recently constructed residential area is located to the east and the town of Millbrook is to the south. Existing homes on Fallis Line are privately serviced for water and septic. There are two existing residential homes on the Site that are supported by water wells and existing monitoring wells were observed. These wells will not be used in the future and are to be decommissioned in accordance with Ontario Regulation 903.

Based upon topographic mapping, the Site exhibits rolling to hilly topography with relief on the order of 25 m. Small creeks were observed in the southern area of the Site that are tributaries of Baxter Creek. Surface water runoff flows according to the local topography toward Baxter Creek. Groundwater seeps were observed within the forested areas on the south slope of the Site. The area of the groundwater seeps and creek areas are a natural heritage area that will not be developed with residential homes. Photographs are provided in Appendix B.

4.2 Subsurface

4.2.1 Regional Physiography and Geology

This area is underlain by Paleozoic sedimentary rocks (i.e. limestone) of Upper Middle Ordovician age. The Site is situated in the physiographic region known at the Peterborough Drumlin Field (Chapman and Putnam, 1984). Locally, the Site is identified to be within an area known as a “sand plains” with drumlinized till plains to the south and west. The physiographic region is shown on Figure 5.

To the west of the Site is the physiographic region known as the Oak Ridges Moraine (ORM) where the till is sandier with silt and fine sand. The ORM is a large distinctive feature that extends from Trenton to the east to the Niagara Escarpment to the west. The ground surface associated with this feature is typically hilly. The ORM is known to provide recharge to numerous streams and rivers.

The surficial geology is presented on Figure 6 which indicates the Site consists predominantly of stone-poor, sandy silt to silty sand-textured till. The northeast corner of the Site, and proposed future stormwater management pond, is comprised of fine-textured glaciolacustrine deposits. The southern portion of the Site is identified as Modern Alluvial deposits.

The Quaternary geology of this area indicates glaciofluvial ice-contact deposits that consists of gravel and sand, minor till and includes esker, kame, end moraine, ice-marginal delta and subaqueous fan deposits throughout the Site. Surrounding areas consist of till, glaciolacustrine deposits and organic deposits. The Quaternary geology is depicted on Figure 7.

The available MECP well records indicate the soils are generally clay with sand and gravel layers and shale / limestone at depth. The records include twenty-six (26) drilled overburden wells and five (5) drilled bedrock wells within 500 m of the Site.

4.2.2 Local Geology

This section of the report discusses the subsurface soil conditions observed during the test hole program. The subsurface stratigraphy was investigated by drilling twelve (12) boreholes on August 22 and 23, 2017 and fourteen (14) boreholes between March 3 and March 5, 2021. Boreholes drilled in 2017 are denoted by "-17" (for example BH1-17) and boreholes drilled in 2021 are denoted by "-21" (for example BH1-21). The letters "D" and "S" refer to "deep" and "shallow" boreholes, respectively and are used when referring to the deep and shallow nested wells.

Groundwater monitoring wells were installed in eleven (11) of the boreholes including three (3) nested well locations. Five wells were installed in 2017 and six wells in 2021. The monitoring wells were installed to depths ranging from 2.1 to 6.6 m. The locations of the test holes are illustrated on the Test Hole Plan, Figure 3. Details of the subsurface conditions encountered are presented graphically in Appendix A. Cross-sections depicting the geologic conditions beneath the Site are provided on Figure 8. It should be noted that the boundaries between the strata have been inferred from the test hole observations and non-continuous samples. They generally represent a transition from one soil type to another, and should not be inferred to represent an exact plane of geological change. Further, conditions may vary between and beyond the test holes.

The boreholes encountered a layer of topsoil, underlain by very loose to very dense till (the upper zones containing occasional organics). The till ranged in composition from silty sand / sandy silt to silty clay / clayey silt and was underlain in some boreholes by dense to very dense sand. The following paragraphs describe the soils that were encountered:

A layer of surficial topsoil was encountered in all boreholes ranging from 200 to 915 mm in thickness. This soil was observed to be in a damp, loose state and has been significantly disturbed by root growth and agricultural activities. As such, it is expected to be devoid of any structural engineering properties.

The till layer extended to depths ranging from 1.5 to 6.2 m in boreholes BH4-17, BH5-17, BH6-17, BH10-17, BH12-17, BH2-21 and BH4-21 and was underlain by a sand. It the remaining boreholes, till extended to the full depth of investigation. Till was not encountered in BH5-21. The soil was generally brown in colour with a composition ranging from silty sand / sandy silt to silty clay / clayey silt, containing gravel and occasional cobbles and generally existing in a moist in-situ state. Based on past experience with till in this area, it can be expected to contain sand seams. Standard penetration testing (SPT) "N" values obtained from within the till layer varied from 1 blow / 300 mm to over 100 blows / 300 mm indicating a very loose to very dense in-situ state of relative density.

Moisture content tests conducted on samples of the till yielded values ranging from 4 to 36 % moisture by weight. Grain size distribution analyses conducted on representative samples of the till indicated the following compositional ranges: 0 to 31 % gravel, 5 to 56 % sand, 5 to 43 % clay-sized particles and 22 to 58 % silt-sized particles (Unified Soil Classification System).

A layer of sand was encountered beneath the till layer in boreholes BH4-17, BH5-17, BH6-17, BH10-17, BH12-17, BH2-21 and BH4-21. Sand was encountered in BH5-21 to the bottom of the borehole. This layer was encountered at depths ranging from 1.5 to 6.2 m and extended to the depth of the investigation in these boreholes. The soil was generally brown in colour, consisted of sand with silt and generally existed in a damp in-situ condition. BH12-17 encountered groundwater seepage within the sand layer. SPT N values obtained from within this layer varied from 38 blows / 300 mm to over 100 blows / 300 mm, indicating a dense to very dense in-situ state of relative density. Moisture content tests conducted on samples of this layer yielded values ranging from 3 to 25 % moisture by weight. A grain size distribution analysis conducted on a representative sample indicated the following composition: 0 % gravel, 74 – 82 % sand, 3 to 7 % clay-sized particles and 11 to 23 % silt-sized particles.

Grain size distribution analyses were carried out on eleven (11) representative soil samples. The grain size distribution results are summarized in Table 4.1 and graphically presented in Appendix A.

Table 4.1 Grain Size Distribution Summary

Location	Depth (m)	Grain Size Distribution				Described Soil Unit
		%Gravel	%Sand	%Fines		
				%Silt	%Clay	
BH1-17, SS-3	1.5 – 2.1	4	10	58	28	Till
BH4-17, SS-6	4.6 – 5.0	0	74	23	3	Sand
BH6-17, SS-2	0.8 – 1.2	12	20	50	18	Till
BH8-17, SS-3	1.5 – 1.8	8	56	36		Till
BH9-17, SS-5	3.0 – 3.5	31	42	22	5	Till
BH11-17, SS-7	6.1 – 6.6	21	48	25	6	Till
BH1D-21, SS-5	3.0 – 3.7	1	5	54	40	Till
BH3-21, SS-3	1.5 – 2.1	1	11	45	43	Till
BH5D-21, SS-4	2.3 – 2.9	0	82	11	7	Sand
BH7-21, SS-5	3.0 – 3.7	6	34	46	14	Till
BH11D-21, SS-2B	0.9 – 1.35	0	6	54	40	Till

Notes: %Fines indicates silt and clay particles; grain size distribution based on Unified Soil Classification System.

4.2.3 Groundwater

Groundwater seepage was observed in boreholes BH3-17, BH10-17, BH11-17, BH12-17, BH1S-21, BH1D-21, BH3-21, BH11D-21 and BH11S-21 during the drilling operations at depths of 0.9 to 6.4 m. The remaining seventeen (17) boreholes remained dry throughout drilling operations. When encountered, seepage was generally noted from within the till (expected to be from thin sand seams) and of minimal volume. Only BH12-17 encountered groundwater seepage from within the sand layer. Groundwater monitoring wells were installed in eleven (11) of the boreholes including three (3) nested well locations. Five wells were installed in 2017 and six wells in 2021. The monitoring wells were installed to depths ranging from 2.3 to 6.6 m. All wells utilized a sand pack around the screened interval and a bentonite seal above the screened interval. A summary of the monitoring well details is provided in Table 4.2:

Table 4.2 Summary of Monitoring Wells

Location	Depth of Well (m)	Pipe Stick-Up (m)	Effective Well Screen Interval[1] (m)	Water Seepage Depth[2] (m)
BH3-17	6.6	1.0	3.1 – 6.6	~4.6
BH4-17	6.1	0.95	2.8 – 6.1	Not observed
BH8-17	6.1	1.0	2.8 – 6.1	Not observed
BH9-17	5.6	1.0	3.4 – 5.6	Not observed
BH11-17	6.1	0.9	4.3 – 6.1	~4.6
BH1S-21	2.3	0.65	0.6 – 2.3	~2.3
BH1D-21	6.1	0.9	2.8 – 6.1	~4.6
BH5S-21	2.2	0.8	0.4 – 2.2	Not observed
BH5D-21	5.8	1.1	2.5 – 5.8	Not observed
BH11S-21	2.3	0.75	0.5 – 2.3	~0.9
BH11D-21	6.0	0.85	2.6 – 6.0	~3.0

Notes:
"S" denotes the shallow nested well; "D" denotes the deep nested well; m = metres;
(1) Effective well screen includes 10-slot screen and sand pack; (2) Water seepage depth is the estimated depth where water was encountered during the drilling activities.

Groundwater measurements were obtained in September 2017 from the original monitoring wells and on March 17, 2021 from monitoring wells present on the Site. Depth to groundwater levels ranged from 0.2 to 2.5 m on March 17, 2021. Several wells were also dry including BH4-17, BH9-17, BH5S-21 and BH5D-21 to depths of 6.1, 5.6, 2.2 and 5.8 metres below ground surface (mbgs), respectively. The data is summarized in Table 4.3. Monitors BH4-17 and BH8-17 could not be located.

Table 4.3 Potentiometric Water Level Summary

Location	Ground Elevation (masl)*	Water Level (mbgs)			Potentiometric Elevation (masl)		
		Sept. 7, 2017	Sept. 22, 2017	Mar. 17, 2021	Sept. 7, 2017	Sept. 22, 2017	Mar. 17, 2021
BH3-17	248.3	0.9	0.9	--	247.4	247.4	--
BH4-17	251.6	Dry	Dry	Dry	Dry	Dry	Dry
BH8-17	255.4	Dry	Dry	--	Dry	Dry	--
BH9-17	251.6	Dry	Dry	Dry	Dry	Dry	Dry
BH11-17	246.5	4.7	4.8	2.0	241.8	241.7	244.5
BH1S-21		--	--	0.2	--	--	247.8
BH1D-21		--	--	0.2	--	--	247.8
BH5S-21		--	--	Dry	--	--	Dry
BH5D-21		--	--	Dry	--	--	Dry
BH11S-21		--	--	0.6	--	--	254.3
BH11D-21		--	--	2.5	--	--	252.4

Notes:
"S" denotes the shallow nested well; "D" denotes the deep nested well
mbgs = metres below ground surface; masl = metres above sea level
(*) Ground elevations for 2017 boreholes interpolated from the topographic plan of the site provided by Valdor, with electronic title "16119_Fallis Line Subdivision_Preliminary Concept.pdf". Ground elevations for 2021 boreholes interpolated from ODTM Lidar Derived data as shown on Figure 3.
The potentiometric elevations provided are for the purpose of evaluating groundwater elevation and flow direction. The ground elevations should not be relied upon as a legal survey or topographic elevation survey.

Based on the water level data collected and the surrounding topography, the shallow groundwater flow direction is inferred to be toward Baxter Creek. The direction of shallow groundwater movement is illustrated on the Potentiometric Elevations Plan, Figure 9. It should be noted that the water levels presented in this report represent potentiometric surface elevations and do not indicate that there is a permanent water table as shallow as the water levels indicated in Table 4.3 or at other areas of the Site where seepage was observed.

A water table can be visualized as a "surface" where the subsurface is permanently saturated with water (i.e. an aquifer) and is not confined below a lower permeable unit. Typically, unconfined water tables are comprised of sand and gravel and relatively shallow. Water observed in this assessment is minor in volume from within the till unit, not a sand and gravel aquifer.

It is GHD's opinion that there is not a permanently saturated, shallow aquifer at the Site and the groundwater aquifer is found at depth. It is expected that minimal groundwater seepage will be encountered at depths ranging from about 0.9 to 6.4 m and is hydraulically discontinuous across the Site. It should be noted that groundwater levels are transient and tend to fluctuate with the seasons, periods of precipitation and temperature. It is our opinion that any high groundwater levels are seasonal in nature and will lower during drier summer or winter months. Long term groundwater monitoring is expected to illustrate this trend.

It is our opinion that there should not be any significant constraints for development within the proposed residential development area from expected seasonal variations of groundwater as the water levels can be handled with appropriate engineering techniques (such as engineered foundation drains). Based upon the information reviewed, typical basement depths are not expected to be a concern from a groundwater perspective. The seepage observed was minimal and can be handled with appropriate engineering techniques.

During storm events or thaw events, water percolates into the soil and infiltrates the monitoring well through the sand pack and well screen. Water within the well pipe accumulates and slowly drains through the till. The volume of water within the well pipe is generally about one (1) L per metre of 50 mm pipe, indicating that the volume of water is minimal.

Significant quantities of groundwater within the shallow soils are not expected at this Site. Stormwater infiltrated through the topsoil is expected to drain horizontally along the interface of lower permeable soils to ditches or gullies or adjacent seepage areas that support water bodies or drain vertically via fractures, fissures or sand seams within the till.

Based on local knowledge and previous experience in the area, it is expected that artesian (pressured) groundwater conditions exist in the confined aquifer located at depths below this area. It is also known that the aquitard (i.e. confining) soil layer within which excavations for this construction may occur, can be “leaky”, in that it can allow upwards leakage of the pressurized groundwater into excavations via hydraulically-connected seams / lenses of sand.

4.2.4 Hydraulic Conductivity

Hydraulic conductivity (K) testing was completed at borehole BH11-17 on September 7, 2017. Additional testing was completed on March 17, 2021 at BH11-17, BH1S-21 (two tests), BH1D-21, BH11S-21 and BH11D-21.

The testing consisted of rising and falling head testing and was completed using a one-metre long slug. The change in water levels during the hydraulic conductivity testing was measured using data loggers programmed at 0.5 second intervals. The data was analyzed using AQTESOLV and the Bouwer-Rice solution for each rising and falling head test (Appendix C for solution data). The K values for the hydraulic conductivity testing are on the order of 10^{-5} to 10^{-8} cm/sec. The shallower monitoring wells typically had higher K values and the deeper monitoring wells had lower K values.

The hydraulic conductivity testing suggests that excavations within these soils, if groundwater is encountered, would be expected to yield low volumes of water. However, increased amounts of water may be expected where pockets or layers of water bearing sands and gravels are intersected.

4.2.5 Infiltration Testing

For purposes of Low Impact Development (LID) strategies, infiltration data of the shallow soils in the area of boreholes BH1-17 and BH11-17 is presented in this section. In-situ constant head permeameter tests were completed at two (2) locations to evaluate the infiltration capacity of the shallow vadose (i.e. unsaturated) zone. The importance of infiltration is for the implementation of Low Impact Development (LID) strategies to recharge precipitation into the ground at pre-development or near pre-development values. Infiltration testing was completed of the shallow vadose zone using an ETC Pask (constant head) permeameter.

Based upon the infiltration testing results, the upper vadose zone consists of soils with a field saturated hydraulic conductivity on the order 10^{-4} cm/sec to 10^{-6} cm/sec. Based on the Supplementary Guidelines to the Ontario Building Code 2012, this data correlates to infiltration rates on the order of 12 to 50 mm/hour. It is noted, however, that slight variations in the soil stratigraphy may cause variations in the permeability of the soil in both vertical and horizontal orientations.

LIDs can be applied to any soil type, and we recommend that infiltration locations be kept away from private lands by targeting publicly-owned lands for maintenance and long-term care. LID strategies should not be constructed on private lots to reduce the risk of soggy backyards and ponded water in residential yards. Only naturally occurring infiltration strategies for private properties should be incorporated (i.e. roof water discharged via downspouts to sodded lawns with adequate topsoil depths). LID strategies may be targeted along the boundary of the natural heritage system or parklands but are not recommended to be within privately owned lots with the exception of downspout disconnections to sodded lawns.

5. Hydrogeology

The hydrogeology of the area is characterized by rolling to hilly topography of soils that generally consist of silty sand to silty clay till with sandier soils in some locations below the topsoil layer. Seasonal water is expected to consist of horizontal migration at the till interface with limited vertical migration within the till. Only a minor portion of the existing infiltration is expected to recharge the deeper aquifers that are confined below the till.

Information regarding groundwater characteristics of the immediate area was obtained from an inventory of well records. A total of fifty-one (51) well records were identified within 500 m of the Site for statistical breakdown including twenty-six (26) drilled overburden wells, five (5) drilled bedrock wells and twenty (20) monitoring wells or well abandonment records. The monitoring wells and abandonment records will not be considered further in this assessment. The MECP well records and their locations are provided in Appendix D.

5.1 Existing Local Water Supplies

Lands to the east are in various stages of development and will be municipally serviced. However water wells within the vicinity of the Site are still in use. Physical and hydraulic data are presented on MECP well records (Appendix D) and the information indicates the presence of two (2) aquifer systems:

1. A confined overburden aquifer within the sand and gravel tapped by drilled wells; and
2. A confined, deeper aquifer within the bedrock tapped by other drilled wells.

A summary of the MECP data is presented in Table 5.1. The information from the MECP data indicates that the majority of wells in this area are drilled into the overburden with some bedrock wells. The groundwater was generally described as “fresh” in the well records reviewed. The presence of methane gas was not noted on the reviewed well records; however, based on past experience in this area methane gas may be encountered within local wells advanced to bedrock. The overburden and bedrock wells are inferred to be confined based upon deposits of clay and till above the water bearing zones. No dug / bored wells were identified in the well records.

Twenty-six (26) drilled overburden wells were identified in the well records. The overburden wells yielded an average flow rate of 318 litres per minute (L/min) or 84.2 gallons per minute (gpm). Water was encountered at 22.8 m (74.7 feet) within sand and / or gravel soil units. The average depth of these wells was 35.1 m (115 feet).

Five (5) well records were identified for bedrock wells. The bedrock wells yielded an average flow rate of 18.9 L/min or 5 gpm. Water was encountered at 57.7 m (189.4 feet) within the limestone formation. Limestone was encountered at an average depth of 57.2 m (187.6 feet). The average depth of these wells was 60.1 m (197.2 feet).

Table 5.1 Summary of MECP Water Well Data

Total Number of Wells Inventoried:	31
Dug/Bored Wells:	0 (0%)
Drilled Wells (Overburden):	26 (84%)
Drilled Wells (Bedrock):	5 (16%)
Monitoring Well and Abandonment Records:	20 (not considered in statistical analysis)

Parameters	Statistical Summary Dug / Bored Wells		Statistical Summary Drilled – Overburden		Statistical Summary Drilled – Bedrock	
WELL YIELDS						
Range	-- L/min	-- gpm	8-1323 L/min	2-350 gpm	11.3-26.5 L/min	3-7 gpm
Average	-- L/min	-- gpm	318 L/min	89.9 gpm	18.9 L/min	5.0 gpm
REPORTED YIELDS	Frequency		Frequency		Frequency	
Not Reported	0	0%	1	4%	0	0%
Dry	0	0%	0	0%	0	0%
0 to 1 lgpm	0	0%	0	0%	0	0%
2 to 4 lgpm	0	0%	1	4%	1	20%
5 to 9 lgpm	0	0%	8	31%	4	80%
≥10 lgpm	0	0%	16	61%	0	0%
STATIC WATER LEVELS						
Range	-- m	-- ft	+7 – 30.5 m	+23 – 100 ft	3.4 – 30.5 m	11 – 100 ft
Average	-- m	-- ft	10.0 m	32.8 ft	18.8 m	61.8 ft
WATER ENCOUNTERED						
Range	-- m	-- ft	5.5 – 63.4 m	18 – 208 ft	45.7 – 66.8 m	150 – 219 ft
Average	-- m	-- ft	22.8 m	74.7 ft	57.7 m	189.4 ft
WELL DEPTH						
Range	-- m	-- ft	16.5 – 67.1 m	54 – 220 ft	46.6 – 72.2 m	153 – 237 ft
Average	-- m	-- ft	35.1 m	115 ft	60.1 m	197.2 ft

Notes: Data based on MECP well record information (see Appendix D). L/m represents litres per minute, gpm indicates gallons per minute and m is metres.

5.2 Well Survey

To supplement the MECP well records reviewed, GHD staff conducted a well survey of the area to investigate where private wells may still be in use. The well survey map showing the homes that were surveyed is shown on the Well Survey Plan in Appendix D. A total of eleven (11) homes were contacted. Due to COVID-19 concerns, the well survey was completed by issuance of a letter to the homes. Hydrogeological concerns are not anticipated based on the review of MECP water well records and the well survey.

Well survey information is summarized in Table 5.2. Of the eleven (11) residences surveyed, information was obtained from five (5) locations. The well survey found five (5) drilled wells and indicated that the residents generally have good water quality and quantity with deeper wells encountering methane at the bedrock interface. One (1) water sample was collected during the well survey.

Table 5.2 Well Survey Summary

Address	Well Type	Well Depth (mbtoc)	Water Level (mbtoc)	Comments	Well Survey Plan
919 Fallis Line	Previously surveyed in 2017. House no longer present in 2021 – lot re-developed as part of Fallis Line residential subdivision development.				WS-1
893 Fallis Line	Drilled Well	63	18.9	Methane in water	WS-2
886 Fallis Line	Drilled Well	64	17.7	Methane in water	WS-3
825 Fallis Line	Drilled Well	--	--	Rental owned by developer	WS-4
811 Fallis Line	Drilled Well	16.7	9.2	--	WS-5
787 Fallis Line	Drilled Well	--	--	Rental owned by developer	WS-6
771 Fallis Line	--	--	--	No response to well survey letter	WS-7
773 Fallis Line	--	--	--	No response to well survey letter	WS-8
769 Fallis Line	--	--	--	No response to well survey letter	WS-9
760 Fallis Line	--	--	--	No response to well survey letter	WS-10
720 Fallis Line	--	--	--	No response to well survey letter	WS-11

Note: mbtoc = metres below top of casing

5.3 Background Water Quality

The MECP well records reviewed for this assessment generally reported fresh water supplies. One (1) groundwater sample was collected during the well survey and two (2) water samples were collected from monitoring wells installed on the Site (boreholes BH11-17 and BH11D-21) to evaluate background water quality. The water samples were delivered to Caduceon and SGS Canada (SGS) for chemical analyses in 2017 and 2021, respectively. The Certificates of Analysis are presented in Appendix E. The data is summarized and compared with the Ontario Drinking Water Standards (ODWS) in Table 5.3.

Table 5.3 Water Quality Summary

Parameter	Analytical Data			ODWS	
Analysis	**BH11-17**	**811 Fallis Line**	**BH11D-21**	**MAC***	**AO/OG***
Alkalinity (mg/L as $CaCO_3$)	229	265	306	--	30 to 500
Ammonia + Ammonium (mg/L)	<0.01	<0.01	<0.04	--	--
Calcium (mg/L)	116	106	121	--	--
Chloride (mg/L)	15.3	11.9	9.5	--	250
Colour (TCU)	4	2	4	--	5
Copper (mg/L)	0.010	0.004	0.0041		
Conductivity (µmho/cm)	604	599	566	--	--
Fluoride (mg/L)	<0.1	<0.1	0.46	1.5	--
Hardness (mg/L as $CaCO_3$)	**332**	**325**	**372**	--	80-100
Iron (mg/L)	0.067	0.015	**0.5**	--	0.3
Magnesium (mg/L)	10.2	14.6	17.2	--	--
Manganese (mg/L)	0.037	0.001	**0.0918**	--	0.05
Nitrate – N (mg/L)	**18.6**	6.1	8.77	10	--
Nitrite – N (mg/L)	<0.1	<0.1	0.004	1.0	--
pH (no units)	7.99	7.86	7.91	--	6.5 to 8.5
Potassium (mg/L)	<0.01	0.9	---		
Sodium (mg/L)	7.0	8.8	13.4	--	(20) 200
Sodium Adsorption Ratio (no units)	0.166	0.213	---		
Sulphate (mg/L)	7	9	10	--	500
Turbidity (N.T.U.)	**879**	1.5	**145**	--	5
Zinc (mg/L)	0.020	0.005	0.013		
Langelier Index	0.962	0.855	---	--	--

Notes: All units are parts per million (mg/L) unless otherwise stated; (<) indicates levels that are below the detectable limits. Bolded values exceed their applicable ODWS.

In general, the analyses indicate the parameters meet the ODWS with the exception of hardness for all samples collected and for turbidity, nitrate, manganese and iron for the samples collected from the monitoring wells. Elevated hardness is a common trait of groundwater supplies in Southern Ontario due to the presence of calcareous glacial tills. Exceedance of turbidity is due to limited development of the monitoring wells prior to sampling. Elevated nitrate is likely caused by the use of fertilizer for agricultural purposes (i.e., growing of cash crops such as corn and soy beans on the Site). Nitrate concentrations are expected to reduce after development of the subdivision and agricultural activities cease. The proposed residential development will be municipally serviced, therefore elevated nitrate is not an issue. Iron and manganese are naturally occurring within the soil matrix and will not be an issue for the development. Methane gas was also not observed at the tested well locations but may be present in deep wells drilled to the bedrock.

5.4 Source Water Protection Considerations

Where proposed developments are being planned, it is important to determine the presence of Significant Groundwater Recharge Areas (SGRAs) and Highly Vulnerable Aquifers (HVAs) in the area. These areas are protected under the Clean Water Act (2006). In general, SGRAs are defined as areas where water seeps into an aquifer from rain and melting snow, supplying water to the underlying aquifer. An HVA aquifer occurs where the subsurface material offers limited protection from contamination resulting from surface activities. GHD considered the potential for SGRAs and HVAs by reviewing the "Source Protection Information Atlas" that is currently available through the MECP website. The information is current as of February 4, 2021. Based on this information, only a small area in the northwest corner of the Site is within an HVA. The southern portion of the Site is within a SGRA with scores of 2 to 4 (see Figure 10).

GHD notes that the proposed development is outside of the local SGRA and the HVA is a very minor portion of the Site. In our opinion, with the protective capabilities of the till, there are no concerns from a HVA perspective related to the proposed development. As a best practice and to maintain groundwater quality, the development should consider the reduction of potential infiltration of contaminants to the subsurface using best management practices. Clean stormwater from the development rooftop would not be a concern for infiltration; however, runoff from other sources should be evaluated and may require pre-treatment. For example, runoff from asphalt should consider the use of an oil-grit separator or the reduction of the use of deicing salts.

If infiltration of stormwater is required from asphalt areas, GHD recommends the use of an oil-grit-separator (OGS) that will remove oil and sediment from the discharge before it is released for infiltration. An OGS can have a removal efficiency to 80 percent, meeting the MECP 'enhanced' level of protection.

5.4.1 Other Source Water Protection Considerations

The Site is not within a wellhead protection area (WHPA). A WHPA is defined as the surface and subsurface area surrounding a water well or well field that supplies a municipal residential system through which contaminants are reasonably likely to move so as to eventually reach the water well. The WHPA does not apply.

The Site is not within a wellhead protection area Q1 or Q2. WHPA Q1/Q2 (moderate risk level) means that activities that take water without returning it to the same source may be a threat (Q1) and activities that reduce recharge may be a threat (Q2). Activities that take water would include construction dewatering or other groundwater pumping. Pumping or dewatering activities may require appropriate permitting from the MECP but are not a concern from a source water protection perspective.

6. Conclusions and Recommendations

Supporting data upon which our recommendations are based have been presented in the foregoing sections of this report. Based on the results of our hydrogeologic assessment, it is our professional opinion that the Site is suitable for the proposed house (and garage) and there is low potential for groundwater impact due to the planned construction. It is recommended that good construction and mitigation techniques must be used to minimize the potential for impact. Detailed conclusions and recommendations are presented in the following sections regarding the water balance and impacts.

6.1 Water Balance Evaluation

An evaluation of the water balance was completed to compute the potential impacts that may occur in the recharge/discharge characteristics related to the proposed house construction. The objective of the water balance is to illustrate that post-development infiltration within the developable area can meet or be close to pre-development values. The computations have used detailed parameters such as precipitation (Peterborough A weather station data from 1981 to 2006 was used), regional evapotranspiration, infiltration and runoff. Information from the Peterborough A weather station was selected as it was the closest weather station to the Site (~10 km). The detailed calculations can be reviewed in Appendix F. The calculations are based on a total Site area of 49.22 ha (121.6 acres). A summary of the expected pre-development water balance values for the proposed house construction is described in the following section based on current information.

6.2 Pre-Development Water Balance

The pre-development water balance incorporated the existing soils, slope and agricultural areas. The infiltration factor for the area was calculated from the table of values presented in the “Land Development Guidelines” (MOEE, 1995). It is based on three sub-factors which are:

- Topography sub-factor;
- Soil sub-factor; and
- Cover sub-factor.

The subfactor for topography used a range of representative parameters for the surrounding areas including 0.1 for the forested areas; 0.15 for the agricultural areas and 0.20 for a flatter, naturalized area. The soils are generally comprised of till as per the water balance calculations. The existing vegetation sub-factor was selected to represent both the wooded and agricultural areas of the Site (see Appendix F.2 for breakdown of areas). Table 6.1 summarizes the expected pre-development water balance values for the Site.

Table 6.1 Pre-Development Summary

Total Precipitation (Peterborough A):	- 855 mm/year
Regional Evapotranspiration:	- 556 mm/year
Recharge Available:	- 299 mm/year
Area of Recharge Available (Site):	- 49.22 ha
Total Water Surplus:	- 148,335 m^3/year
Total Estimated Infiltration:	- 70,356 m^3/year
Total Estimated Runoff:	- 77,979 m^3/year

Based upon these values, the overall Sites infiltrate on the order of 70,350 m^3 per year or about 145 mm/year.

6.3 Post-Development Water Balance (No Enhancements)

The computation of the water budget was repeated for the proposed house construction assuming no mitigation techniques, that is, runoff from impervious surfaces is unrecoverable and not infiltrated into the ground. The anticipated impact of the proposed construction is related to increased runoff from imperious surfaces such as building roof tops, paved roadways, driveways and parking areas. These are assumed to be impervious surfaces with zero infiltration capacity in this model. A summary of the computations is provided in Table 6.2.

Table 6.2 Post-Development Summary (No Enhancements)

Area of Site:	- 49.22 ha
Impervious Surfaces:	- 20.56 ha
Pervious Surfaces	- 28.66 ha
Total Water Surplus:	- 226,439 m^3/year
Total Estimated Infiltration:	- 42,674 m^3/year
Infiltration % Difference (pre- vs. post-):	- (-39%) (decrease)
Total Estimated Runoff:	- 183,765 m^3/year
Runoff % Difference (pre- vs. post-):	- (136%) (increase)

Information that was provided to GHD in order to compute the post-development water budget in Table 6.2 included evaporation from impervious surfaces (20% of precipitation) and development areas gleaned from the “Draft Concept” prepared by The Biglieri Group Ltd., dated February 20, 2020:

- Single detached lots – 15.86 ha:
  - Assume rooftops cover 60% of the lots;
  - Assume paved driveways cover 15% of the lots; and
  - Assume manicured lawns cover 25% of the lots.
- Townhouse lots – 3.57 ha:
  - Assume rooftops cover 75% of the lots;
  - Assume paved driveways cover 5% of the lots; and
  - Assume manicured lawns cover 20% of the lots.
- Medium density (5-storey building) lot – 0.88 ha:
  - Assume rooftop covers 60% of the lot;
  - Assume paved parking area / driveway covers 20 of the lot; and
  - Assume manicured lawn covers 20% of the lots.
- Parkland and trails – 2.10 ha;
- Right-of-ways – 7.65 ha:
  - Assume paved asphalt / concrete surfaces cover 50% of the right-of-ways; and
  - Assume manicured lawn covers 50% of the right-of-ways.
- Natural heritage system – 16.43 ha;
- Easement – 0.01 ha;
- Stormwater facility – 2.57 ha;
  - Assume pond area – 1.285 ha; and
  - Grass / open space – 1.285 ha.
- Road widening – 0.16 ha.

Under this scenario, the total infiltration volume decreased by 39% and runoff volume increased by 136%.

Within the areas evaluated, the infiltration has reduced and the runoff increased versus the pre-development values. Groundwater base flow would be expected to decrease over time in this scenario. Based upon this scenario, mitigative strategies are required to minimize infiltration losses and reduce storm water runoff. The following section discusses the water balance after considering the mitigation strategy of conveying rooftop stormwater to the ground for infiltration.

6.4 Post-Development Water Balance (Enhanced Infiltration)

The post-construction water budget computations were repeated considering enhanced infiltration options which are also known as Low Impact Development (LID) technologies. These technologies include and are not restricted to rainwater harvesting, downspout disconnection, infiltration trenches, vegetated filter strips, bioretention, permeable pavement, enhanced grass swales, dry swales and perforated pipe systems. For this Site, downspout disconnection was considered as a LID used to balance the water budget.

Based upon LID documentation, downspout disconnections can reduce rooftop runoff by 25% to 50% (i.e. 25% to 50% of the rooftop runoff can be infiltrated). Our water balance suggests that about 31% of all the available rooftop runoff (after evaporation) is needed to infiltrate the soils to maintain the pre-development infiltration values.

A summary of the post-construction water budget with enhancements for infiltration is presented in Table 6.3.

Table 6.3 Post-Development Summary (With Downspout Disconnection)

Area of Site:	- 49.22 ha
Total Water Surplus:	- 226,439 m^3/year
% of Rooftop Runoff Required for Infiltration	- 31.8%
Rooftop Runoff Infiltrated	- 27,682 m^3/year
Total Estimated Infiltration:	- 70,356 m^3/year
Infiltration % Difference (pre- vs. post-):	- (0%) (meets pre-development)
Total Estimated Runoff:	- 156,083 m^3/year
Runoff % Difference (pre- vs. post-):	- 100% (increase)

In this scenario and based on the information provided, the post-development infiltration values meet the pre-development values. Runoff has increased as compared with the pre-development conditions and will need to be managed as per a storm water management plan. In general, these water balance calculations indicate development infiltration values can be maintained at pre-development values for the overall development.

6.5 Impact on Groundwater Baseflow

The importance of the groundwater baseflow is that, depending upon the hydraulic functionality with the Site, it provides discharge to water bodies and wells. Water infiltrating to the till is expected to provide seasonal interflow of water that may support neighbouring vegetation, environmental features and groundwater to seepage areas that support Baxter Creek and should be maintained where possible. Water balance calculations suggest that the infiltration to the subsurface can be kept near pre-development values. It is GHD's professional opinion that there is not expected to be a significant impact to the shallow groundwater baseflow that is supplying seepage to Baxter Creek.

6.6 Impact on Surface Water Bodies

The impacts to surface water bodies are related to the reduction of the groundwater baseflow and water quality concerns related to human activities such as road salting, minor fuel and oil leaks, fertilizer application etc. It is expected that there will be minor impacts to groundwater and neighbouring surface water bodies. Runoff from the development will be collected by an internal storm sewer system and treated using a stormwater management pond or other low impact development strategies. Further details are provided within the Functional Servicing Report regarding the stormwater management of the Site.

6.7 Mitigation Measures

Several mitigative techniques have been recommended in order to address concerns relating to the potential for impact to the base flow. The impact and mitigation measures can be arranged into two (2) distinct categories: construction phase and operational phase.

6.7.1 Construction Phase

Prior to construction, storm water management techniques should be incorporated to control additional surface water runoff and permit enhanced infiltration into the surrounding ground. Storm water management techniques will minimize the potential for groundwater impact and also minimize the amount of silt or other fine-grained soil particles becoming mobile and entering into downgradient areas. The installation of strategically placed silt fences will reduce flow velocities of storm water enabling particulate to settle out prior to entering downgradient areas.

If groundwater volumes of greater than 50,000 L/day are to be pumped during construction activities then a permit applied for through the Environmental Sector and Activity Registry (EASR) would be required from the MECP. If the volumes are to exceed 400,000 L/day, a Permit To Take Water (PTTW) would be required.

During the operational phase of the development, it is expected that storm water excess will be controlled as per the Stormwater Management report. As indicated above, LIDs can be used to maintain pre-development infiltration values and reduce storm water runoff.

During the construction phase and grading work, suitable sedimentation controls will be required to help control surface water flow. As construction work progresses at the Site, regular maintenance and additional sedimentation measures may be required to limit the effect of siltation of run-off water in localized areas. Vegetative cover should be re-established in disturbed areas following the completion of the construction work to reduce erosion and sediment loading to the adjacent features.

6.7.2 Operational Phase

During the operational phase of the subdivision, it is expected that storm water excess will be controlled as indicated in the Functional Servicing Report. It is recommended that all roof leader drains of the future homes be allowed to drain onto the ground surface for infiltration. Swales may be required in some areas to divert the runoff water from driveways or other structures. Other LIDs may be required to maintain pre-development infiltration values and reduce storm water runoff and can be evaluated at the detailed design stage.

It is our opinion that there should not be any significant constraints for this development from a groundwater perspective as any water can be handled with appropriate engineering techniques.

6.7.2.1 Private Wells

There are a number of private water wells in this area with generally drilled wells tapping into the underlying aquifers. Issues regarding water quantity were not identified in our well survey. The existing private wells are located upgradient of the proposed development. It is our opinion that there is low potential for significant impact to existing drilled wells from a quantity perspective.

6.7.2.2 Groundwater Quality

As indicated, the existing private wells are located upgradient of the proposed development. Impacts to groundwater quality at the existing private wells is not anticipated.

Road salting practices will be the responsibility of Peterborough County. Where it is practical, as a best practice measure road salting should be minimized.

6.7.2.3 Maintenance of Infiltration

During the operational phase of the development, it is expected that storm water excess may be controlled by LIDs and as per the Stormwater Management or Functional Servicing report(s). LID technologies include and are not restricted to rainwater harvesting, downspout disconnection, infiltration trenches, vegetated filter strips, bioretention, permeable pavement, enhanced grass swales, dry swales and perforated pipe systems. In general, from a quantitative stand point incorporating effective at-source infiltration structures into final land development design as part of a storm water management strategy is primarily dependent on (but not limited to), native soil infiltration rates and depth to seasonal high groundwater table.

The implementation of LIDs at this Site to infiltrate the roof top runoff is the primary method of infiltration to maintain shallow groundwater. It is recommended that all roof leader drains of the future homes be allowed to drain onto the ground surface for infiltration. Swales may be required in some areas to divert the runoff water from driveways or other structures. We also recommend that a minimum topsoil depth of 300 mm be applied to lawns and reduced lot grading may help to reduce runoff. Other LIDs may be required to maintain pre-development infiltration values and reduce storm water runoff and will be evaluated by the detailed design

6.7.2.4 Natural Heritage System

No mitigation is required provided pre-development infiltration values can be maintained which will continue to support the shallow groundwater that provides baseflow to seeps that are tributaries of Baxter Creek. Based upon our water balance calculations, pre-development infiltration values can be maintained.

6.7.2.5 Monitoring and Contingency Programs

It is our opinion that groundwater monitoring or contingency programs are not required.

6.8 Servicing

Private services for water and septic disposal are not considered as the Site will be connected to municipal services. However, any wells at the Site (including monitoring wells) are recommended to be decommissioned in accordance with Ontario Regulation 903 prior to development of the Site. If septic systems are encountered, the systems should be removed.

6.9 Summary Conclusions

In summary, the proposed development area is comprised of topsoil underlain by very loose to very dense till (the upper zones containing occasional organics). The till ranged in composition from silty sand / sandy silt to silty clay / clayey silt and was underlain in some boreholes by dense to very dense sand. Bedrock was not encountered in any of the boreholes. Groundwater seepage was observed in boreholes BH3-17, BH10-17, BH11-17, BH12-17, BH1S-21, BH1D-21, BH3-21, BH11D-21 and BH11S-21 during the drilling operations at depths of 0.9 to 6.4 m. The remaining seventeen (17) boreholes remained dry throughout drilling operations. When encountered, seepage was noted to be from within the till and of minimal quantities.

A permanent shallow groundwater table was not observed. It is our professional opinion that there should not be any significant constraints for the proposed residential development from a groundwater perspective and the groundwater seepage observed can be handled with appropriate engineering techniques.

No impacts are expected to groundwater as a result of the future development provided that appropriate planning (i.e., incorporation of LIDs as supported by the water balance calculations), mitigation measures and proper construction techniques are considered.

The following Statement of Limitations should be read carefully and is an integral part of this report. We trust this report meets your immediate needs. Should any questions arise regarding any aspect of our report, please contact our office.

Sincerely,

GHD

Robert Neck, P.Geo. (Limited)

Nyle McIlveen, P.Eng.
/BN/nmc/02

7. References

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Ministry of the Environment, Conservation and Parks, February, 2021. Source Protection Information Atlas, available online at www.ontario.ca.

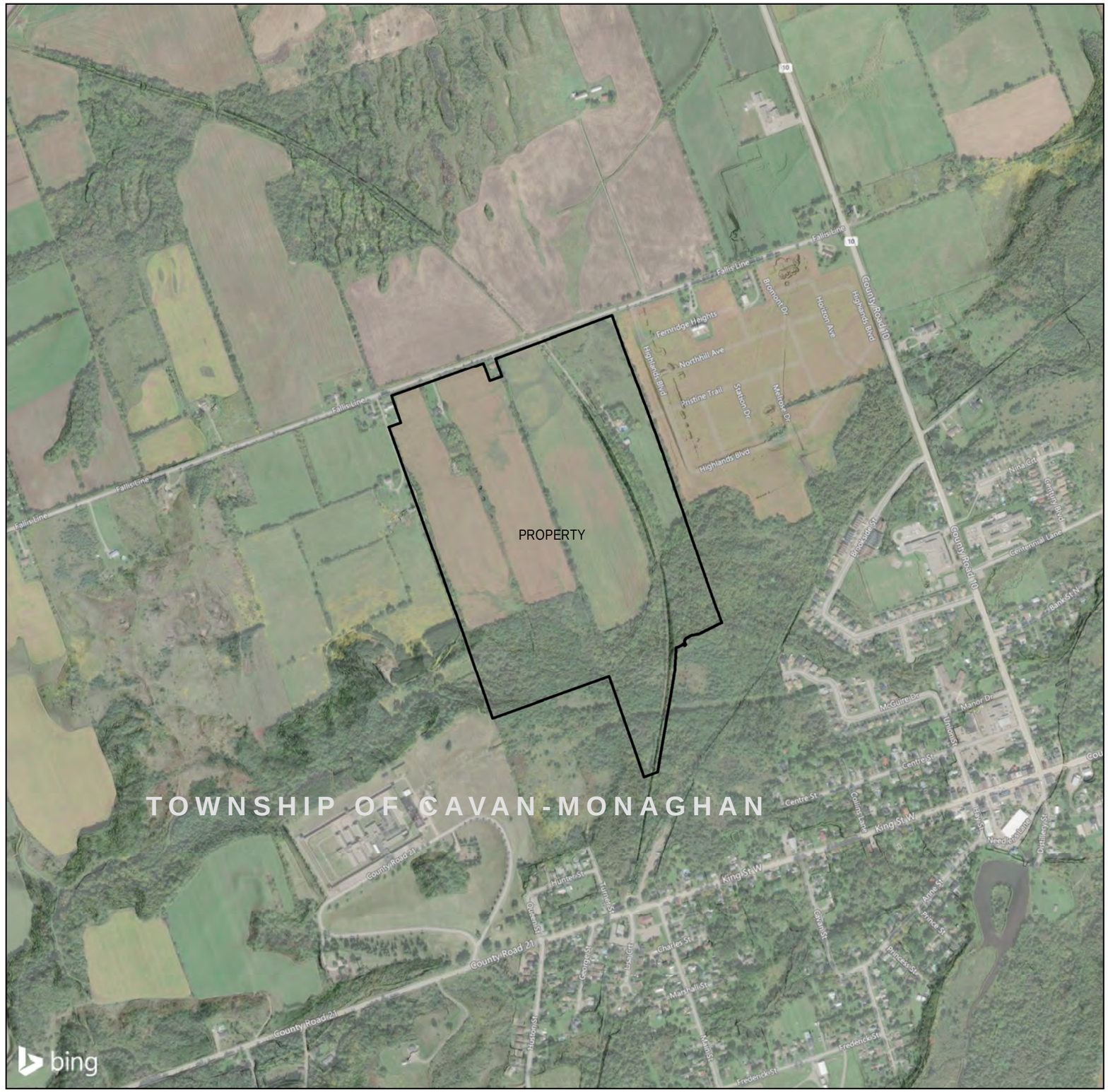
8. Statement of Limitations

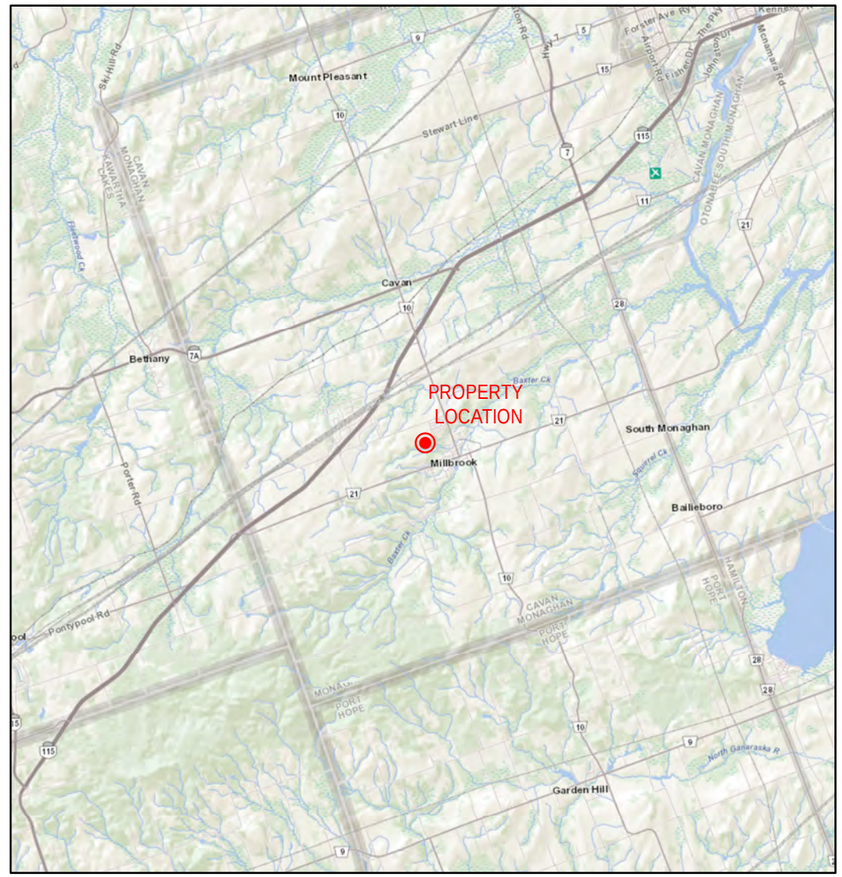
This report is intended solely for The Bromont Group in assessing the hydrogeologic aspects of the lands situated at 787 and 825 Fallis Line in Millbrook, Ontario and is prohibited for use by others without GHD's prior written consent. This report is considered GHD's professional work product and shall remain the sole property of GHD. Any unauthorized reuse, redistribution of or reliance on the report shall be at the Client and recipient's sole risk, without liability to GHD. Client shall defend, indemnify and hold GHD harmless from any liability arising from or related to Client's unauthorized distribution of the report. No portion of this report may be used as a separate entity; it is to be read in its entirety and shall include all supporting drawings and appendices.

The recommendations made in this report are in accordance with our present understanding of the project, the current site use, ground surface elevations and conditions, and are based on the work scope approved by the Client and described in the report. The services were performed in a manner consistent with that level of care and skill ordinarily exercised by members of hydrogeological engineering professions currently practicing under similar conditions in the same locality. No other representations, and no warranties or representations of any kind, either expressed or implied, are made. Any use which a third party makes of this report, or any reliance on or decisions to be made based on it, are the responsibility of such third parties.

All details of design and construction are rarely known at the time of completion of a hydrogeological study. The recommendations and comments made in the study report are based on our interpretation of the subsurface conditions and resulting understanding of the project, as defined at the time of the study. We should be retained to review our recommendations when the drawings and specifications are complete. Without this review, GHD will not be liable for any misunderstanding of our recommendations or their application and adaptation into the final design. Any use which a third party makes of this report, or any reliance on or decisions to be made based on it, are the responsibility of such third parties.

Figures





Citation(s)

Ontario Digital Terrain Model [Derivative]. Central Lake Ontario Conservation Authority, 2018.

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Map Projection: Transverse Mercator
Horizontal Datum: North American 1983
Grid: NAD 1983 UTM Zone 17N

Paper Size ANSI B

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Meters

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GHD

THE BROMONT GROUP
787 & 825 FALLIS LINE, MILLBROOK, ON
TOWNSHIP OF CAVAN-MONAGHAN
COUNTY OF PETERBOROUGH

HYDROGEOLOGY ASSESSMENT
SITE LOCATION

Project No. 11224019
Revision No. -
Date Mar 2021

FIGURE 1

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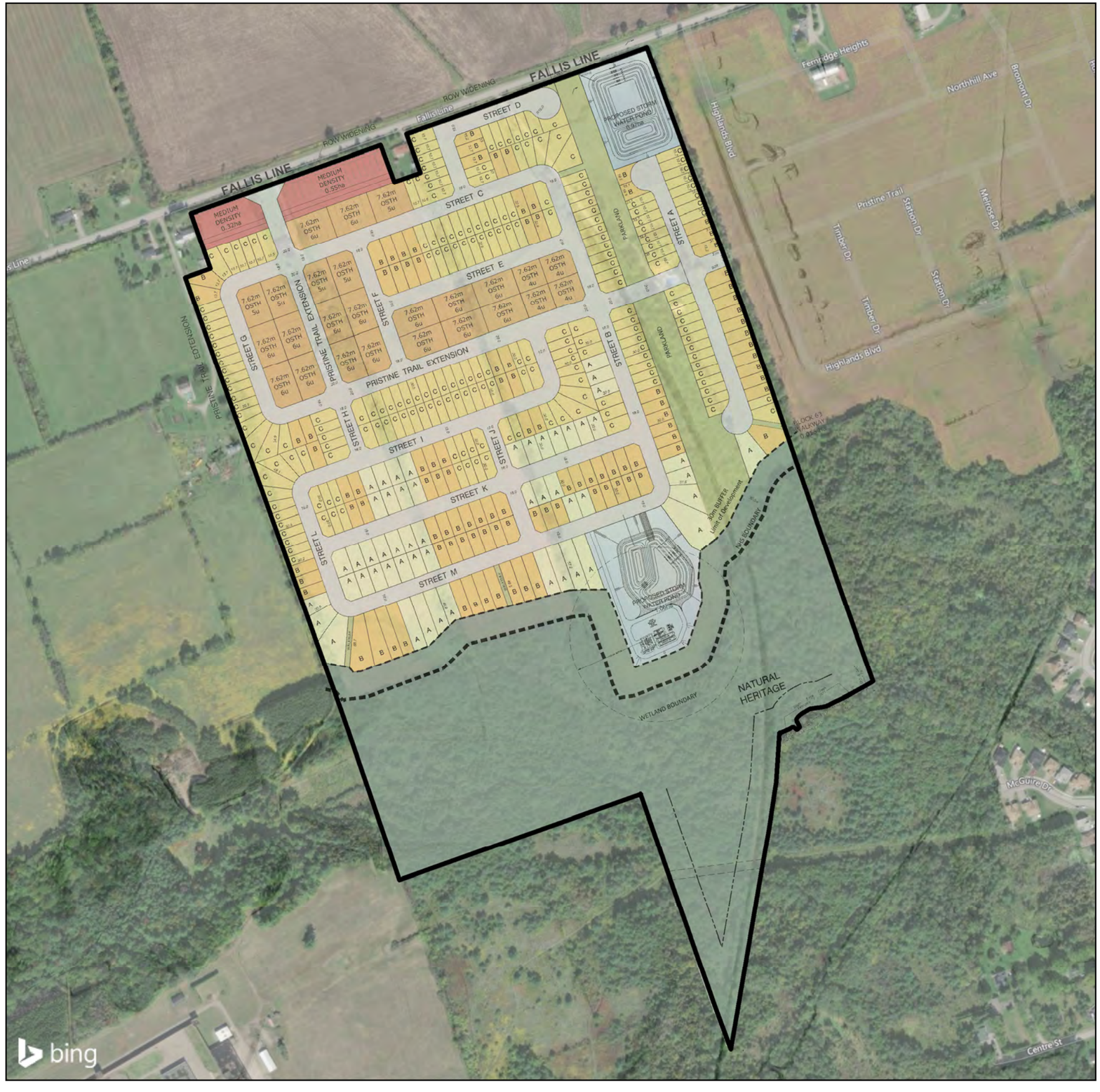

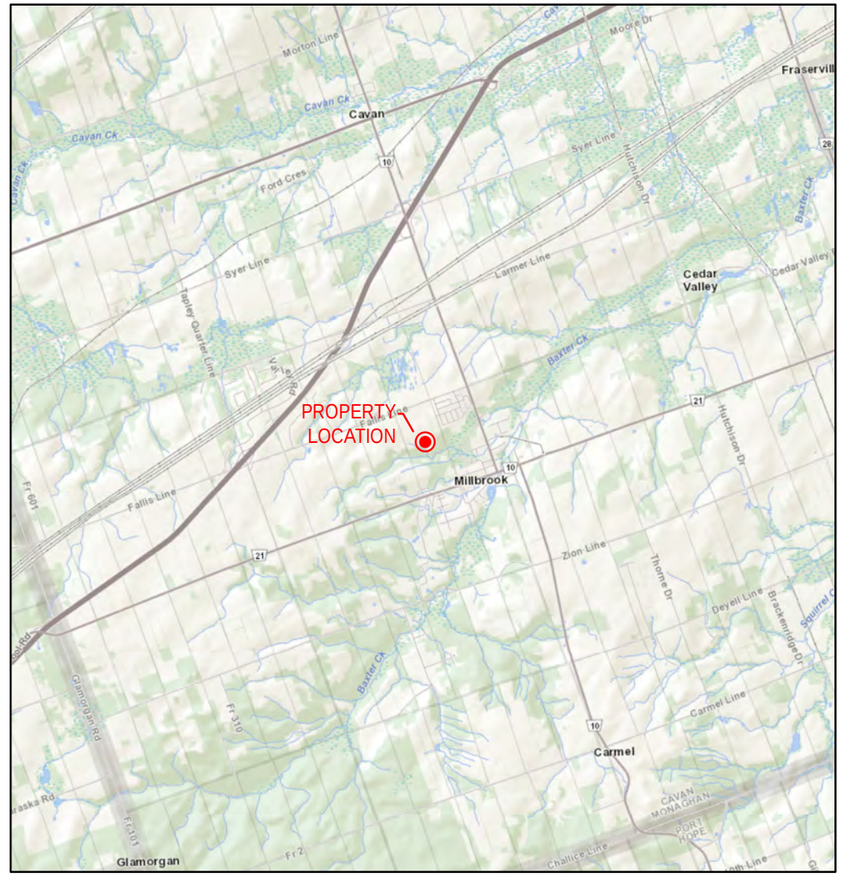

CITATIONS

Ontario Digital Terrain Model [Derivative]. Central Lake Ontario Conservation Authority, 2018.

Conceptual Draft Plan, Fallis Line West [20697]. The Biglieri Group Ltd. 2021-03-29.

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Horizontal Datum: North American 1983
Grid: NAD 1983 UTM Zone 17N

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Meters

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THE BROMONT GROUP
787 & 825 FALLIS LINE, MILLBROOK, ON
TOWNSHIP OF CAVAN-MONAGHAN
COUNTY OF PETERBOROUGH

HYDROGEOLOGY ASSESSMENT

PRELIMINARY CONCEPT PLAN

Project No. 11224019
Revision No. -
Date Mar 2021

FIGURE 2

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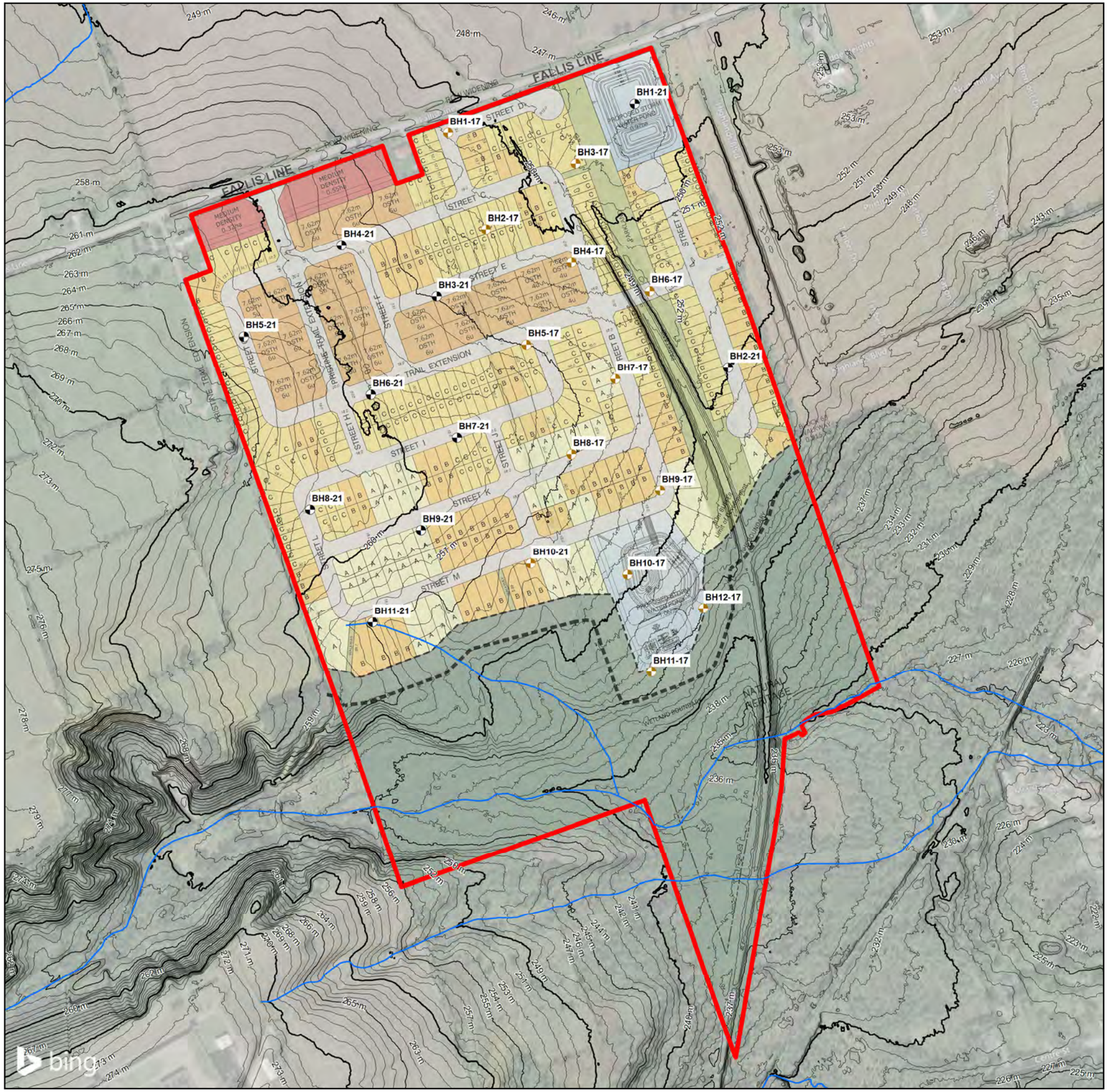

TEST HOLES

- Boreholes Drilled in 2021
- Boreholes Drilled in 2017

CONTOURS

- Contour Line, Major
  10 m Contour Index
  ODTM Lidar Derived
- Contour Line, Intermediate
  5 m Contour Index
  ODTM Lidar Derived
- Contour Line, Minor
  1 m Contour Interval
  ODTM Lidar Derived

ONTARIO HYDROGRAPHIC NETWORK (OHN)

- Stream

ADMINISTRATIVE BOUNDARIES

- Property Limit

CITATIONS

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Ontario Digital Terrain Model [Derivative]. OMAFRA. Peterborough, 2016-2017.

Conceptual Draft Plan, Fallis Line West [20697]. The Biglieri Group Ltd. 2021-03-29.

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Paper Size ANSI B

0 60 120 180 240
Meters

N

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THE BROMONT GROUP
787 & 825 FALLIS LINE, MILLBROOK, ON
TOWNSHIP OF CAVAN-MONAGHAN
COUNTY OF PETERBOROUGH

HYDROGEOLOGY ASSESSMENT

TEST HOLE PLAN

Project No.	11224019
Revision No.	-
Date	Mar 2021

FIGURE **3**

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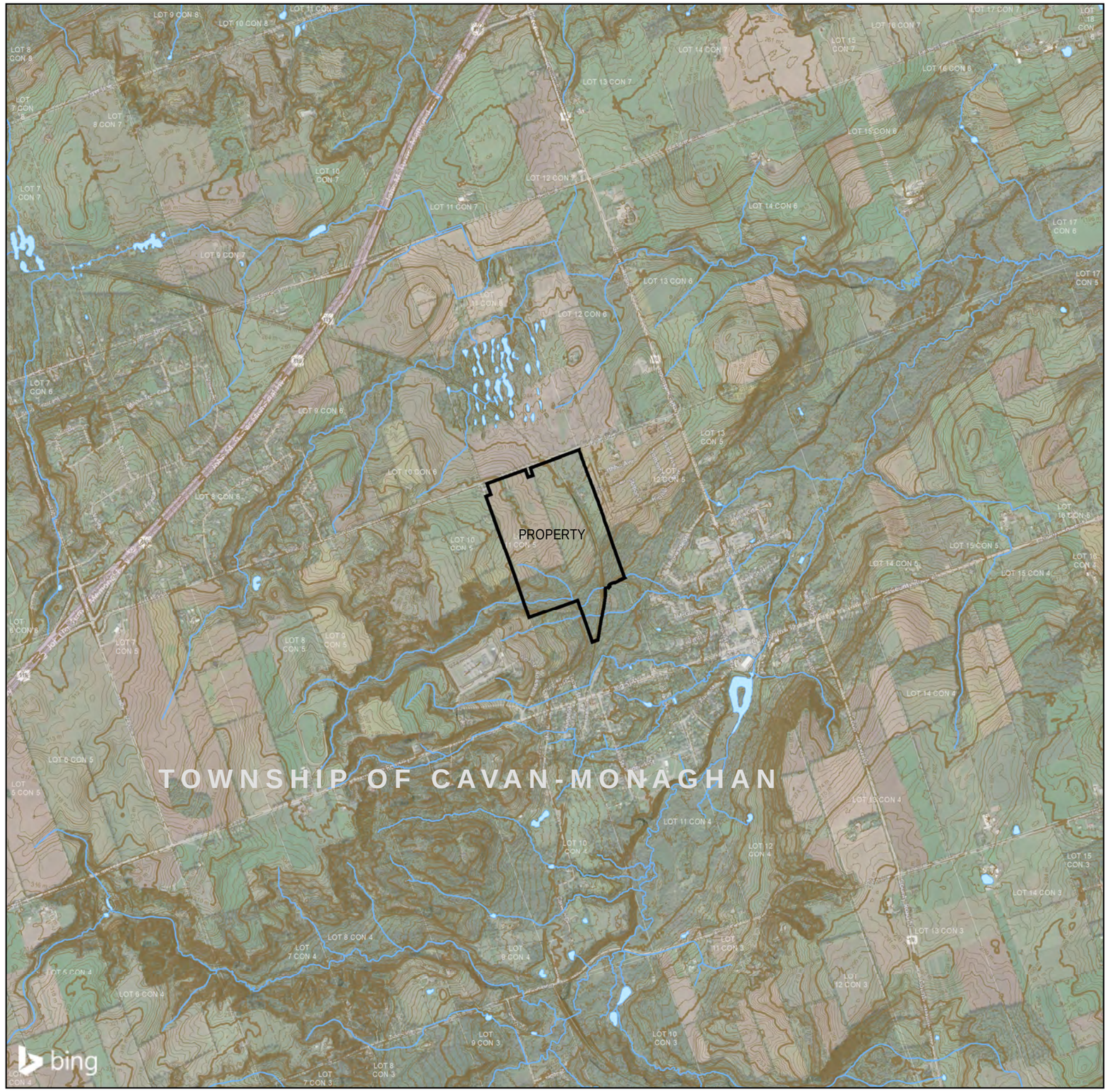

CONTOURS

- Contour Line, Major
  10 m Contour Index
  ODTM Lidar Derived
- Contour Line, Intermediate
  5 m Contour Index
  ODTM Lidar Derived
- Contour Line, Minor
  1 m Contour Interval
  ODTM Lidar Derived

OHN WATERCOURSE

- Stream

OHN WATERBODY

- OHN Waterbody
- OHN Shoreline

ADMINISTRATIVE BOUNDARIES

- Geographic Lot Boundary
- Property Limit
- Municipal, Lower Tier Boundary

Citation(s)

Ontario Digital Terrain Model [Derivative]. Central Lake Ontario Conservation Authority, 2018.

Ontario Hydrographic Network (OHN). Ministry of Natural Resources and Forestry. Current to 27/01/2021.

Map Projection: Transverse Mercator
Horizontal Datum: North American 1983
Grid: NAD 1983 UTM Zone 17N

Paper Size ANSI B

0 330 660 990 1,320
Meters

N

Data Disclaimer(s)

GHD

THE BROMONT GROUP
787 & 825 FALLIS LINE, MILLBROOK, ON
TOWNSHIP OF CAVAN-MONAGHAN
COUNTY OF PETERBOROUGH

HYDROGEOLOGY ASSESSMENT
REGIONAL TOPOGRAPHY

Project No.	11224019
Revision No.	-
Date	Mar 2021

FIGURE 4

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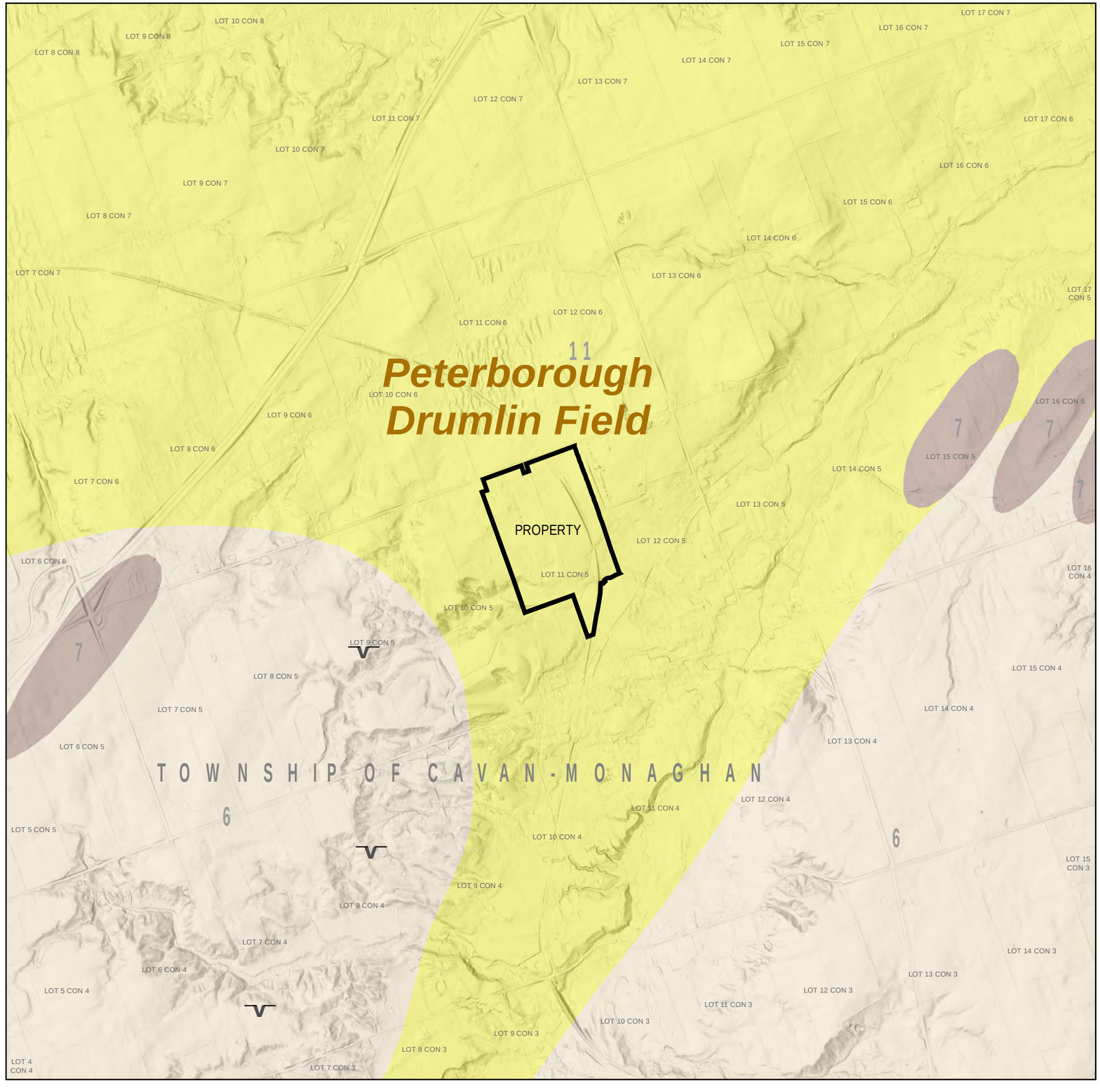

ADMINISTRATIVE BOUNDARIES

- Geographic Lot Fabric
- Property Limit
- Municipal, Lower Tier Boundary

PHYSIOGRAPHY

Physiography of Southern Ontario (MRD228)

DESCRIPTION

- Boulder Pavement
- Dissected Terrain
- Mud Flow Scars
- Sand Dunes
- Escarpment
- Shorecliff
- Shorecliff (weakly developed)
- Physiography Regions

PHYSIOGRAPHIC LANDFORMS

- 1: Escarpments
- 2: Till Moraines
- 3: Spillways
- 4: Kame Moraines
- 5: Till Plains (Undrumlinized)
- 6: Till Plains (Drumlinized)
- 7: Drumlins
- 8: Bevelled Till Plains
- 9: Limestone Plains
- 10: Shale Plains
- 11: Sand Plains
- 12: Clay Plains
- 13: Eskers
- 14: Beaches
- 15: Shallow Till And Rock
- 16: Bare Rock Ridges And Shallow
- 17: Peat And

Citation(s)

Chapman, L.J. and Putnam, D.F. 2007. Physiography of Southern Ontario; Ontario Geological Survey, Miscellaneous Release--Data 228 ISBN 978-1-4249-5158-1

Map Projection: Transverse Mercator
Horizontal Datum: North American 1983
Grid: NAD 1983 UTM Zone 17N

Paper Size ANSI B

0 330 660 990 1,320

Meters

N

Data Disclaimer(s)

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THE BROMONT GROUP
787 & 825 FALLIS LINE, MILLBROOK, ON
TOWNSHIP OF CAVAN-MONAGHAN
COUNTY OF PETERBOROUGH

HYDROGEOLOGY ASSESSMENT
PHYSIOGRAPHY

Project No. 11224019
Revision No. -
Date Mar 2021

FIGURE 5

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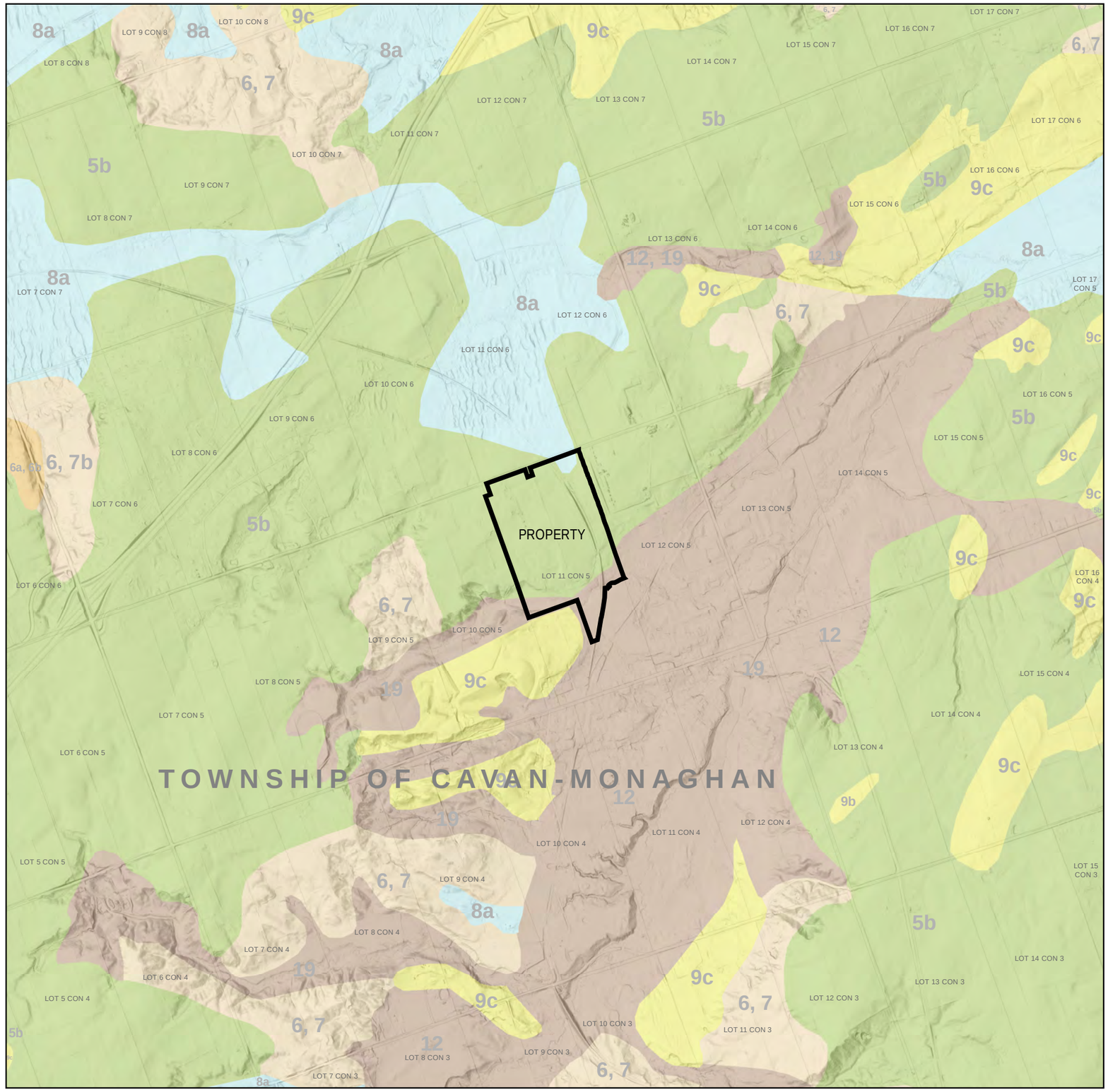

ADMINISTRATIVE BOUNDARIES

- Geographic Lot Fabric
- Property Limit
- Municipal, Lower Tier Boundary

SURFICIAL GEOLOGY

Surficial Geology of Southern Ontario (MRD128-REV)

RECENT

21: Man-made deposits:
Fill, sewage lagoon, landfill, urban development

20: Organic deposits:
Peat, muck, marl

19: Modern alluvial deposits:
Clay, silt, sand, gravel, may contain organic remains

18: Colluvial deposits:
Boulders, scree, talus, undifferentiated landslide materials

17: Eolian deposits:
Fine to very fine sand and silt

16: Coarse-textured marine deposits:
Sand, gravel, minor silt and clay
16a Deltaic deposits
16b Littoral deposits
16c Foreshore and basinal deposits

15: Fine-textured marine deposits:
Silt and clay, minor sand and gravel

14: Coarse-textured lacustrine deposits:
Sand, gravel, minor silt and clay
14a Deltaic deposit
14b Littoral deposits
14c Foreshore and basinal deposits

13: Fine-textured lacustrine deposits:
Silt and clay, minor sand and gravel

PLEISTOCENE

12: Older alluvial deposits:
Clay, silt, sand, gravel, may contain organic remains

11: Coarse-textured glaciomarine deposits:
Sand, gravel, minor silt and clay
11a Deltaic deposits
11b Littoral deposits
11c Foreshore and basinal deposits

10: Fine-textured glaciomarine deposits:
Silt and clay, minor sand and gravel
10a Massive to well laminated
10b Interbedded silt and clay and gritty, pebbly flow till and rainout deposits

9: Coarse-textured glaciolacustrine deposits:
Sand, gravel, minor silt and clay
9a Deltaic deposits
9b Littoral deposits
9c Foreshore and basinal deposits

8: Fine-textured glaciolacustrine deposits:
Silt andclay, minor sand and gravel
8a Massive to well laminated
8b Interbedded silt and clay and gritty, pebbly flow till and rainout deposits

7: Glaciofluvial deposits:
River deposits and delta topset facies
7a Sandy deposits
7b Gravelly deposits

6: Ice-contact stratified deposits:
Sand and gravel, minor silt, clay and till
6a In moraines, eskers, kames and crevasse fills
6b In subaquatic fans

5a: Till:
Silty sand to sand-textured till on Precambrian terrain
5a Silty sand to sand-textured till on Precambrian terrain

5b: Stone-poor, sandy silt to silty sand-textured till
Stone-poor, sandy silt to silty sand-textured till on Paleozoic terrain

5c: Stony, sandy silt to silty sand-textured till
Stony, sandy silt to silty sand-textured till on Paleozoic terrain

5d: Clay to silt-textured till
Clay to silt-textured till (derived from glaciolacustrine deposits or shale)

5e: Undifferentiated older tills
Undifferentiated older tills, may include stratified deposits

PALEOZOIC

4: Bedrock-drift complex in Paleozoic terrain:
4a Primarily till cover
4b Primarily stratified drift cover

3: Paleozoic bedrock

PRECAMBRIAN

2: Bedrock-drift complex in Precambrian terrain:
2a Primarily till cover
2b Primarily stratified drift cover

1: Precambrian bedrock

Citation(s)

MRD128-REV. Ontario Geological Survey 2010. Surficial geology of southern Ontario; Ontario Geological Survey, Miscellaneous Release—Data 128 – Revised.

Map Projection: Transverse Mercator
Horizontal Datum: North American 1983
Grid: NAD 1983 UTM Zone 17N

Paper Size ANSI B

0 330 660 990 1,320
Meters

N

Data Disclaimer(s)

GHD

THE BROMONT GROUP
787 & 825 FALLIS LINE, MILLBROOK, ON
TOWNSHIP OF CAVAN-MONAGHAN
COUNTY OF PETERBOROUGH

HYDROGEOLOGY ASSESSMENT
SURFICIAL GEOLOGY

Project No. 11224019
Revision No. -
Date Mar 2021

FIGURE 6

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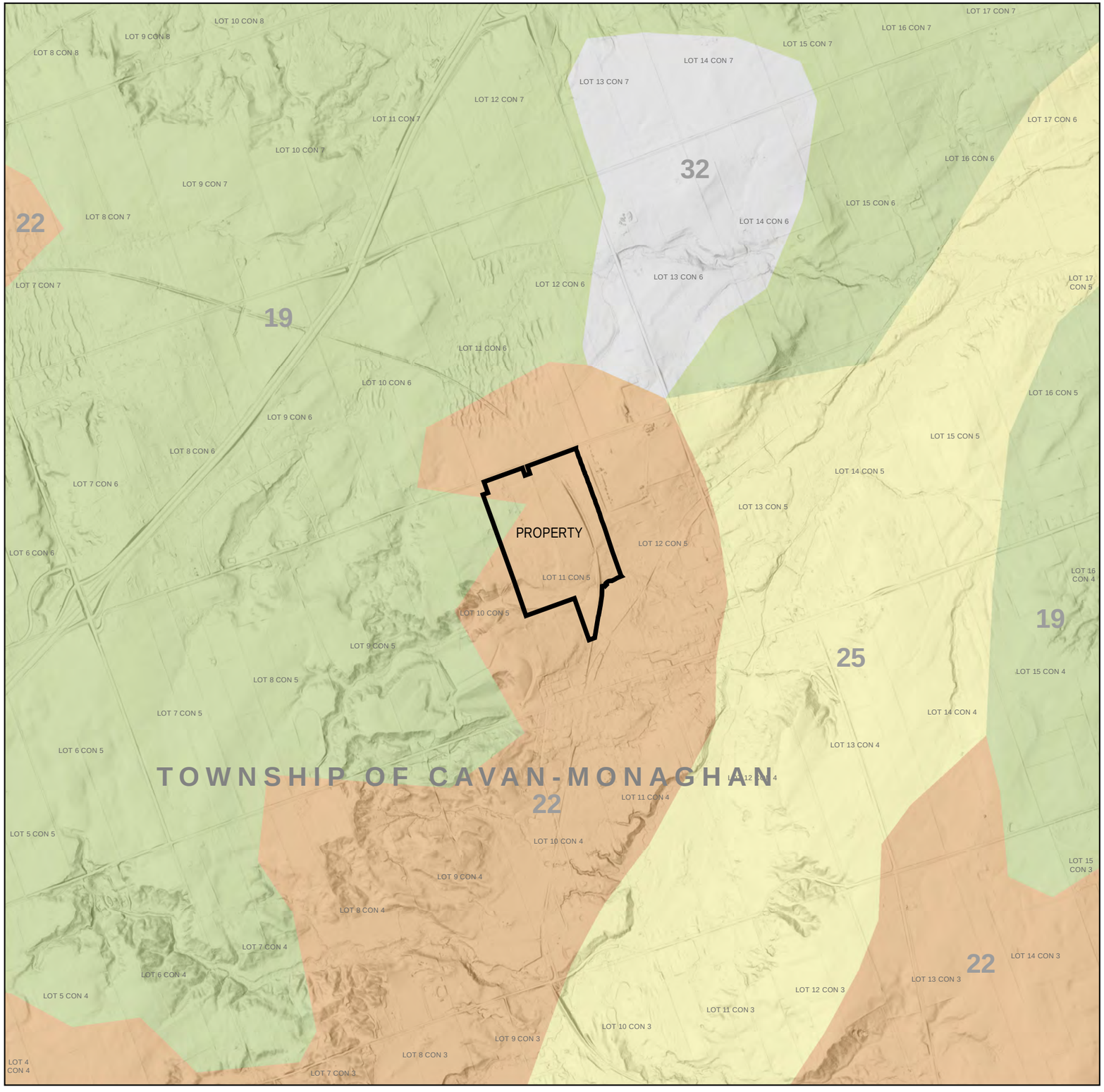

ADMINISTRATIVE BOUNDARIES

Geographic Lot Boundary

Property Limit

Municipal, Lower Tier Boundary

QUATERNARY GEOLOGY

Quaternary Geology of Southern Ontario (EDS014-REV)

33: Lakes

RECENT

29: Lacustrine deposits:
Silt and clay basin or quiet water deposits

32: Organic deposits:
Organic deposits: peat, muck and marl

31: Fluvial deposits:
Gravel, sand, silt and clay deposited on modern flood plains

30: Lacustrine deposits:
Sand, gravelly sand and gravel nearshore and beach deposits

PLEISTOCENE

28: Fluvial deposits:
Gravel, sand, silt and clay deposited on abandoned flood plains, terrace remnants

27: Glaciomarine and marine deposits:
Sand, gravelly sand and gravel nearshore and beach deposits

26: Glaciomarine and marine deposits:
Silt and clay basin and quiet water deposits

25: Glaciolacustrine deposits:
Sand, gravelly sand and gravel nearshore and beach deposits

24: Glaciolacustrine deposits:
Silt and clay, minor sand basin and quiet water deposits

23: Glaciofluvial Outwash deposits:
Gravel and sand includes proglacial river and deltaic deposits

22: Glaciofluvial ice-contact deposits:
Gravel and sand minor till includes esker, kame, end moraine, ice-marginal delta and subaqueous fan deposits

21: Till:
Undifferentiated, fine grained, predominantly silty clay to silt matrix, commonly clast poor, high matrix carbonated content

20: Till:
Undifferentiated, predominantly sand matrix, extremely stony, bouldery and high in total matrix carbonated, often associated with stratified sediments

19: Till:
Undifferentiated, predominantly sandy silt to silt matrix, commonly rich in clasts, often high in total matrix carbonate content

18: Till:
Undifferentiated, predominantly sand to silty to silt matrix, commonly rich in clasts, often low in matrix carbonate content

17: Halton Till (Ontario-Erie lobe):
Predominantly silt to silty clay matrix, high in matrix carbonate content and clast poor

16: Kettleby Till (simcoe lobe):
Predominantly silt to silty clay matrix, highly calcareous,

15: St. Joseph Till (Huron-Georgian Bay lobe):
Silt to silty clay matrix, clay content increases southward, clast poor

14: Wentworth Till (Ontario-Erie lobe):
Sandy silt to silt matrix becoming finer grained to silty clay near Lake Erie, highly calcareous, clast content moderate to low decreasing southward

13: Newmarket Till (Simcoe lobe):
Sandy silt to silt matrix, moderate to high in matrix carbonate content, clast content moderate to high

12: Dunkeld Till (Huron-Georgian Bay lobe):
Silt matrix, high matrix carbonate content, clast poor

11: Rannoch Till (Huron-Georgian Bay lobe):
Silt to clayey silt matrix becoming finer grained southward, highly calcareous, clast poor

10: Elma Till (Huron-Georgian Bay lobe):
Sandy silt to silty matrix, clayey silt along southern margin, moderatey stony, strongly calcareous

9: Port Stanley Till (Ontario-Erie lobe):
Silt to sandy silt matrix becoming silt to silty clay near Lake Erie, strongly calcareous, moderate to low clast content decreasing southward

8: Wartburg Till (Huron-Georgian Bay lobe):
Silty clay matrix, high carbonate content in matrix, clast poor

7: Stratford Till (Huron-Georgian Bay lobe):
Sandy silt matrix, strongly calcareous, moderately stony

6: Mornington Till (Huron-Georgian Bay lobe):
Silty clay matrix, moderate to high matrix carbonate content, clast poor.

5: Tavistock Till (Huron-Georgian Bay lobe)
Sandy silt to silt matrix, silty clay matrix in south and north, moderate to high carbonate content, clast content decreases from moderate to poor northward

4: Maryhill Till (Erie Lobe):
Silty clay to clay matrix, moderate to high matrix carbonate

3: Catfish Creek Till:
Sandy silt to silt matrix, strongly calcareous, moderately stony to stony

PALEOZOIC

2: Bedrock, post-Precambrian:
Undifferentiated carbonate and clastic sedimentary rock, exposed at surface or covered by a discontinuous, thin layer of drift

PRECAMBRIAN

1: Bedrock:
Undifferentiated igneous and metamorphic rock, exposed at surface or covered by a discontinuous, thin layer of drift

Citation(s)

EDS014-REV. Ontario Geological Survey, 1997. Quaternary geology, seamless coverage of the province of Ontario: Ontario Geological Survey, Data Set 14.

Map Projection: Transverse Mercator
Horizontal Datum: North American 1983
Grid: NAD 1983 UTM Zone 17N

Paper Size ANSI B

0 330 660 990 1,320

Meters

N

Data Disclaimer(s)

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787 & 825 FALLIS LINE, MILLBROOK, ON
TOWNSHIP OF CAVAN-MONAGHAN
COUNTY OF PETERBOROUGH

HYDROGEOLOGY ASSESSMENT
QUATERNARY GEOLOGY

Project No. 11224019
Revision No. -
Date Mar 2021

FIGURE 7

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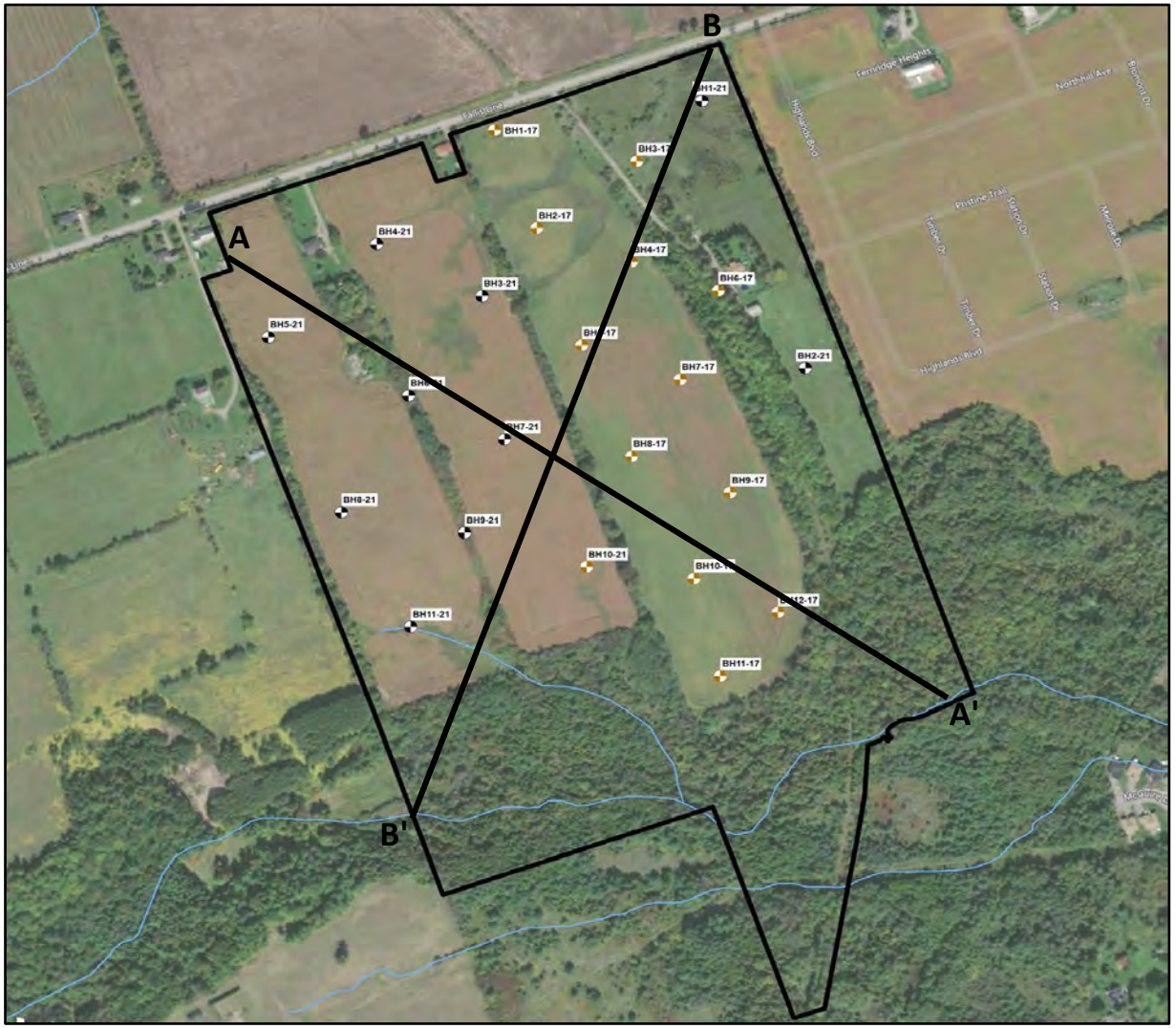


Source: Produced by GHD Limited under Licence with OMNRF © Queen's Printer for Ontario, 2021 (2020). Groundwater data illustrated from March 17, 2021.

Scale:

Map Projection: Transverse Mercator
Horizontal Datum: North American 1983
Grid: NAD 1983 UTM Zone 17N
Paper Size ANSI B

0 60 120 180 240
Meters

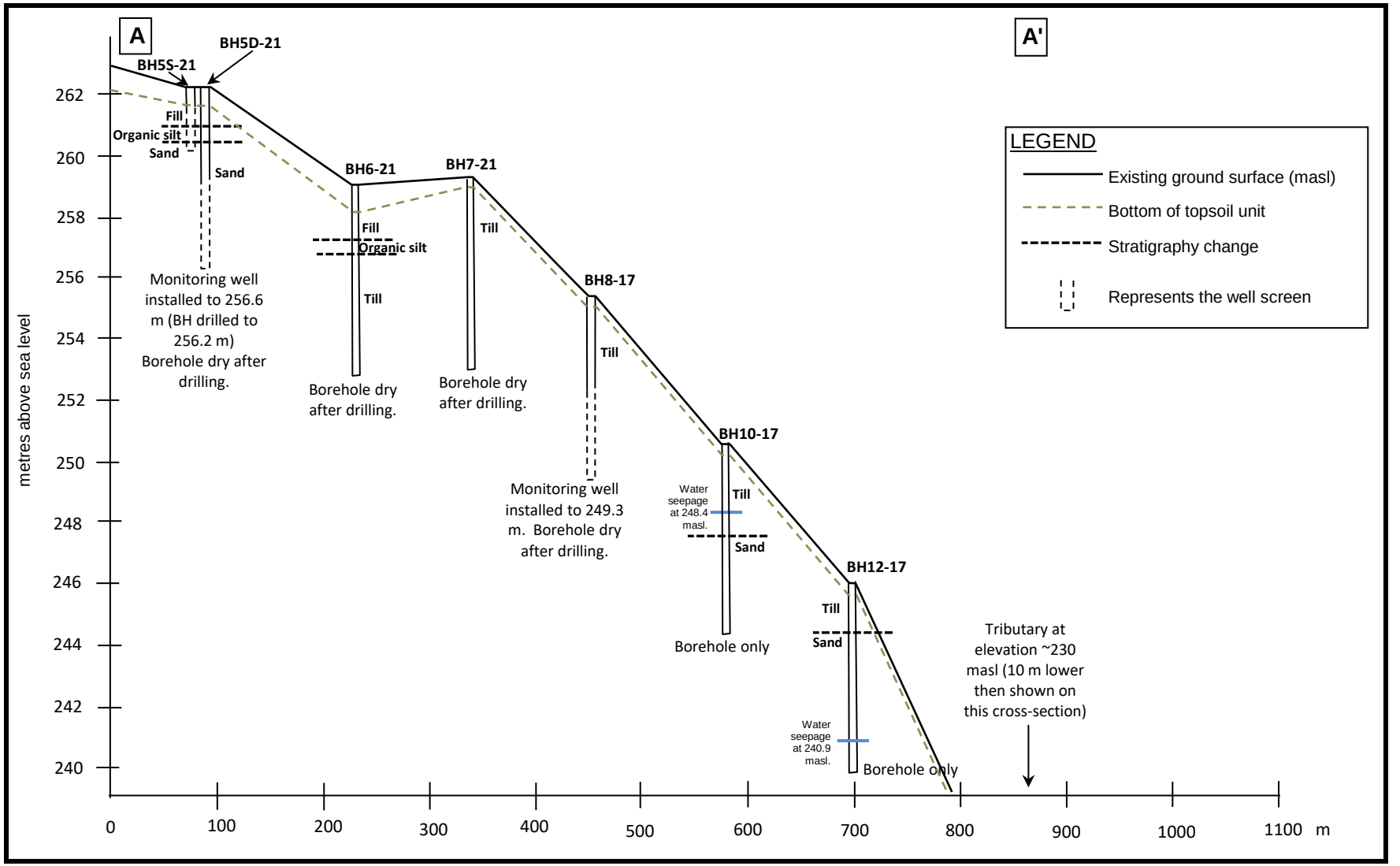
N

The Bromont Group
Fallis Line, Millbrook, ON
Hydrogeological Assessment

11224019-01
March 2021

Cross-Section Alignments

Figure 8.1



Cross-section as per alignment shown on Figure 8.1. Vertical exaggeration 31.2 x

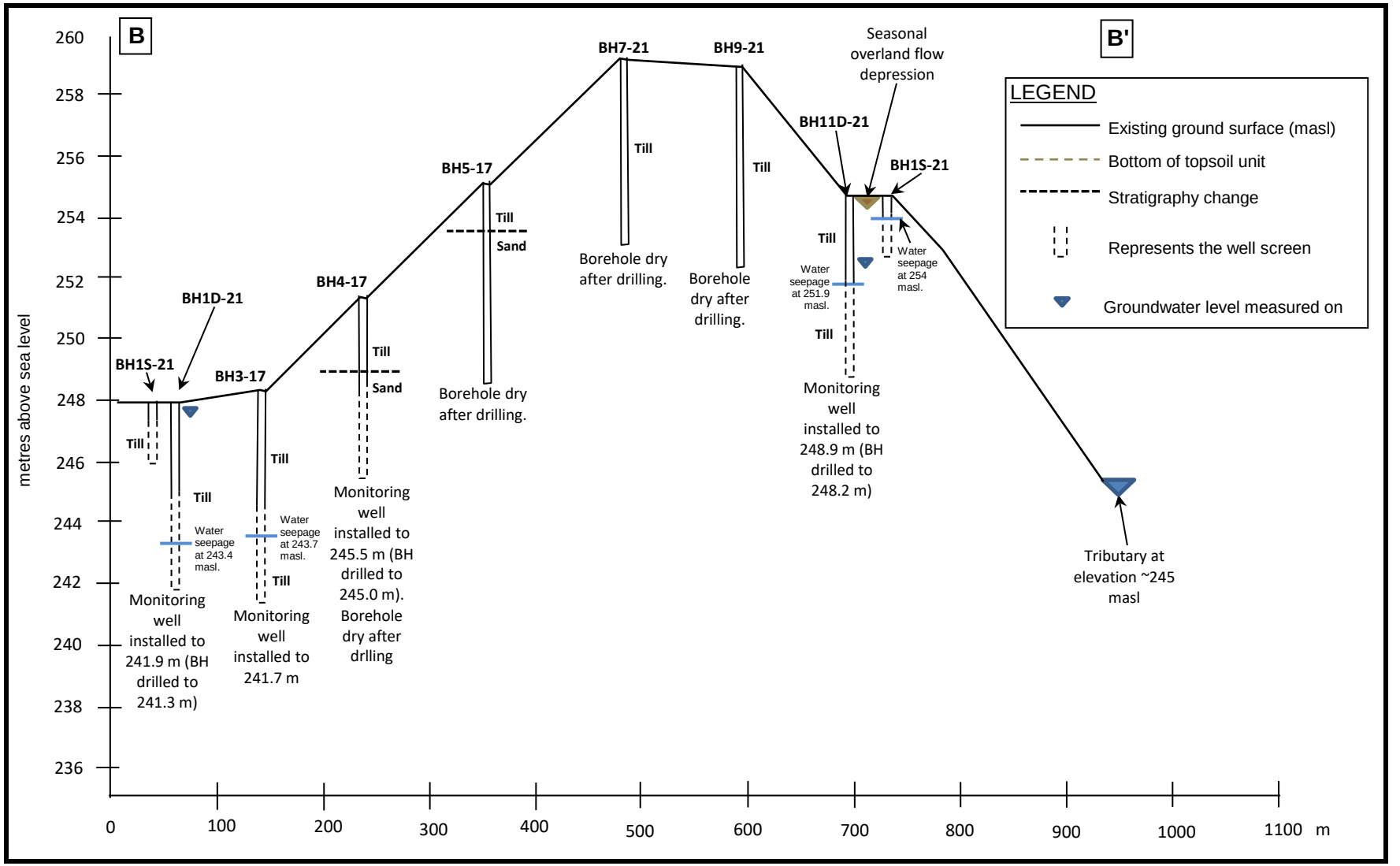
Scale:
As Indicated

The Bromont Group
Fallis Line, Millbrook, ON
Hydrogeological Assessment

A - A' Cross-Section

11224019-01
March 2021

Figure 8.2



Cross-section as per alignment shown on Figure 8.1. Vertical exaggeration 30.6 x

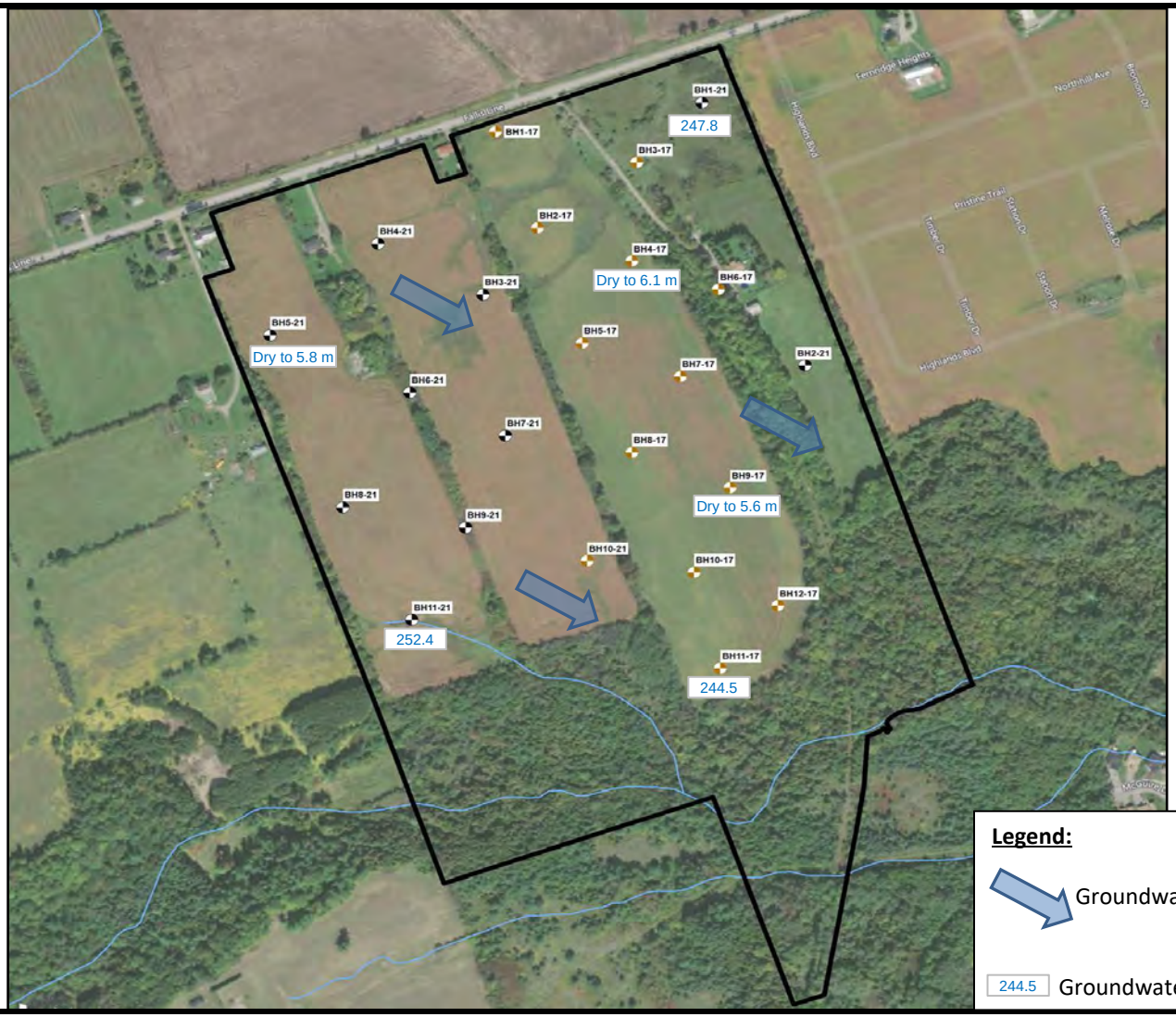
Scale:
As Indicated

The Bromont Group
Fallis Line, Millbrook, ON
Hydrogeological Assessment

B - B' Cross-Section

11224019-01
March 2021

Figure 8.3



Source: Produced by GHD Limited under Licence with OMNRF © Queen's Printer for Ontario, 2021 (2020). Groundwater data illustrated from March 17, 2021.

Scale:

Map Projection: Transverse Mercator
Horizontal Datum: North American 1983
Grid: NAD 1983 UTM Zone 17N
Paper Size ANSI B
0 60 120 180 240
Meters

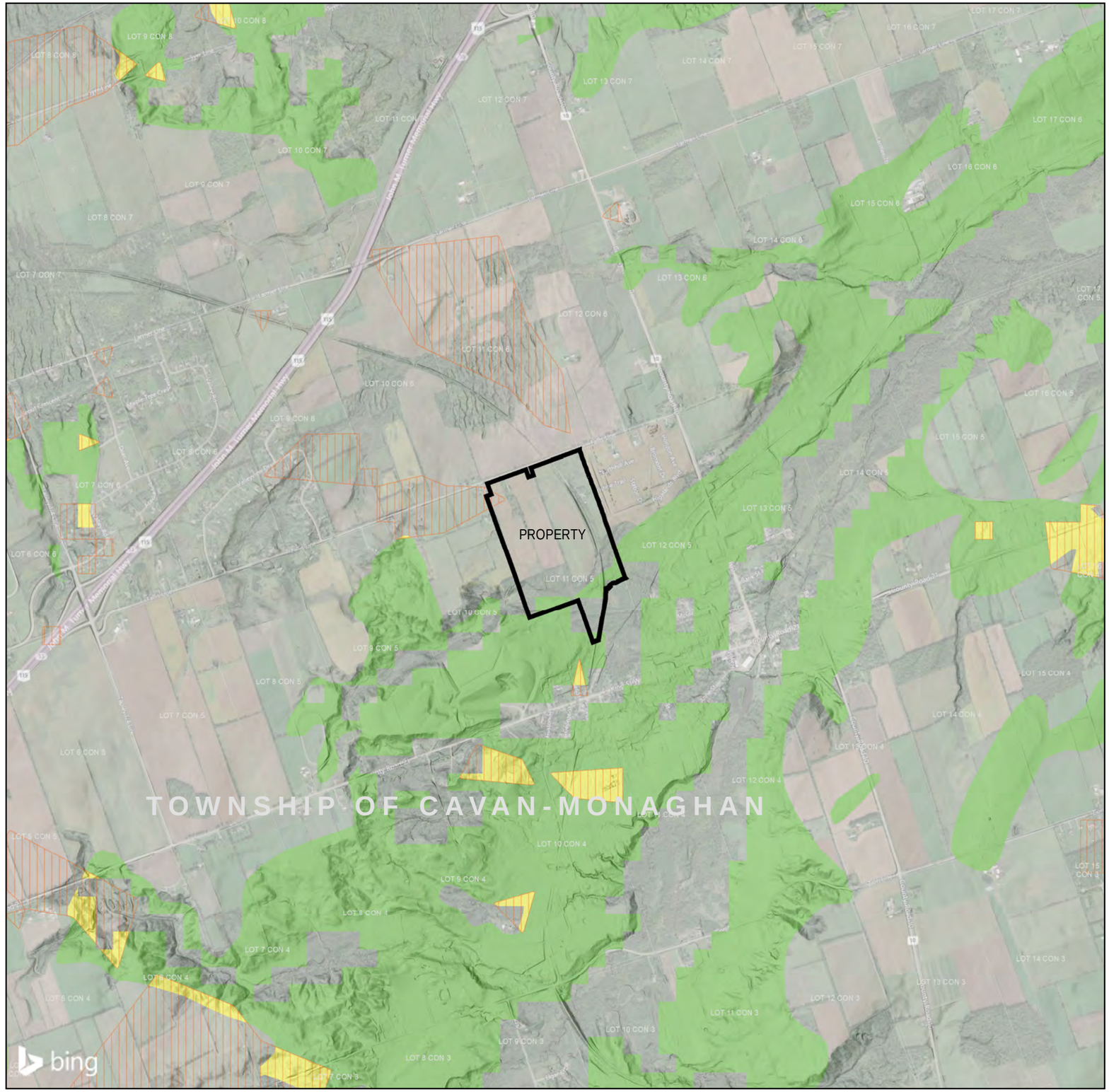
N

The Bromont Group
Fallis Line, Millbrook, ON
Hydrogeological Assessment

11224019-01
March 2021

Potentiometric Elevations

FIGURE 9



SIGNIFICANT GROUNDWATER RECHARGE AREA

Ontario Source Protection Information Atlas

- 0
- 2 - Low
- 4 - Medium
- 6 - High
- Highly Vulnerable Aquifer

ADMINISTRATIVE BOUNDARIES

- Geographic Lot Boundary
- Property Limit
- Municipal, Lower Tier Boundary

Citation(s)

Ontario Digital Terrain Model [Derivative]. Central Lake Ontario Conservation Authority, 2018.

Source Protection Information Atlas. Ministry of Environment, Conservation and Parks. Web Application.

Service Layer Credits: © 2021 Microsoft Corporation © 2021 Maxar ©CNES (2021) Distribution Airbus DS © 2021 TomTom

Map Projection: Transverse Mercator
Horizontal Datum: North American 1983
Grid: NAD 1983 UTM Zone 17N

Paper Size ANSI B

0 330 660 990 1,320

Meters

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TWP OF CAVAN-MONAGHAN, COUNTY OF PETERBOROUGH

HYDROGEOLOGY ASSESSMENT

HIGHLY VULNERABLE AQUIFERS &
SIGNIFICANT GROUNDWATER RECHARGE AREAS

Project No.	11224019
Revision No.	-
Date	Mar 2021

FIGURE 10

Q:\gis2\GIS\PROJECTS\11224000s\11224019\202102_HYG_001\11224019_202102_HYG001_GIS008.mxd
Print date: 17 Feb 2021 - 07:07

Appendix A
Subsurface Exploration Data

REFERENCE No.: 11224019-01 ENCLOSURE No.: A-1

BOREHOLE No.: BH1-17
ELEVATION: 251.3 m

BOREHOLE REPORT

Page: 1 of 1

CLIENT: Bromont Group c/o Valdor Engineering

PROJECT: Proposed Residential Development - Fallis Line, Millbrook, Ontario

LOGGED BY: S. Shepherd DATE: 22 August 2017

DRILLING COMPANY: Landshark Drilling METHOD: Solid Stem Augers and Split Spoons

NOTES: Ground surface elevation interpolated from concept plan provided by Valdor Engineering with electronic title "16119_Fallis Line Subdivision_Preliminary Concept.pdf" by email dated July 11, 2017.

LEGEND

- SS - SPLIT SPOON
- AS - AUGER SAMPLE
- ST - SHELBY TUBE
- CS - CORE SAMPLE
- ▼ - WATER LEVEL

UTM: +/- 17T 702910E 4892792N

Depth (ft)	Depth (m)	m Below Existing Grade	Stratigraphy	DESCRIPTION OF SOIL AND BEDROCK	Type and Number	Recovery %	Moisture Content %	Blows per 6 in. / 15 cm	Penetration Index N	Shear test (Cu) / Sensitivity (S) / Water content (%) / Atterberg limits (%) / "N" Value (blows / 0.3 m) / RQD / CONE	COMMENTS
		0.0		GROUND SURFACE							
				TOPSOIL (380 mm)				1 3 5 5			
1		0.4		**TILL** - Brown Silty Clay, Some Sand, Trace Gravel, Moist, Compact - Occasional Organics to 0.6m	SS-1	79	25		8		Borehole open and dry upon completion of drilling
2											
3	1.0				SS-2	100	18	5 6 11 18	17		
4											
5								4 10 16 21			
6	2.0				SS-3	100	20		26		SS-3: 4% Gravel 10% Sand 86% Silt and Clay 31% between 5-75 µm
7		2.3		Occasional Cobbles, Dense							
8					SS-4	89	14	15 13 22	35		
9											
10	3.0	3.0		Damp to Moist, Very Dense	SS-5	100	7	24 38 50=4"	100+		
11											
12											
13	4.0										
14											
15					SS-6	100	9	21 28 40	68		
16	5.0										
17											
18											
19											
20	6.0	6.1		Dense	SS-7	100	13	8 17 18	35		
21		6.6		END OF BOREHOLE							
22											
23	7.0										
24											

REFERENCE No.: 11224019-01 ENCLOSURE No.: A-2

BOREHOLE No.: BH2-17
ELEVATION: 252.8 m

BOREHOLE REPORT

Page: 1 of 1

CLIENT: Bromont Group c/o Valdor Engineering

PROJECT: Proposed Residential Development - Fallis Line, Millbrook, Ontario

LOGGED BY: S. Shepherd DATE: 22 August 2017

DRILLING COMPANY: Landshark Drilling METHOD: Solid Stem Augers and Split Spoons

NOTES: Ground surface elevation interpolated from concept plan provided by Valdor Engineering with electronic title "16119_Fallis Line Subdivision_Preliminary Concept.pdf" by email dated July 11, 2017.

LEGEND

- SS - SPLIT SPOON
- AS - AUGER SAMPLE
- ST - SHELBY TUBE
- CS - CORE SAMPLE
- ▼ - WATER LEVEL

UTM: +/- 17T 702952E 4892690N

Depth (ft)	Depth (m)	m Below Existing Grade	Stratigraphy	DESCRIPTION OF SOIL AND BEDROCK	Type and Number	Recovery %	Moisture Content %	Blows per 6 in. / 15 cm	Penetration Index N
		0.0		GROUND SURFACE					
		0.3		**TOPSOIL** (300 mm)					
1				**TILL** - Brown Silty Clay, Some Sand, Trace Gravel, Damp, Compact - Occasional Organics to 0.5m	SS-1	83	13	2 5 6 8	11
2									
3	1.0				SS-2	100	17	3 3 8	11
4									
5					SS-3	100	24	3 5 6	11
6	2.0								
7		2.3							
8				Brown Silty Sand, Some Clay, Trace Gravel, Damp, Compact	SS-4	100	16	5 6 5	11
9									
10	3.0				SS-5	100	10	6 6 9	15
11									
12									
13	4.0								
14									
15					SS-6	100	8	6 6 8	14
16	5.0								
17									
18									
19									
20	6.0				SS-7	100	15	7 7 9	16
21		6.6		END OF BOREHOLE					
22									
23	7.0								
24									

Shear test (Cu) △ Field
Sensitivity (S) □ Lab
○ Water content (%)
W_p W_l Atterberg limits (%)
× "N" Value (blows / 0.3 m)
◆ RQD
◎ CONE

10 20 30 40 50 60 70 80 90

COMMENTS

Borehole open and dry upon completion of drilling

BOREHOLE LOG GEOTECH 11148475-01, 17-08-22, BOREHOLE LOG, LR.GPJ GEOLOGIC.GDT 24/10/17

REFERENCE No.: 11224019-01 ENCLOSURE No.: A-3

BOREHOLE No.: BH3-17
ELEVATION: 248.3 m

BOREHOLE REPORT

Page: 1 of 1

CLIENT: Bromont Group c/o Valdor Engineering

PROJECT: Proposed Residential Development - Fallis Line, Millbrook, Ontario

LOGGED BY: S. Shepherd DATE: 22 August 2017

DRILLING COMPANY: Landshark Drilling METHOD: Solid Stem Augers and Split Spoons

NOTES: Ground surface elevation interpolated from concept plan provided by Valdor Engineering with electronic title "16119_Fallis Line Subdivision_Preliminary Concept.pdf" by email dated July 11, 2017.

LEGEND

- SS - SPLIT SPOON
- AS - AUGER SAMPLE
- ST - SHELBY TUBE
- CS - CORE SAMPLE
- ▼ - WATER LEVEL

UTM: +/- 17T 703062E 4892759N

Depth (ft)	Depth (m)	m Below Existing Grade	Stratigraphy	DESCRIPTION OF SOIL AND BEDROCK	Type and Number	Recovery %	Moisture Content %	Blows per 6 in. / 15 cm	Penetration Index N	COMMENTS
		0.0		GROUND SURFACE						
				TOPSOIL (300 mm)				0 0 0		
1		0.3		**TILL** - Brown Silty Clay, Some Sand, Trace Gravel, Moist, Compact	SS-1	33	41	0 2	0	
2				- Occasional Organics to 0.6m				2		
3	1.0				SS-2	100	25	3 6	9	WL - 0.9 m 9/7/2017
4								5		
5					SS-3	100	20	8 10	18	
6	2.0							7		
7					SS-4	100	12	10 15	25	
8								7		
9					SS-5	100	12	9 11	20	
10	3.0									
11										
12										
13	4.0									
14										
15		4.6		Grey Sandy Silt, Some Clay, Trace Gravel, Wet, Very Loose	SS-6	100	34	0 1 3	4	Groundwater seepage encountered at 4.6 m during drilling
16	5.0									
17										
18										
19										
20	6.0	6.1		Compact Sand Seam at 6.2m	SS-7	100	10	19 15 9	24	
21		6.6		END OF BOREHOLE						33 mm inside diameter piezometer installed to 6.6 m
22										
23	7.0									
24										

Shear test (Cu) △ Field
Sensitivity (S) □ Lab
○ Water content (%)
W_p W_l Atterberg limits (%)
× "N" Value (blows / 0.3 m) ◆ RQD ◎ CONE

10 20 30 40 50 60 70 80 90

— 1.0 m

BOREHOLE LOG GEOTECH 11148475-01, 17-08-22, BOREHOLE LOG, LR.GPJ GEOLOGIC.GDT 24/10/17

REFERENCE No.: 11224019-01 ENCLOSURE No.: A-4

BOREHOLE No.: BH4-17
ELEVATION: 251.6 m

BOREHOLE REPORT

Page: 1 of 1

CLIENT: Bromont Group c/o Valdor Engineering

PROJECT: Proposed Residential Development - Fallis Line, Millbrook, Ontario

LOGGED BY: S. Shepherd DATE: 22 August 2017

DRILLING COMPANY: Landshark Drilling METHOD: Solid Stem Augers and Split Spoons

NOTES: Ground surface elevation interpolated from concept plan provided by Valdor Engineering with electronic title "16119_Fallis Line Subdivision_Preliminary Concept.pdf" by email dated July 11, 2017.

LEGEND

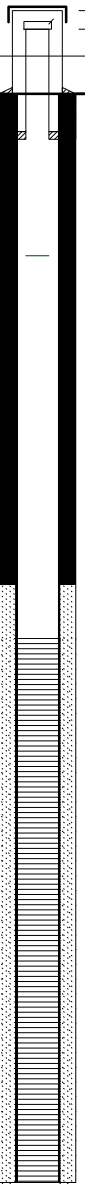
- SS - SPLIT SPOON
- AS - AUGER SAMPLE
- ST - SHELBY TUBE
- CS - CORE SAMPLE
- ▼ - WATER LEVEL

UTM: +/- 17T 703055E 4892637N

Depth (ft)	Depth (m)	m Below Existing Grade	Stratigraphy	DESCRIPTION OF SOIL AND BEDROCK	Type and Number	Recovery %	Moisture Content %	Blows per 6 in. / 15 cm	Penetration Index N
		0.0		GROUND SURFACE					
		0.3		**TOPSOIL** (300 mm)					
1				**TILL** - Brown Silty Clay, Trace Sand, Moist, Compact - Occasional Organics to 0.6m	SS-1	83	26	1 3 5 6	8
2									
3	1.0				SS-2	89	30	2 3 5	8
4									
5		1.5		Some Gravel, Damp	SS-3	100	12	4 7 11	18
6	2.0								
7									
8		2.6		**SAND** - Brown Sand, Some Silt, Damp, Dense to Very Dense	SS-4	100	9	9 22 35	57
9									
10	3.0				SS-5	94	3	40 25 26	51
11									
12									
13	4.0								
14									
15				Silt Seam at 4.6m	SS-6	100	25	16 22 21	43
16	5.0								
17									
18									
19									
20	6.0				SS-7	100	5	21 35 40	75
21									
		6.6		END OF BOREHOLE					
22									
23	7.0								
24									

Shear test (Cu) △ Field
Sensitivity (S) □ Lab
○ Water content (%)
W_p W_l Atterberg limits (%)
× "N" Value (blows / 0.3 m)
◆ RQD
◎ CONE

10 20 30 40 50 60 70 80 90



COMMENTS

Borehole open and dry upon completion of drilling

WL - Dry 9/7/2017

WL - Dry 10/17/2017

SS-6:
0% Gravel
74% Sand
26% Silt and Clay
20% between 5-75 µm

51 mm inside diameter monitoring well installed to 6.1 m

REFERENCE No.: 11224019-01 ENCLOSURE No.: A-5

BOREHOLE No.: BH5-17
ELEVATION: 255.2 m

BOREHOLE REPORT

Page: 1 of 1

CLIENT: Bromont Group c/o Valdor Engineering

PROJECT: Proposed Residential Development - Fallis Line, Millbrook, Ontario

LOGGED BY: S. Shepherd DATE: 22 August 2017

DRILLING COMPANY: Landshark Drilling METHOD: Solid Stem Augers and Split Spoons

NOTES: Ground surface elevation interpolated from concept plan provided by Valdor Engineering with electronic title "16119_Fallis Line Subdivision_Preliminary Concept.pdf" by email dated July 11, 2017.

LEGEND

- SS - SPLIT SPOON
- AS - AUGER SAMPLE
- ST - SHELBY TUBE
- CS - CORE SAMPLE
- ▼ - WATER LEVEL

UTM: +/- 17T 703000E 4892563N

Depth (ft)	Depth (m)	m Below Existing Grade	Stratigraphy	DESCRIPTION OF SOIL AND BEDROCK	Type and Number	Recovery %	Moisture Content %	Blows per 6 in. / 15 cm	Penetration Index N	Shear test (Cu) / Sensitivity (S) / Water content (%) / Atterberg limits (%) / "N" Value (blows / 0.3 m) / RQD / CONE (△ Field, □ Lab)	COMMENTS
		0.0		GROUND SURFACE						10 20 30 40 50 60 70 80 90	
				TOPSOIL (300 mm)				0			Borehole open and dry upon completion of drilling
1		0.3		**TILL** - Brown Sandy Silty Clay, Trace Gravel, Moist, Compact	SS-1	79	18	3 4 8	7	× ○	
2				- Occasional Organics to 0.6m							
3	1.0				SS-2	89	14	4 14 21	35	○ ×	
4											
5		1.5		**SAND** - Brown Sand, Some Silt, Trace Gravel, Damp, Very Dense	SS-3	100	3	25 30 50=4"	100+	○ ×	
6	2.0										
7					SS-4	100	3	38 50=5"	100+	○ ×	
8											
9											
10	3.0				SS-5	100	3	46 50=4"	100+	○ ×	
11											
12											
13	4.0										
14											
15					SS-6	100	6	36 33 35	38	○ ×	
16	5.0										
17											
18											
19											
20	6.0				SS-7	100	5	28 50=5"	100+	○ ×	
21		6.4		END OF BOREHOLE							
22											
23	7.0										
24											

BOREHOLE LOG GEOTECH 11148475-01, 17-08-22, BOREHOLE LOG, LR.GPJ GEOLOGIC.GDT 24/10/17

REFERENCE No.: 11224019-01 ENCLOSURE No.: A-6

BOREHOLE No.: BH6-17
ELEVATION: 252.4 m

BOREHOLE REPORT

Page: 1 of 1

CLIENT: Bromont Group c/o Valdor Engineering

PROJECT: Proposed Residential Development - Fallis Line, Millbrook, Ontario

LOGGED BY: S. Shepherd DATE: 23 August 2017

DRILLING COMPANY: Landshark Drilling METHOD: Solid Stem Augers and Split Spoons

NOTES: Ground surface elevation interpolated from concept plan provided by Valdor Engineering with electronic title "16119_Fallis Line Subdivision_Preliminary Concept.pdf" by email dated July 11, 2017.

LEGEND

- SS - SPLIT SPOON
- AS - AUGER SAMPLE
- ST - SHELBY TUBE
- CS - CORE SAMPLE
- ▼ - WATER LEVEL

UTM: +/- 17T 703151E 4892614N

Depth (ft)	Depth (m)	m Below Existing Grade	Stratigraphy	DESCRIPTION OF SOIL AND BEDROCK	Type and Number	Recovery %	Moisture Content %	Blows per 6 in. / 15 cm	Penetration Index N	Shear test (Cu) / Sensitivity (S) / Water content (%) / Atterberg limits (%) / "N" Value (blows / 0.3 m) / RQD / CONE	COMMENTS
		0.0		GROUND SURFACE							
				TOPSOIL (300 mm)				5			
1		0.3		**TILL** - Brown Sandy Silty Clay, Some Gravel, Moist, Compact	SS-1	79	13	5 8 9	13		Borehole open and dry upon completion of drilling
2				- Occasional Organics to 0.6m							
3	1.0				SS-2	100	23	5 5 5	10		
4											
5		1.5		Dense	SS-3	83	20	5 10 25	35		SS-2: 12% Gravel 20% Sand 68% Silt and Clay 33% between 5-75 µm
6	2.0										
7		2.3		Brown Silty Sand, Some Clay, Trace Gravel, Moist, Dense	SS-4	94	12	31 24 14	38		
8											
9											
10	3.0	3.0		Very Dense	SS-5	83	14	3 24 41	65		
11											
12											
13	4.0										
14											
15		4.6		**SAND** - Brown Sand, Some Silt, Trace Gravel, Damp, Very Dense	SS-6	100	4	16 50=5"	100+		
16											
17	5.0										
18											
19											
20	6.0	6.1		Dense	SS-7	100	5	15 15 29	44		
21		6.6		END OF BOREHOLE							
22											
23	7.0										
24											

BOREHOLE LOG GEOTECH 11148475-01, 17-08-22, BOREHOLE LOG, LR.GPJ GEOLOGIC.GDT 24/10/17

REFERENCE No.: 11224019-01 ENCLOSURE No.: A-7

BOREHOLE No.: BH7-17
ELEVATION: 254.5 m

BOREHOLE REPORT

Page: 1 of 1

CLIENT: Bromont Group c/o Valdor Engineering

PROJECT: Proposed Residential Development - Fallis Line, Millbrook, Ontario

LOGGED BY: S. Shepherd DATE: 23 August 2017

DRILLING COMPANY: Landshark Drilling METHOD: Solid Stem Augers and Split Spoons

NOTES: Ground surface elevation interpolated from concept plan provided by Valdor Engineering with electronic title "16119_Fallis Line Subdivision_Preliminary Concept.pdf" by email dated July 11, 2017.

LEGEND

- SS - SPLIT SPOON
- AS - AUGER SAMPLE
- ST - SHELBY TUBE
- CS - CORE SAMPLE
- ▼ - WATER LEVEL

UTM: +/- 17T 703108E 4892501N

Depth (ft)	Depth (m)	m Below Existing Grade	Stratigraphy	DESCRIPTION OF SOIL AND BEDROCK	Type and Number	Recovery %	Moisture Content %	Blows per 6 in. / 15 cm	Penetration Index N	Shear test (Cu) / Sensitivity (S) / Water content (%) / Atterberg limits (%) / "N" Value (blows / 0.3 m) / RQD / CONE	COMMENTS
	0.0			GROUND SURFACE							
				TOPSOIL (300 mm)				0 3			
1		0.3		**TILL** - Brown Silty Sand, Some Clay, Trace Gravel, Moist, Compact - Occasional Organics to 1.1m	SS-1	83	18	3 5	6		Borehole open and dry upon completion of drilling
2											
3	1.0				SS-2	83	15	4 3 20	23		
4											
5		1.5		Very Dense	SS-3	100	3	50=5"	100+		
6											
7	2.0										
8					SS-4	100	6	50=5"	100+		
9											
10	3.0				SS-5	100	6	50=4"	100+		
11											
12											
13	4.0										
14											
15					SS-6	100	6	46 50=4"	100+		
16	5.0										
17											
18											
19											
20	6.0										
21					SS-7	100	7	25 31 44	75		
		6.6		END OF BOREHOLE							
22											
23	7.0										
24											

BOREHOLE LOG GEOTECH 11148475-01, 17-08-22, BOREHOLE LOG, LR.GPJ GEOLOGIC.GDT 24/10/17

REFERENCE No.: 11224019-01 ENCLOSURE No.: A-8

BOREHOLE No.: BH8-17
ELEVATION: 255.4 m

BOREHOLE REPORT

Page: 1 of 1

CLIENT: Bromont Group c/o Valdor Engineering

PROJECT: Proposed Residential Development - Fallis Line, Millbrook, Ontario

LOGGED BY: S. Shepherd DATE: 23 August 2017

DRILLING COMPANY: Landshark Drilling METHOD: Solid Stem Augers and Split Spoons

NOTES: Ground surface elevation interpolated from concept plan provided by Valdor Engineering with electronic title "16119_Fallis Line Subdivision_Preliminary Concept.pdf" by email dated July 11, 2017.

LEGEND

- SS - SPLIT SPOON
- AS - AUGER SAMPLE
- ST - SHELBY TUBE
- CS - CORE SAMPLE
- ▼ - WATER LEVEL

UTM: +/- 17T 703046E 4892430N

Depth ft	Depth m	m Below Existing Grade	Stratigraphy	DESCRIPTION OF SOIL AND BEDROCK	Type and Number	Recovery %	Moisture Content %	Blows per 6 in. / 15 cm	Penetration Index N	COMMENTS
		0.0		GROUND SURFACE						
1		0.3		**TOPSOIL** (300 mm)	SS-1	88	21	0 2 3 5	5	Borehole open and dry upon completion of drilling
2				**TILL** - Brown Silty Sand, Some Clay, Trace Gravel, Moist, Compact - Occasional Organics to 1.1m						
3	1.0				SS-2	100	19	1 50=1"	100+	WL - Dry 9/7/2017
4										
5		1.5		Damp, Very Dense	SS-3	100	7	27 50=4"	100+	SS-3: 8% Gravel 56% Sand 36% Silt and Clay
6	2.0									
7										
8					SS-4	100	5	30 34 40	74	
9										
10	3.0				SS-5	100	6	34 40 42	82	
11										
12										
13	4.0									
14										
15					SS-6	100	4	46 50=4"	100+	
16	5.0									
17										
18										
19										
20	6.0	6.1		END OF BOREHOLE	SS-7	100	6	50=2"	100+	33 mm inside diameter piezometer installed to 6.1 m
21										
22										
23	7.0									
24										

Shear test (Cu) △ Field
Sensitivity (S) □ Lab
○ Water content (%)
W_p W_l Atterberg limits (%)
× "N" Value (blows / 0.3 m) ◆ RQD ◎ CONE

10 20 30 40 50 60 70 80 90

— 1.0 m

BOREHOLE LOG GEOTECH 11148475-01, 17-08-22, BOREHOLE LOG, LR.GPJ GEOLOGIC.GDT 24/10/17

REFERENCE No.: 11224019-01 ENCLOSURE No.: A-9

BOREHOLE No.: BH9-17
ELEVATION: 251.6 m

BOREHOLE REPORT

Page: 1 of 1

CLIENT: Bromont Group c/o Valdor Engineering

PROJECT: Proposed Residential Development - Fallis Line, Millbrook, Ontario

LOGGED BY: S. Shepherd DATE: 23 August 2017

DRILLING COMPANY: Landshark Drilling METHOD: Solid Stem Augers and Split Spoons

NOTES: Ground surface elevation interpolated from concept plan provided by Valdor Engineering with electronic title "16119_Fallis Line Subdivision_Preliminary Concept.pdf" by email dated July 11, 2017.

LEGEND

- SS - SPLIT SPOON
- AS - AUGER SAMPLE
- ST - SHELBY TUBE
- CS - CORE SAMPLE
- ▼ - WATER LEVEL

UTM: +/- 17T 703145E 4892381N

Depth (ft)	Depth (m)	m Below Existing Grade	Stratigraphy	DESCRIPTION OF SOIL AND BEDROCK	Type and Number	Recovery %	Moisture Content %	Blows per 6 in. / 15 cm	Penetration Index N	COMMENTS
		0.0		GROUND SURFACE						
				TOPSOIL (300 mm)				0 2		
1		0.3		**TILL** - Brown Silty Sand, Some Clay, Trace Gravel, Moist, Compact - Occasional Organics to 0.6m	SS-1	83	25	3 3	5	Borehole open and dry upon completion of drilling
2										
3	1.0				SS-2	100	7	14 14 13	27	WL - Dry 9/7/2017
4										WL - Dry 10/17/2017
5		1.7		Brown Silt, Some Clay, Some Sand, Trace Gravel, Moist, Compact	SS-3	89	17	25 7 11	18	
6	2.0									
7										
8		2.4		Brown Gravelly Silty Sand, Some Clay, Moist, Very Dense	SS-4	100	10	17 22 32	54	
9										
10	3.0				SS-5	100	8	24 33 25	38	SS-5: 31% Gravel 42% Sand 27% Silt and Clay 18% between 5-75 µm
11										
12										
13	4.0									
14										
15					SS-6	100	7	35 50=5"	100+	
16	5.0									
17										
18										
19										
20	6.0	6.1		END OF BOREHOLE	SS-7	100	5	50=2"	100+	51 mm inside diameter monitoring well installed to 5.6 m
21										
22										
23	7.0									
24										

Shear test (Cu) △ Field
Sensitivity (S) □ Lab
○ Water content (%)
W_p W_l Atterberg limits (%)
× "N" Value (blows / 0.3 m)
◆ RQD
◎ CONE

10 20 30 40 50 60 70 80 90

— m
— 0.91 m

BOREHOLE LOG GEOTECH 11148475-01, 17-08-22, BOREHOLE LOG, LR.GPJ GEOLOGIC.GDT 24/10/17

REFERENCE No.: 11224019-01 ENCLOSURE No.: A-10

BOREHOLE No.: BH10-17
ELEVATION: 250.7 m

BOREHOLE REPORT

Page: 1 of 1

CLIENT: Bromont Group c/o Valdor Engineering

PROJECT: Proposed Residential Development - Fallis Line, Millbrook, Ontario

LOGGED BY: S. Shepherd DATE: 23 August 2017

DRILLING COMPANY: Landshark Drilling METHOD: Solid Stem Augers and Split Spoons

NOTES: Ground surface elevation interpolated from concept plan provided by Valdor Engineering with electronic title "16119_Fallis Line Subdivision_Preliminary Concept.pdf" by email dated July 11, 2017.

LEGEND

- SS - SPLIT SPOON
- AS - AUGER SAMPLE
- ST - SHELBY TUBE
- CS - CORE SAMPLE
- ▼ - WATER LEVEL

UTM: +/- 17T 703105E 4892285N

Depth (ft)	Depth (m)	m Below Existing Grade	Stratigraphy	DESCRIPTION OF SOIL AND BEDROCK	Type and Number	Recovery %	Moisture Content %	Blows per 6 in. / 15 cm	Penetration Index N	Shear test (Cu) / Sensitivity (S) / Water content (%) / Atterberg limits (%) / "N" Value (blows / 0.3 m) / RQD / CONE	COMMENTS
		0.0		GROUND SURFACE							
				TOPSOIL (300 mm)				0 2 5 5			Borehole open upon completion of drilling
1		0.3		**TILL** - Brown Silty Sand, Some Clay, Trace Gravel, Moist, Compact	SS-1	92	15		7		
2				- Occasional Organics to 0.9m				3 4 6			
3	1.0				SS-2	100	19		10		
4								6 6 8			
5					SS-3	100	19		14		
6	2.0										
7		2.3						2 3 6			Slight groundwater seepage encountered at 2.3 m during drilling
8				Brown Silty Sand, Some Clay, Trace Gravel, Wet, Loose	SS-4	100	14		9		
9											
10	3.0	3.0		**SAND** - Brown Sand, Some Silt, Trace Gravel, Damp, Very Dense	SS-5	94	6	39 42 24	66		
11											
12											
13	4.0										
14											
15		4.6		Moist				24			
16					SS-6	100	7	32 38	70		
17	5.0										
18											
19											
20	6.0				SS-7	100	6	50=5"	100+		
21		6.2		END OF BOREHOLE							
22											
23	7.0										
24											

BOREHOLE LOG GEOTECH 11148475-01, 17-08-22, BOREHOLE LOG, LR.GPJ GEOLOGIC.GDT 24/10/17

REFERENCE No.: 11224019-01 ENCLOSURE No.: A-11

BOREHOLE No.: BH11-17
ELEVATION: 246.5 m

BOREHOLE REPORT

Page: 1 of 1

CLIENT: Bromont Group c/o Valdor Engineering

PROJECT: Proposed Residential Development - Fallis Line, Millbrook, Ontario

LOGGED BY: S. Shepherd DATE: 23 August 2017

DRILLING COMPANY: Landshark Drilling METHOD: Solid Stem Augers and Split Spoons

NOTES: Ground surface elevation interpolated from concept plan provided by Valdor Engineering with electronic title "16119_Fallis Line Subdivision_Preliminary Concept.pdf" by email dated July 11, 2017.

LEGEND

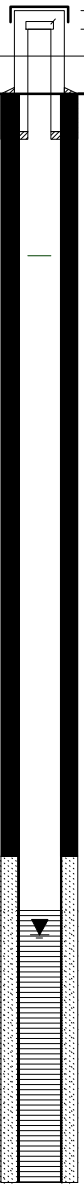
- SS - SPLIT SPOON
- AS - AUGER SAMPLE
- ST - SHELBY TUBE
- CS - CORE SAMPLE
- ▼ - WATER LEVEL

UTM: +/- 17T 703134E 4892182N

Depth (ft)	Depth (m)	m Below Existing Grade	Stratigraphy	DESCRIPTION OF SOIL AND BEDROCK	Type and Number	Recovery %	Moisture Content %	Blows per 6 in. / 15 cm	Penetration Index N
		0.0		GROUND SURFACE					
		0.3		**TOPSOIL** (300 mm)					
1				**TILL** - Brown Silty Sand, Some Clay, Trace Gravel, Moist, Compact - Occasional Organics to 0.8m	SS-1	83	22	0 2 3 7	5
2									
3	1.0				SS-2	78	9	11 6 7	13
4									
5					SS-3	100	14	7 6 7	13
6	2.0								
7									
8					SS-4	100	12	9 10 9	19
9									
10	3.0	3.0		Dense	SS-5	72	10	14 17 18	35
11									
12									
13	4.0								
14									
15		4.6		Wet, Compact	SS-6	100	10	6 8 7	15
16	5.0								
17									
18									
19									
20	6.0	6.1		Dense, With Gravel	SS-7	100	6	9 20 27	47
21		6.6		END OF BOREHOLE					
22									
23	7.0								
24									

Shear test (Cu) △ Field
Sensitivity (S) □ Lab
○ Water content (%)
W_p W_l Atterberg limits (%)
× "N" Value (blows / 0.3 m) ◆ RQD ◎ CONE

10 20 30 40 50 60 70 80 90



— m
— 0.91 m

COMMENTS

Borehole open upon completion of drilling

Slight groundwater seepage encountered at 4.6 m during drilling
WL - 4.8 m
10/17/2017

WL - 4.7 m
9/7/2017

SS-7:
21% Gravel
48% Sand
31% Silt and Clay
20% between 5-75 µm

51 mm inside diameter monitoring well installed to 6.1 m

BOREHOLE LOG GEOTECH 11148475-01, 17-08-22, BOREHOLE LOG, LR.GPJ GEOLOGIC.GDT 24/10/17

REFERENCE No.: 11224019-01 ENCLOSURE No.: A-12

BOREHOLE No.: BH12-17
ELEVATION: 246.1 m

BOREHOLE REPORT

Page: 1 of 1

CLIENT: Bromont Group c/o Valdor Engineering

PROJECT: Proposed Residential Development - Fallis Line, Millbrook, Ontario

LOGGED BY: S. Shepherd DATE: 23 August 2017

DRILLING COMPANY: Landshark Drilling METHOD: Solid Stem Augers and Split Spoons

NOTES: Ground surface elevation interpolated from concept plan provided by Valdor Engineering with electronic title "16119_Fallis Line Subdivision_Preliminary Concept.pdf" by email dated July 11, 2017.

LEGEND

- SS - SPLIT SPOON
- AS - AUGER SAMPLE
- ST - SHELBY TUBE
- CS - CORE SAMPLE
- ▼ - WATER LEVEL

UTM: +/- 17T 703196E 4892253N

Depth (ft)	Depth (m)	m Below Existing Grade	Stratigraphy	DESCRIPTION OF SOIL AND BEDROCK	Type and Number	Recovery %	Moisture Content %	Blows per 6 in. / 15 cm	Penetration Index N
		0.0		GROUND SURFACE					
1				**TOPSOIL** (460 mm)	SS-1	75	17	0 2 2	4
		0.5		**TILL** - Brown Silty Sand, Some Clay, Trace Gravel, Moist, Compact - Occasional Organics to 0.9m				1	
3	1.0				SS-2	94	11	4 7 10	17
5		1.5		Dense	SS-3	100	6	12 20 24	44
6		1.8		**SAND** - Brown Sand, Some Silt, Trace Gravel, Damp, Very Dense					
	2.0				SS-4	100	4	21 50=5"	100+
10	3.0				SS-5	100	7	30 40 50	90
15	5.0				SS-6	100	6	50=5"	100+
17		5.2		Wet					
20	6.0	6.1		Damp	SS-7	100	9	50=4"	100+
		6.2		END OF BOREHOLE					
23	7.0								

Shear test (Cu) △ Field
Sensitivity (S) □ Lab
○ Water content (%)
W_p W_l Atterberg limits (%)
× "N" Value (blows / 0.3 m)
◆ RQD
◎ CONE

10 20 30 40 50 60 70 80 90

COMMENTS

Groundwater seepage encountered at 5.2 m during drilling

▼ WL - 5.2 m 8/23/2017

BOREHOLE LOG GEOTECH 11148475-01, 17-08-22, BOREHOLE LOG, LR.GPJ GEOLOGIC.GDT 24/10/17

REFERENCE No.: 11224019 ENCLOSURE No.: A-13

BOREHOLE No.: BH1D-21
ELEVATION: 248.0 m

BOREHOLE REPORT

Page: 1 of 1

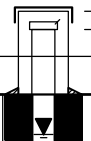
CLIENT: Bromont Group
PROJECT: Geotechnical Investigation - 787 & 825 Fallis Line, Millbrook
LOGGED BY: J. Scott DATE: 3 March 2021
DRILLING COMPANY: Landshark Group METHOD: Solid Stem Augers and Split Spoons
NOTES: Ground surface elevation interpolated from ODTM Lidar Derived data.

LEGEND
SS - SPLIT SPOON
AS - AUGER SAMPLE
ST - SHELBY TUBE
CS - CORE SAMPLE
- WATER LEVEL

UTM: +/- 17T 703105.4E 4892846.0N

Depth (ft)	Depth (m)	m Below Existing Grade	Stratigraphy	DESCRIPTION OF SOIL AND BEDROCK	Type and Number	Recovery %	Moisture Content %	Blows per 6 in. / 15 cm	Penetration Index N	COMMENTS
		0.0		GROUND SURFACE						
				TOPSOIL (460mm)	SS-1	0		0 0 0 1	0	WL - 0.2 m 3/17/2021
		0.5		**TILL** - Clayey Silt, Few Sand, Trace Gravel, Very Soft, Brown, Moist						
		0.8		Very Stiff	SS-2	100	17	9 10 11 12	21	- Borehole open upon completion with water level at approximately 3.7m
	1.0				SS-3	100	15	9 9 15 12	24	
	2.0				SS-4	100	22	7 8 8 8	16	
	3.0	3.0		Stiff	SS-5	100	19	5 5 6 6	11	- SS5: 1% Gravel 5% Sand 54% Silt 40% Clay (<0.002mm)
		4.6		Wet	SS-6	100	31	0 0 1 2	1	- Groundwater seepage first observed at approximately 4.6 m
	5.0									
	6.0	6.1		Hard	SS-7	83	11	13 16 16 17	32	- 50 mm diamter monitoring well installed to 6.1m
		6.7		END OF BOREHOLE						
	7.0									

Shear test (Cu) △ Field ☐ Lab
Sensitivity (S)
○ Water content (%)
Atterberg limits (%) W_P W_l
× "N" Value (blows / 0.3 m) ◆ RQD ◎ CONE
10 20 30 40 50 60 70 80 90



BOREHOLE LOG GEOTECH 11224019-DSG-21-03-19, GINT BOREHOLE LOGS, JS.GPJ GEOLOGIC.GDT 19/3/21

REFERENCE No.: 11224019 ENCLOSURE No.: A-14

BOREHOLE No.: BH1S-21
ELEVATION: 248.0 m

BOREHOLE REPORT

Page: 1 of 1

CLIENT: Bromont Group
PROJECT: Geotechnical Investigation - 787 & 825 Fallis Line, Millbrook
LOGGED BY: J. Scott DATE: 3 March 2021
DRILLING COMPANY: Landshark Group METHOD: Solid Stem Augers and Split Spoons
NOTES: Ground surface elevation interpolated from ODTM Lidar Derived data.

LEGEND

- SS - SPLIT SPOON
- AS - AUGER SAMPLE
- ST - SHELBY TUBE
- CS - CORE SAMPLE
- ▼ - WATER LEVEL

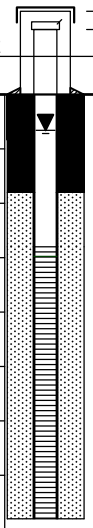
UTM: +/- 17T 703105.4E 4892846.0N

Depth (ft)	Depth (m)	m Below Existing Grade	Stratigraphy	DESCRIPTION OF SOIL AND BEDROCK	Type and Number	Recovery %	Moisture Content %	Blows per 6 in. / 15 cm	Penetration Index N
		0.0		GROUND SURFACE					
				TOPSOIL (460mm)					
		0.5		**TILL** - Clayey Silt Few Sand Trace Gravel, Very Soft, Brown. Moist					
		0.8		Very Stiff					
	1.0								
	2.0								
		2.4		END OF BOREHOLE					
	3.0								
	4.0								
	5.0								
	6.0								
	7.0								

Shear test (Cu) △ Field
Sensitivity (S) □ Lab
○ Water content (%)
W_P W_l Atterberg limits (%)
× "N" Value (blows / 0.3 m) ◆ RQD ◎ CONE

10 20 30 40 50 60 70 80 90

COMMENTS



WL - 0.2 m
3/17/2021

- Strata obtained from BH1D-21

- 50 mm diamter monitoring well installed to 2.3m

BOREHOLE LOG GEOTECH 11224019-DSG-21-03-19, GINT BOREHOLE LOGS, JS.GPJ GEOLOGIC.GDT 19/3/21

REFERENCE No.: 11224019 ENCLOSURE No.: A-15

BOREHOLE No.: BH2-21
ELEVATION: 249.0 m

BOREHOLE REPORT

Page: 1 of 1

CLIENT: Bromont Group
PROJECT: Geotechnical Investigation - 787 & 825 Fallis Line, Millbrook
LOGGED BY: J. Scott DATE: 3 March 2021
DRILLING COMPANY: Landshark Group METHOD: Solid Stem Augers and Split Spoons
NOTES: Ground surface elevation interpolated from ODTM Lidar Derived data.

LEGEND

- SS - SPLIT SPOON
- AS - AUGER SAMPLE
- ST - SHELBY TUBE
- CS - CORE SAMPLE
- ▼ - WATER LEVEL

UTM: +/- 17T 703243.9E 4892529.9N

Depth (ft)	Depth (m)	m Below Existing Grade	Stratigraphy	DESCRIPTION OF SOIL AND BEDROCK	Type and Number	Recovery %	Moisture Content %	Blows per 6 in. / 15 cm	Penetration Index N
		0.0		GROUND SURFACE					
		0.2		**TOPSOIL** (200mm)	SS-1A	67	26	3 3	6
1				**TILL** - Sandy Silt, With Clay, Few Gravel, Loose, Dark Brown to Brown, Moist - Occasional Organics to 0.70m.	SS-1B		25	3 2	
2		0.7			SS-2A	50	21	3	32
3	1.0			Dense, Brown	SS-2B		9	10 22 19	
5		1.5		Very Dense	SS-3	79	7	12 22 50=5"	100+
8	2.0	2.3		Dense	SS-4	67	11	13 15 18 12	33
10	3.0				SS-5	100	8	15 14 18 16	32
13	4.0								
15		4.6		Very Dense	SS-6	13	6	50=3"	100+
16	5.0								
19	6.0								
20		6.2		**SAND** - Sand, With Silt and Clay, Very Dense, Brown, Moist	SS-7A	46	9	32	100+
					SS-7B		4	50=5"	
22		6.7		END OF BOREHOLE					
23	7.0								
24									

Shear test (Cu) △ Field
Sensitivity (S) □ Lab
○ Water content (%)
W_P W_l Atterberg limits (%)
× "N" Value (blows / 0.3 m)
◆ RQD
◎ CONE

10 20 30 40 50 60 70 80 90

COMMENTS

- Borehole open and free of groundwater accumulation upon completion.

BOREHOLE LOG GEOTECH 11224019-DSG-21-03-19, GINT BOREHOLE LOGS, JS.GPJ GEOLOGIC.GDT 19/3/21

REFERENCE No.: 11224019 ENCLOSURE No.: A-16

BOREHOLE No.: BH3-21
ELEVATION: 255.1 m

BOREHOLE REPORT

Page: 1 of 1

CLIENT: Bromont Group
PROJECT: Geotechnical Investigation - 787 & 825 Fallis Line, Millbrook
LOGGED BY: J. Scott DATE: 4 March 2021
DRILLING COMPANY: Landshark Group METHOD: Solid Stem Augers and Split Spoons
NOTES: Ground surface elevation interpolated from ODTM Lidar Derived data.

LEGEND
- SS - SPLIT SPOON
- AS - AUGER SAMPLE
- ST - SHELBY TUBE
- CS - CORE SAMPLE
- WATER LEVEL

UTM: +/- 17T 702896.8E 4892621.1N

Depth (ft)	Depth (m)	m Below Existing Grade	Stratigraphy	DESCRIPTION OF SOIL AND BEDROCK	Type and Number	Recovery %	Moisture Content %	Blows per 6 in. / 15 cm	Penetration Index N	Shear test (Cu) / Sensitivity (S) / Water content (%) / Atterberg limits (%) / "N" Value (blows / 0.3 m) / RQD / CONE (10 20 30 40 50 60 70 80 90)	COMMENTS
		0.0		GROUND SURFACE							
				TOPSOIL (230mm)	SS-1A	54	34	2 3	5		
		0.2		**TILL** - Clayey Silt, Few Sand, Trace Gravel, Firm, Dark Brown to Brown, Moist - Occasional Organics to 0.85m.	SS-1B		35	2 2			
		0.8		Brown	SS-2A	33	36	2 2	5		
	1.0				SS-2B		33	3 2			
		1.5		Very Stiff				5 6			
				Sand Seam at 1.8m	SS-3	100	19	10 13	16		- SS3: 1% Gravel 11% Sand 45% Silt 43% Clay (<0.002mm)
	2.0	2.3		Hard				12 20			
					SS-4	100	10	16 18	36		
	3.0	3.0		Very Stiff Sand Seam at 3.2m				10 10			
					SS-5	100	10	15 12	25		
		3.7		Hard							
	4.0										
					SS-6	46	10	12 50=5"	100+		
	5.0										
	6.0										
					SS-7	100	21	18 16 21 24	37		
		6.7		END OF BOREHOLE							
	7.0										

- Borehole open upon completion with water level at approximately 6.4m

BOREHOLE LOG GEOTECH 11224019-DSG-21-03-19, GINT BOREHOLE LOGS, JS.GPJ GEOLOGIC.GDT 19/3/21

REFERENCE No.: 11224019 ENCLOSURE No.: A-17

BOREHOLE No.: BH4-21
ELEVATION: 257.0 m

BOREHOLE REPORT

Page: 1 of 1

CLIENT: Bromont Group
PROJECT: Geotechnical Investigation - 787 & 825 Fallis Line, Millbrook
LOGGED BY: J.Scott DATE: 3 March 2021
DRILLING COMPANY: Landshark Group METHOD: Solid Stem Augers and Split Spoons
NOTES: Ground surface elevation interpolated from ODTM Lidar Derived data.

LEGEND

- SS - SPLIT SPOON
- AS - AUGER SAMPLE
- ST - SHELBY TUBE
- CS - CORE SAMPLE
- WATER LEVEL

UTM: +/- 17T 702801.4E 4892676.0N

Depth (ft / m)	m Below Existing Grade	Stratigraphy	DESCRIPTION OF SOIL AND BEDROCK	Type and Number	Recovery %	Moisture Content %	Blows per 6 in. / 15 cm	Penetration Index N	Shear test (Cu) / Sensitivity (S) / Water content (%) / Atterberg limits (%) / "N" Value (blows / 0.3 m) / RQD / CONE — Field / Lab	COMMENTS
ft m	0.0		GROUND SURFACE		%	%		N	10 20 30 40 50 60 70 80 90	
	0.2		**TOPSOIL** (205mm)	SS-1A	83	33	2 2	5		- Borehole open and free of groundwater accumulation upon completion.
1			**TILL** - Clayey Silt, Few Sand, Trace Gravel, Firm, Dark Brown to Brown, Moist - Occasional Organics to 0.60m.	SS-1B		25	3 4			
2	0.6		Stiff, Brown							
3 1.0				SS-2	50	18	5 4 5 5	9		
4										
5							3 4			
6 2.0				SS-3	88	19	5 5	9		
7	2.3		Very Stiff				12			
8			Sand Seam at 2.4m	SS-4	100	15	10 14 12	24		
9										
10 3.0	3.0		Hard, Occasional Cobbles				17 23			
11				SS-5	46	9	50=4"	100+		
12										
13 4.0										
14										
15							50=5"			
16				SS-6	21	7		100+		
17 5.0										
18										
19										
20 6.0	6.1		**SAND** - Sand, With Silt and Clay, Very Dense, Brown, Moist	SS-7	46	8	39 50=5"	100+		
21	6.4		END OF BOREHOLE							
22										
23 7.0										
24										

BOREHOLE LOG GEOTECH 11224019-DSG-21-03-19, GINT BOREHOLE LOGS, JS.GPJ GEOLOGIC.GDT 19/3/21

REFERENCE No.: 11224019 ENCLOSURE No.: A-18

BOREHOLE No.: BH5D-21
ELEVATION: 262.4 m

BOREHOLE REPORT

Page: 1 of 1

CLIENT: Bromont Group
PROJECT: Geotechnical Investigation - 787 & 825 Fallis Line, Millbrook
LOGGED BY: J.Scott DATE: 5 March 2021
DRILLING COMPANY: Landshark Group METHOD: Solid Stem Augers and Split Spoons
NOTES: Ground surface elevation interpolated from ODTM Lidar Derived data. Well Tag Number A301561.

LEGEND

- SS - SPLIT SPOON
- AS - AUGER SAMPLE
- ST - SHELBY TUBE
- CS - CORE SAMPLE
- WATER LEVEL

UTM: +/- 17T 702694.7E 4892571.5N

Depth (ft)	Depth (m)	m Below Existing Grade	Stratigraphy	DESCRIPTION OF SOIL AND BEDROCK	Type and Number	Recovery %	Moisture Content %	Blows per 6 in. / 15 cm	Penetration Index N
		0.0		GROUND SURFACE					
				TOPSOIL (915mm)	SS-1	45	19	9 8 3 2	11
					SS-2A	71	29	3 2	4
	1.0	0.9		**FILL** - Sand, With Silt and Clay, Very Loose, Brown, Moist	SS-2B		7	2 1	
		1.5		**ORGANIC SILT**	SS-3A	79	26	4 4	9
		1.7		**SAND** - Sand, With Silt and Clay, Loose, Brown, Moist	SS-3B		5	5 2	
	2.0	2.3		Very Loose	SS-4	42	7	2 1 1 2	2
	3.0	3.0		Dense	SS-5	67	7	14 14 17 18	31
	4.0								
		4.6		Very Dense	SS-6	54	9	24 50=5"	100+
	5.0								
	6.0	6.2		END OF BOREHOLE	SS-7	29	4	50=5"	100+
	7.0								

Shear test (Cu) △ Field
Sensitivity (S) □ Lab
○ Water content (%)
W_P W_l Atterberg limits (%)
× "N" Value (blows / 0.3 m) ◆ RQD ◎ CONE
10 20 30 40 50 60 70 80 90

COMMENTS

— m
— 1.08 m

- Borehole open and free of groundwater accumulation upon completion.

WL - Dry 3/17/2021

- SS4: 0% Gravel 82% Sand 11% Silt 7% Clay (<0.002mm)

- 50 mm diamter monitoring well installed to 5.8m

BOREHOLE LOG GEOTECH 11224019-DSG-21-03-19, GINT BOREHOLE LOGS, JS.GPJ GEOLOGIC.GDT 19/3/21

REFERENCE No.: 11224019 ENCLOSURE No.: A-19

BOREHOLE No.: BH5S-21
ELEVATION: 262.4 m

BOREHOLE REPORT

Page: 1 of 1

CLIENT: Bromont Group
PROJECT: Geotechnical Investigation - 787 & 825 Fallis Line, Millbrook
LOGGED BY: J.Scott DATE: 5 March 2021
DRILLING COMPANY: Landshark Group METHOD: Solid Stem Augers and Split Spoons
NOTES: Ground surface elevation interpolated from ODTM Lidar Derived data.

LEGEND

- SS - SPLIT SPOON
- AS - AUGER SAMPLE
- ST - SHELBY TUBE
- CS - CORE SAMPLE
- ▼ - WATER LEVEL

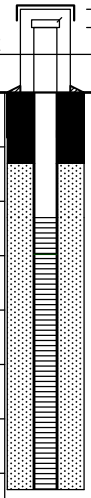
UTM: +/- 17T 702694.7E 4892571.5N

Depth (ft / m)	m Below Existing Grade	Stratigraphy	DESCRIPTION OF SOIL AND BEDROCK	Type and Number	Recovery %	Moisture Content %	Blows per 6 in. / 15 cm	Penetration Index N
0.0	0.0		GROUND SURFACE					
	0.0		**TOPSOIL** (915mm)					
1.0	0.9		**FILL** - Sand, With Silt and Clay, Very Loose, Brown, Moist					
	1.5		**ORGANIC SILT**					
	1.7		**SAND** - Sand, With Silt and Clay, Loose, Brown, Moist					
2.0	2.2		END OF BOREHOLE					
3.0								
4.0								
5.0								
6.0								
7.0								

Shear test (Cu) △ Field
Sensitivity (S) □ Lab
○ Water content (%)
W_P W_l Atterberg limits (%)
× "N" Value (blows / 0.3 m) ◆ RQD ◎ CONE

10 20 30 40 50 60 70 80 90

COMMENTS



— m
— 0.80 m

WL - Dry 3/17/2021

- Strata obtained from BH5D-21

- 50 mm diamter monitoring well installed to 2.2m

BOREHOLE LOG GEOTECH 11224019-DSG-21-03-19, GINT BOREHOLE LOGS, JS.GPJ GEOLOGIC.GDT 19/3/21

REFERENCE No.: 11224019 ENCLOSURE No.: A-20

BOREHOLE No.: BH6-21
ELEVATION: 259.1 m

BOREHOLE REPORT

Page: 1 of 1

CLIENT: Bromont Group
PROJECT: Geotechnical Investigation - 787 & 825 Fallis Line, Millbrook
LOGGED BY: J.Scott DATE: 5 March 2021
DRILLING COMPANY: Landshark Group METHOD: Solid Stem Augers and Split Spoons
NOTES: Ground surface elevation interpolated from ODTM Lidar Derived data.

LEGEND
SS - SPLIT SPOON
AS - AUGER SAMPLE
ST - SHELBY TUBE
CS - CORE SAMPLE
- WATER LEVEL

UTM: +/- 17T 702833.9E 4892513.0N

Depth (ft)	Depth (m)	m Below Existing Grade	Stratigraphy	DESCRIPTION OF SOIL AND BEDROCK	Type and Number	Recovery %	Moisture Content %	Blows per 6 in. / 15 cm	Penetration Index N	COMMENTS
		0.0		GROUND SURFACE						
				TOPSOIL (915mm)	SS-1	71	38	3 2 4 4	6	- Borehole open and free of groundwater accumulation upon completion.
					SS-2A	67	19	2 5	34	
	1.0	0.9		**FILL** - Sand, With Silt and Clay, Dense, Brown, Moist	SS-2B		10	29 20		
		1.6		**ORGANIC SILT**	SS-3A	63	11	16	29	
		1.8			SS-3B		22	14		
	2.0			**TILL** - Sandy Silt, With Clay, Few Gravel, Compact, Brown, Moist	SS-3C		7	15 50=5"		
		2.3		Dense, Occasional Cobbles				14 14		
					SS-4	100	7	18 22	32	
	3.0	3.0		Very Dense				22		
					SS-5	67	8	25 36 32	61	
	4.0									
					SS-6	13	6	50=3"	100+	
	5.0									
	6.0									
					SS-7	21	6	50=5"	100+	
		6.2		END OF BOREHOLE						
	7.0									

Shear test (Cu) △ Field
Sensitivity (S) □ Lab
○ Water content (%)
W_P W_l Atterberg limits (%)
× "N" Value (blows / 0.3 m)
◆ RQD
◎ CONE

10 20 30 40 50 60 70 80 90

REFERENCE No.: 11224019 ENCLOSURE No.: A-21

BOREHOLE No.: BH7-21
ELEVATION: 259.3 m

BOREHOLE REPORT

Page: 1 of 1

CLIENT: Bromont Group
PROJECT: Geotechnical Investigation - 787 & 825 Fallis Line, Millbrook
LOGGED BY: J.Scott DATE: 4 March 2021
DRILLING COMPANY: Landshark Group METHOD: Solid Stem Augers and Split Spoons
NOTES: Ground surface elevation interpolated from ODTM Lidar Derived data.

LEGEND

- SS - SPLIT SPOON
- AS - AUGER SAMPLE
- ST - SHELBY TUBE
- CS - CORE SAMPLE
- ▼ - WATER LEVEL

UTM: +/- 17T 702936.2E 4892456.8N

Depth (ft)	Depth (m)	m Below Existing Grade	Stratigraphy	DESCRIPTION OF SOIL AND BEDROCK	Type and Number	Recovery %	Moisture Content %	Blows per 6 in. / 15 cm	Penetration Index N	Shear test (Cu) / Sensitivity (S) / Water content (%) / Atterberg limits (%) / "N" Value (blows / 0.3 m) / RQD / CONE	COMMENTS
		0.0		GROUND SURFACE						10 20 30 40 50 60 70 80 90	
		0.3		**TOPSOIL** (300mm)	SS-1A	63	27	4 5	10		- Borehole open and free of groundwater accumulation upon completion.
1				**TILL** - Sandy Silt, With Clay, Few Gravel, Loose to Compact, Dark Brown to Brown, Moist	SS-1B		16	5 4			
2											
3	1.0	1.1		- Occasional Organics to 0.75m.	SS-2A	58	24	3 3	7		
4				Compact, Brown	SS-2B		9	4 4			
5					SS-3	67	11	9 7	14		
6								7 8			
7	2.0										
8					SS-4	71	16	6 8 13	21		
9								14			
10	3.0							16			- SS5: 6% Gravel 34% Sand 46% Silt 14% Clay (<0.002mm)
11					SS-5	100	11	13 12	25		
12		3.7						8			
13	4.0			Very Dense, Occasional Cobbles							
14											
15					SS-6	17	6	50=4"	100+		
16	5.0										
17											
18											
19											
20	6.0	6.2		END OF BOREHOLE	SS-7	21	5	50=5"	100+		
21											
22											
23	7.0										
24											

BOREHOLE LOG GEOTECH 11224019-DSG-21-03-19, GINT BOREHOLE LOGS, JS.GPJ GEOLOGIC.GDT 19/3/21

REFERENCE No.: 11224019 ENCLOSURE No.: A-22

BOREHOLE No.: BH8-21
ELEVATION: 261.8 m

BOREHOLE REPORT

Page: 1 of 1

CLIENT: Bromont Group
PROJECT: Geotechnical Investigation - 787 & 825 Fallis Line, Millbrook
LOGGED BY: J. Scott DATE: 5 March 2021
DRILLING COMPANY: Landshark Group METHOD: Solid Stem Augers and Split Spoons
NOTES: Ground surface elevation interpolated from ODTM Lidar Derived data.

LEGEND

- SS - SPLIT SPOON
- AS - AUGER SAMPLE
- ST - SHELBY TUBE
- CS - CORE SAMPLE
- ▼ - WATER LEVEL

UTM: +/- 17T 702771.1E 4892372.6N

Depth (ft)	Depth (m)	m Below Existing Grade	Stratigraphy	DESCRIPTION OF SOIL AND BEDROCK	Type and Number	Recovery %	Moisture Content %	Blows per 6 in. / 15 cm	Penetration Index N	Shear test (Cu) / Sensitivity (S) / Water content (%) / Atterberg limits (%) / "N" Value (blows / 0.3 m) / RQD / CONE (10 20 30 40 50 60 70 80 90)	COMMENTS
	0.0			GROUND SURFACE							
		0.3		**TOPSOIL** (255mm)	SS-1		27	1 2 3 2	5		- Borehole open and free of groundwater accumulation upon completion.
		0.8		**TILL** - Sandy Silt, With Clay, Few Gravel, Loose, Brown, Moist							
	1.0			Very Dense	SS-2		13	5 11 50=1"	100+		
					SS-3		5	22 37 37 30	74		
	2.0	2.0		Occasional Cobbles							
					SS-4		5	27 44 50=5"	100+		
	3.0				SS-5		6	35 42 49 44	91		
	4.0										
					SS-6		7	48 50=5"	100+		
	5.0										
	6.0				SS-7		7	37 50=5"	100+		
		6.4		END OF BOREHOLE							
	7.0										

BOREHOLE LOG GEOTECH 11224019-DSG-21-03-19, GINT BOREHOLE LOGS, JS.GPJ GEOLOGIC.GDT 19/3/21

REFERENCE No.: 11224019 ENCLOSURE No.: A-23

BOREHOLE No.: BH9-21
ELEVATION: 259.0 m

BOREHOLE REPORT

Page: 1 of 1

CLIENT: Bromont Group
PROJECT: Geotechnical Investigation - 787 & 825 Fallis Line, Millbrook
LOGGED BY: J. Scott DATE: 4 March 2021
DRILLING COMPANY: Landshark Group METHOD: Solid Stem Augers and Split Spoons
NOTES: Ground surface elevation interpolated from ODTM Lidar Derived data.

LEGEND

- SS - SPLIT SPOON
- AS - AUGER SAMPLE
- ST - SHELBY TUBE
- CS - CORE SAMPLE
- ▼ - WATER LEVEL

UTM: +/- 17T 702887.4E 4892348.3N

Depth (ft)	Depth (m)	m Below Existing Grade	Stratigraphy	DESCRIPTION OF SOIL AND BEDROCK	Type and Number	Recovery %	Moisture Content %	Blows per 6 in. / 15 cm	Penetration Index N	Shear test (Cu) / Sensitivity (S) / Water content (%) / Atterberg limits (%) / "N" Value (blows / 0.3 m) / RQD / CONE	COMMENTS
		0.0		GROUND SURFACE						10 20 30 40 50 60 70 80 90	
		0.3		**TOPSOIL** (255mm)	SS-1A	12	28	5	12		- Borehole open and free of groundwater accumulation upon completion.
1				**TILL** - Sandy Silt, With Clay, Few Gravel, Compact, Dark Brown to Brown, Moist - Occasional Organics to 0.75m.	SS-1B		27	5 7 4			
2		0.8		Brown				4			
3	1.0				SS-2	24	19	6 8 7	14		
4											
5					SS-3	19	19	4 6 8 9	14		
6	2.0										
7								9			
8					SS-4	24	15	6 8 11	14		
9											
10	3.0							12			
11					SS-5	24	10	12 13 10	25		
12											
13	4.0										
14											
15		4.6		Dense				19			
16	5.0				SS-6	24	17	17 24 24	41		
17											
18											
19											
20	6.0	6.1		Very Dense, Occasional Cobbles				10			
21					SS-7	22	10	18 50=4"	100+		
		6.5		END OF BOREHOLE							
22											
23	7.0										
24											

BOREHOLE LOG GEOTECH 11224019-DSG-21-03-19, GINT BOREHOLE LOGS, JS.GPJ GEOLOGIC.GDT 19/3/21

REFERENCE No.: 11224019 ENCLOSURE No.: A-24

BOREHOLE No.: BH10-21
ELEVATION: 253.0 m

BOREHOLE REPORT

Page: 1 of 1

CLIENT: Bromont Group
PROJECT: Geotechnical Investigation - 787 & 825 Fallis Line, Millbrook
LOGGED BY: J. Scott DATE: 4 March 2021
DRILLING COMPANY: Landshark Group METHOD: Solid Stem Augers and Split Spoons
NOTES: Ground surface elevation interpolated from ODTM Lidar Derived data.

LEGEND

- SS - SPLIT SPOON
- AS - AUGER SAMPLE
- ST - SHELBY TUBE
- CS - CORE SAMPLE
- ▼ - WATER LEVEL

UTM: +/- 17T 703013.4E 4892304.0N

Depth (ft)	Depth (m)	m Below Existing Grade	Stratigraphy	DESCRIPTION OF SOIL AND BEDROCK	Type and Number	Recovery %	Moisture Content %	Blows per 6 in. / 15 cm	Penetration Index N	Shear test (Cu) / Sensitivity (S) / Water content (%) / Atterberg limits (%) / "N" Value (blows / 0.3 m) / Field / Lab / RQD / CONE	COMMENTS
		0.0		GROUND SURFACE						10 20 30 40 50 60 70 80 90	
		0.2		**TOPSOIL** (230mm)	SS-1A	71	24	3	6		- Borehole open and free of groundwater accumulation upon completion.
1				**TILL** - Sandy Silt, With Clay Few Gravel, Loose, Dark Brown to Brown, Moist - Occasional Organics to 0.30m	SS-1B		23	3			
2		0.8			SS-1C		23	5			
3	1.0			Compact	SS-2	92	22	3 4 6 7	10		
5					SS-3	83	24	6 12 8 10	20		
6	2.0										
8		2.6		Dense, Occasional Cobbles	SS-4	88		32 6 22 19	28		
10	3.0				SS-5	100	15	16 20 26 26	46		
13	4.0										
15		4.6		Very Dense, Occasional Cobbles	SS-6	42	16	25 50=3"	100+		
16	5.0										
19	6.0										
20		6.2		END OF BOREHOLE	SS-7	16	6	50=4"	100+		
21											
22											
23	7.0										
24											

BOREHOLE LOG GEOTECH 11224019-DSG-21-03-19, GINT BOREHOLE LOGS, JS.GPJ GEOLOGIC.GDT 19/3/21

REFERENCE No.: 11224019 ENCLOSURE No.: A-25

BOREHOLE No.: BH11D-21
ELEVATION: 254.9 m

BOREHOLE REPORT

Page: 1 of 1

CLIENT: Bromont Group
PROJECT: Geotechnical Investigation - 787 & 825 Fallis Line, Millbrook
LOGGED BY: J. Scott DATE: 4 March 2021
DRILLING COMPANY: Landshark Group METHOD: Solid Stem Augers and Split Spoons
NOTES: Ground surface elevation interpolated from ODTM Lidar Derived data.

LEGEND

- SS - SPLIT SPOON
- AS - AUGER SAMPLE
- ST - SHELBY TUBE
- CS - CORE SAMPLE
- ▼ - WATER LEVEL

UTM: +/- 17T 702829.8E 4892241.8N

Depth (ft)	Depth (m)	m Below Existing Grade	Stratigraphy	DESCRIPTION OF SOIL AND BEDROCK	Type and Number	Recovery %	Moisture Content %	Blows per 6 in. / 15 cm	Penetration Index N
		0.0		GROUND SURFACE					
		0.3		**TOPSOIL** (275mm)	SS-1A	75	33	5 2	5
1				**TILL** - Clayey Silt, Few Sand, Trace Gravel, Firm, Dark Brown to Brown, Moist - Occasional Organics to 0.90m	SS-1B		29	3 3	
2									
3	1.0	0.9		Soft, Brown	SS-2A	67	21	3 2	4
					SS-2B		25	2 2	
4								2	
5		1.5		Stiff				3 6	
6	2.0				SS-3	100	10	7 10	13
7									
8		2.3		Very Stiff				5	
					SS-4	71	9	8 8	16
9								9	
10	3.0	3.0		Wet				6	
11					SS-5	100	16	8 12 10	20
12									
13	4.0								
14									
15								7	
16	5.0				SS-6	100	18	8 11 11	19
17									
18									
19									
20	6.0							10 12	
21					SS-7	100	17	13 14	25
22		6.7		END OF BOREHOLE					
23	7.0								
24									

Shear test (Cu) △ Field
Sensitivity (S) □ Lab
○ Water content (%)
W_P W_l Atterberg limits (%)
× "N" Value (blows / 0.3 m) ◆ RQD ◎ CONE

10 20 30 40 50 60 70 80 90

COMMENTS

— m
— 0.85 m

- Borehole open upon completion with water level at approximately 6.5m
- SS2B: 0% Gravel 6% Sand 54% Silt 40% Clay (<0.002mm)
- WL - 2.5 m 3/17/2021
- Groundwater seepage first observed at approximately 3.0 m
- 50 mm diamter monitoring well installed to 6.0m

BOREHOLE LOG GEOTECH 11224019-DSG-21-03-19, GINT BOREHOLE LOGS, JS.GPJ GEOLOGIC.GDT 19/3/21

REFERENCE No.: 11224019 ENCLOSURE No.: A-26

BOREHOLE No.: BH11S-21
ELEVATION: 254.9 m

BOREHOLE REPORT

Page: 1 of 1

CLIENT: Bromont Group
PROJECT: Geotechnical Investigation - 787 & 825 Fallis Line, Millbrook
LOGGED BY: J. Scott DATE: 4 March 2021
DRILLING COMPANY: Landshark Group METHOD: Solid Stem Augers and Split Spoons
NOTES: Ground surface elevation interpolated from ODTM Lidar Derived data.

LEGEND

- SS - SPLIT SPOON
- AS - AUGER SAMPLE
- ST - SHELBY TUBE
- CS - CORE SAMPLE
- ▼ - WATER LEVEL

UTM: +/- 17T 702829.8E 4892241.8N

Depth (ft)	Depth (m)	m Below Existing Grade	Stratigraphy	DESCRIPTION OF SOIL AND BEDROCK	Type and Number	Recovery %	Moisture Content %	Blows per 6 in. / 15 cm	Penetration Index N
		0.0		GROUND SURFACE					
		0.3		**TOPSOIL** (275mm)					
				TILL - Clayey Silt, Few Sand, Trace Gravel, Firm, Dark Brown to Brown, Moist - Occasional Organics to 0.90m					
	1.0	0.9		Soft, Brown					
		1.5		Stiff					
	2.0	2.3		END OF BOREHOLE					
	3.0								
	4.0								
	5.0								
	6.0								
	7.0								

Shear test (Cu) △ Field
Sensitivity (S) □ Lab
○ Water content (%)
W_P W_l Atterberg limits (%)
× "N" Value (blows / 0.3 m) ◆ RQD ◎ CONE

10 20 30 40 50 60 70 80 90

COMMENTS

— m
— 0.75 m

WL - 0.6 m
3/17/2021

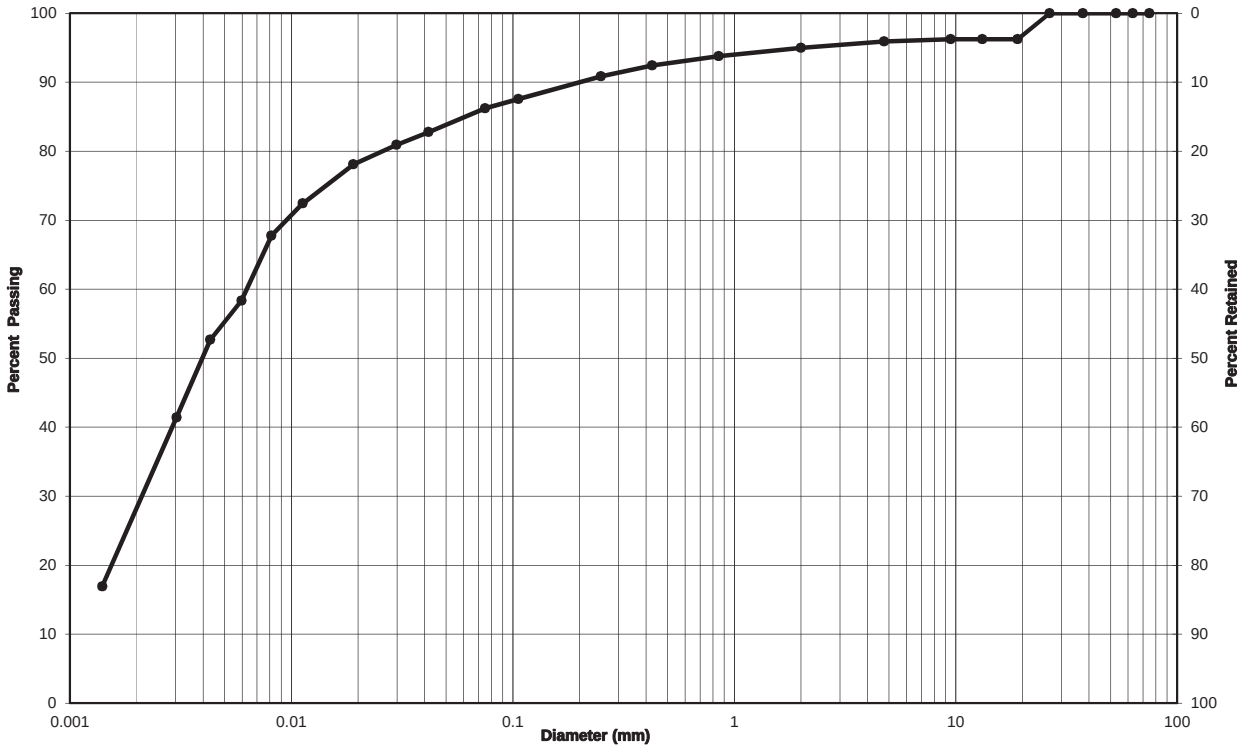
- Strata obtained from BH11D-21

- 50 mm diamter monitoring well installed to 2.3m

BOREHOLE LOG GEOTECH 11224019-DSG-21-03-19, GINT BOREHOLE LOGS, JS.GPJ GEOLOGIC.GDT 19/3/21

Particle-Size Analysis of Soils (Geotechnical) (USCS) (ASTM D422)

Client:	Bromont c/o Valdor Engineering	**Lab no.:**	SS-17-69
Project/Site:	Fallis Line Subdivision	**Project no.:**	11224019-01
Borehole no.:	BH1-17	Sample no.:	SS-3
Depth:	1.5 - 2.1 m	Enclosure:	A-27



Clay & Silt	Sand			Gravel	
	Fine	Medium	Coarse	Fine	Coarse
Unified Soil Classification System					

Soil Description	Gravel	Sand	Clay & Silt
BH1-17 SS-3	4	10	86

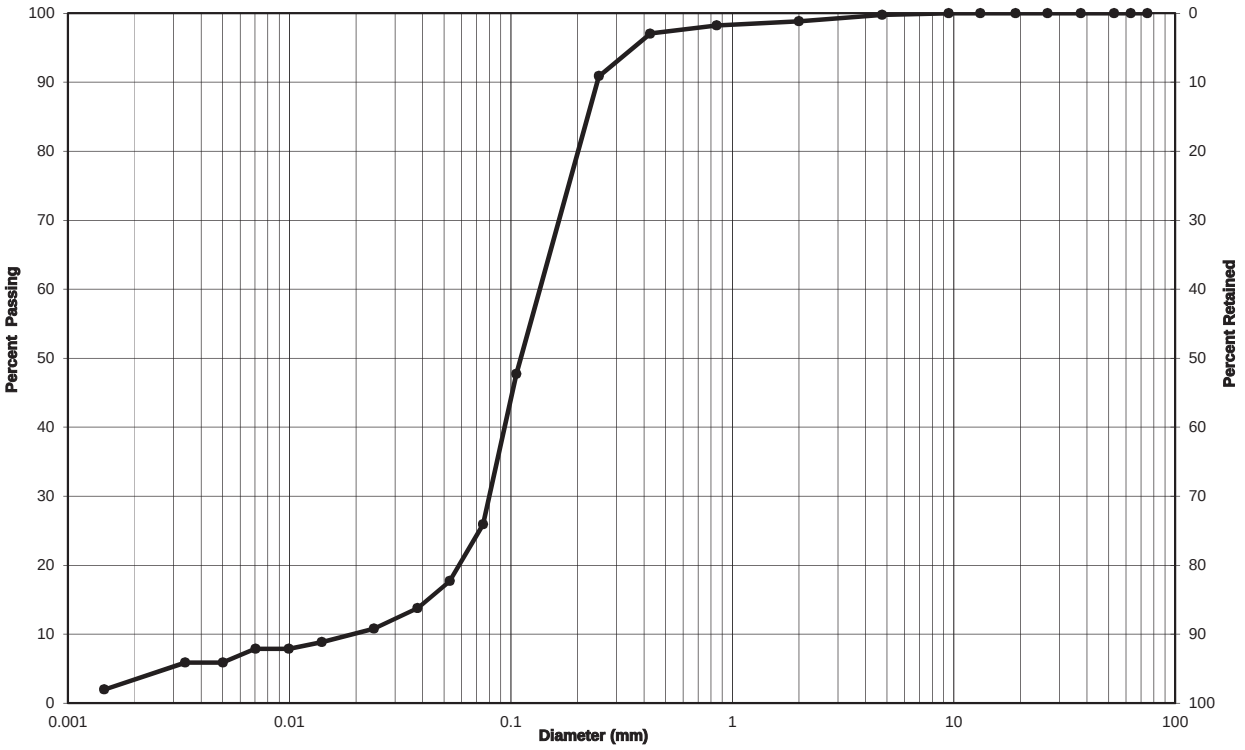
Remarks:

Performed by:	J. Sullivan	**Date:**	September 14, 2017
Verified by:		**Date:**	September 14, 2017

Particle-Size Analysis of Soils (Geotechnical) (USCS) (ASTM D422)

Client:	Bromont c/o Valdor Engineering	**Lab no.:**	SS-17-69
Project/Site:	Fallis Line Subdivision	**Project no.:**	11224019-01

Borehole no.:	BH4-17	Sample no.:	SS-6
Depth:	4.6 - 5.0 m	Enclosure:	A-28



Clay & Silt	Sand			Gravel	
	Fine	Medium	Coarse	Fine	Coarse
Unified Soil Classification System					

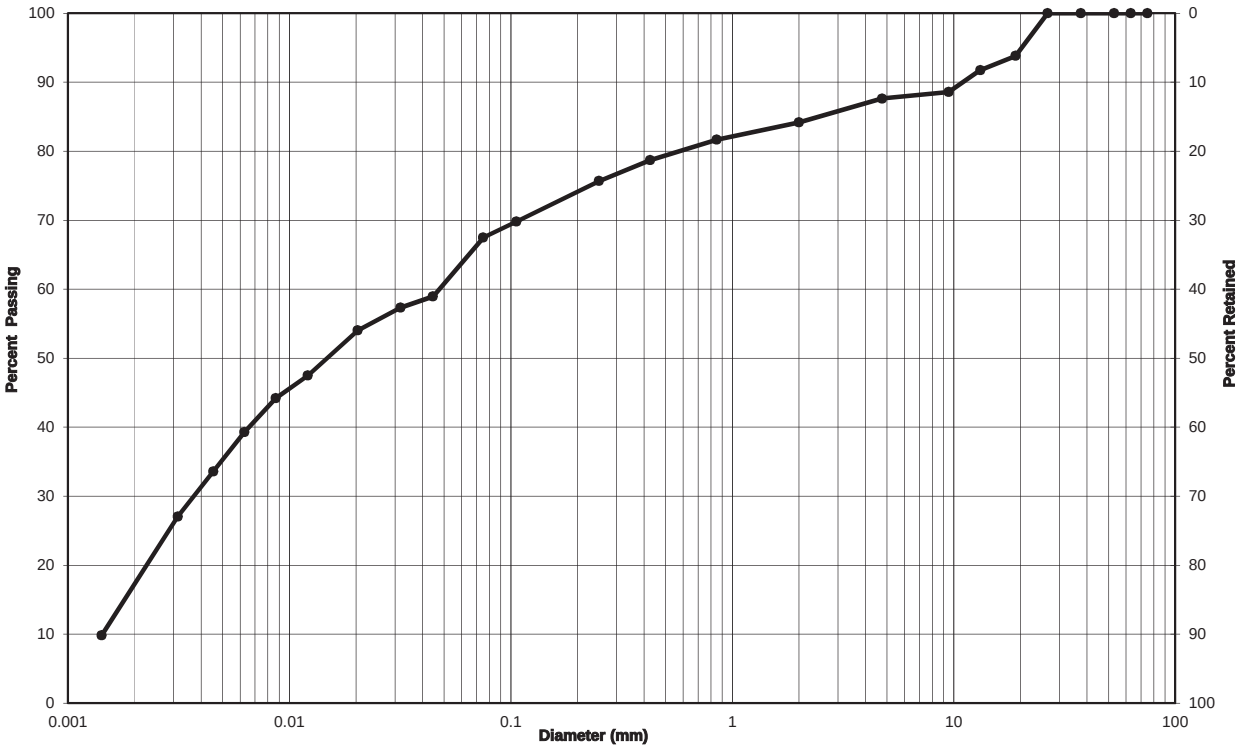
Soil Description	Gravel	Sand	Clay & Silt
BH4-17 SS-6	0	74	26

Remarks:

Performed by:	J. Sullivan	**Date:**	September 13, 2017
Verified by:		**Date:**	September 13, 2017

Particle-Size Analysis of Soils (Geotechnical) (USCS) (ASTM D422)

Client:	Bromont c/o Valdor Engineering	**Lab no.:**	SS-17-69
Project/Site:	Fallis Line Subdivision	**Project no.:**	11224019-01
Borehole no.:	BH6-17	Sample no.:	SS-2
Depth:	0.8 - 1.2 m	Enclosure:	A-29



Clay & Silt	Sand			Gravel	
	Fine	Medium	Coarse	Fine	Coarse
Unified Soil Classification System					

Soil Description	Gravel	Sand	Clay & Silt
BH6-17 SS2	12	20	68

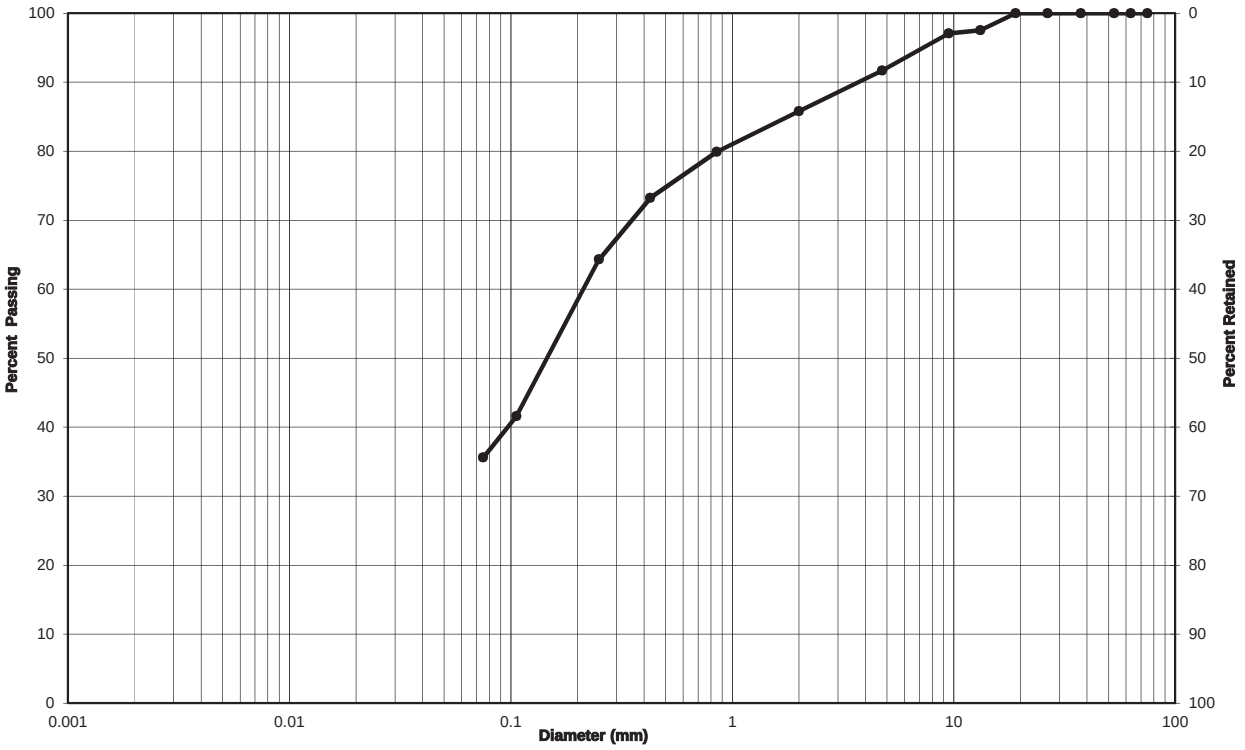
Remarks:

Performed by:	J. Sullivan	**Date:**	September 14, 2017
Verified by:		**Date:**	September 14, 2017

Particle-Size Analysis of Soils (Geotechnical) (USCS) (ASTM D422)

Client:	Bromont c/o Valdor Engineering	**Lab no.:**	SS-17-69
Project/Site:	Fallis Line Subdivision	**Project no.:**	11224019-01

Borehole no.:	BH8-17	Sample no.:	SS-3
Depth:	1.5 - 1.8 m	Enclosure:	A-30



Clay & Silt	Sand			Gravel	
	Fine	Medium	Coarse	Fine	Coarse
Unified Soil Classification System					

Soil Description	Gravel	Sand	Clay & Silt
BH8-17 SS-3	8	56	36

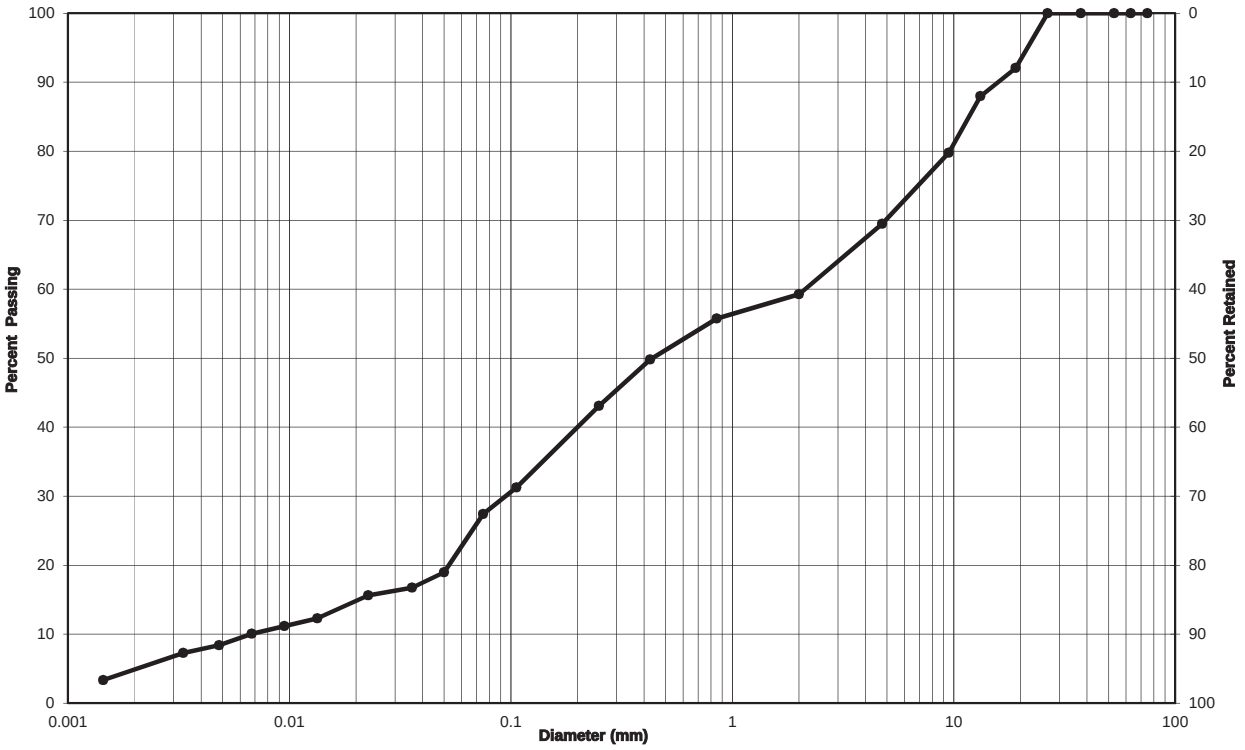
Remarks:

Performed by:	J. Sullivan	**Date:**	September 13, 2017
Verified by:		**Date:**	September 13, 2017

Particle-Size Analysis of Soils (Geotechnical) (USCS) (ASTM D422)

Client:	Bromont c/o Valdor Engineering	**Lab no.:**	SS-17-69
Project/Site:	Fallis Line Subdivision	**Project no.:**	11224019-01

Borehole no.:	BH9-17	Sample no.:	SS-5
Depth:	3.0 - 3.5 m	Enclosure:	A-31



Clay & Silt	Sand			Gravel	
	Fine	Medium	Coarse	Fine	Coarse
Unified Soil Classification System					

Soil Description	Gravel	Sand	Clay & Silt
BH9-17 SS-5	31	42	27

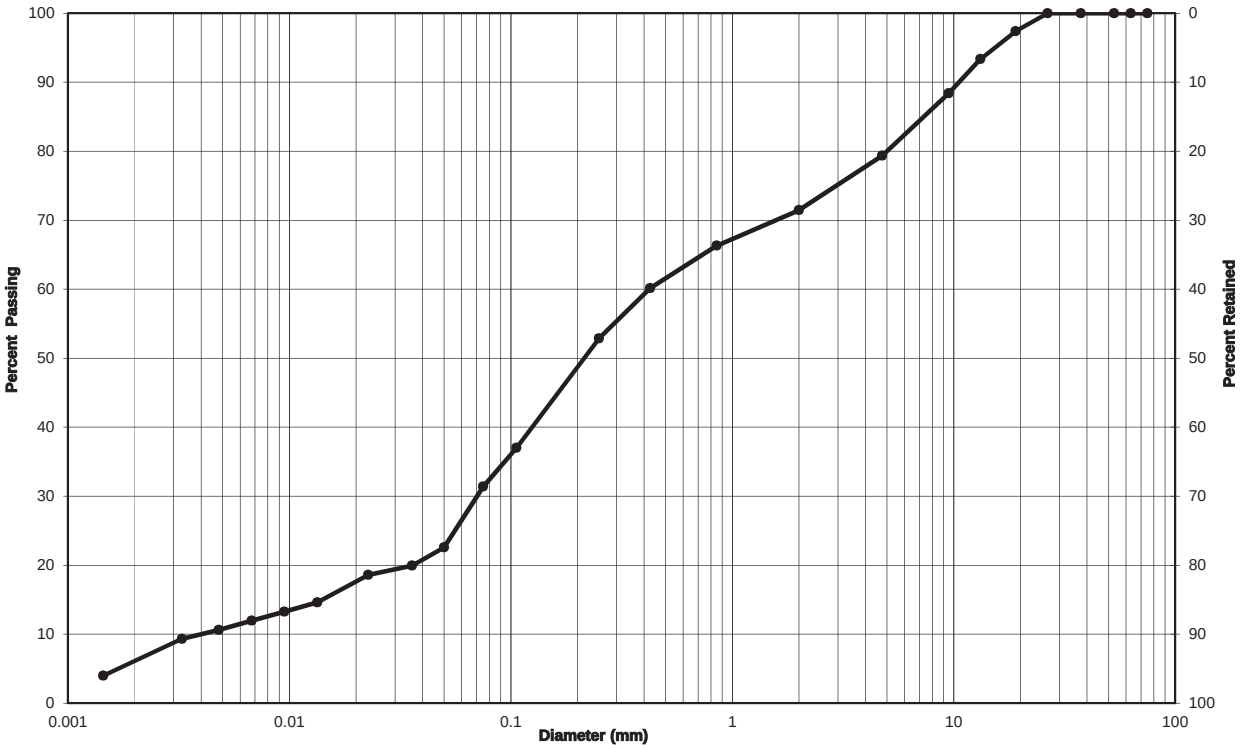
Remarks:

Performed by:	J. Sullivan	**Date:**	September 13, 2017
Verified by:		**Date:**	September 13, 2017

Particle-Size Analysis of Soils (Geotechnical) (USCS) (ASTM D422)

Client:	Bromont c/o Valdor Engineering	**Lab no.:**	SS-17-69
Project/Site:	Fallis Line Subdivision	**Project no.:**	11224019-01

Borehole no.:	BH11-17	Sample no.:	SS-7
Depth:	6.1 - 6.6 m	Enclosure:	A-32



Clay & Silt	Sand			Gravel	
	Fine	Medium	Coarse	Fine	Coarse
Unified Soil Classification System					

Soil Description	Gravel	Sand	Clay & Silt
BH11-17 SS-7	21	48	31

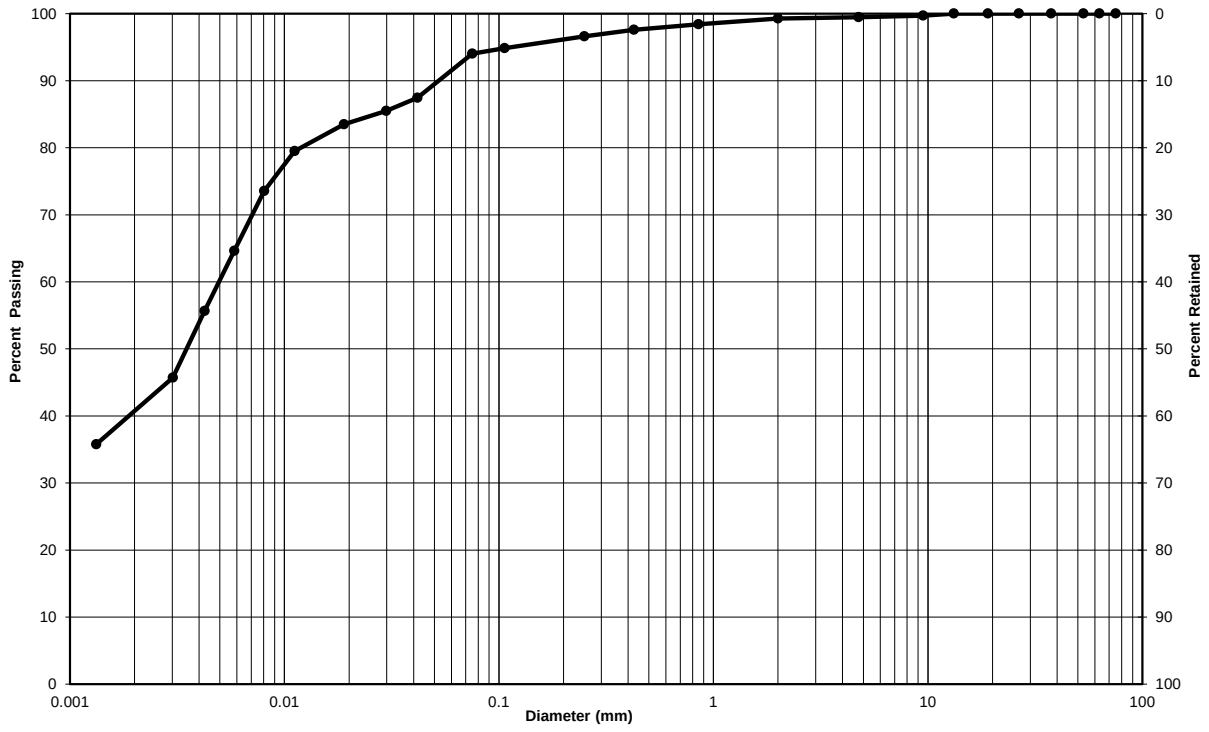
Remarks:

Performed by:	J. Sullivan	**Date:**	September 13, 2017
Verified by:		**Date:**	September 13, 2017

Particle-Size Analysis of Soils (Geotechnical) (USCS) (ASTM D422)

Client:	Bromont Group	**Lab no.:**	SS-21-17
Project/Site:	Fallis Line	**Project no.:**	11224019

Borehole no.:	BH1-21	Sample no.:	SS5
Depth:	3.05 - 3.7 m	Enclosure:	A-33



Clay & Silt	Sand			Gravel	
	Fine	Medium	Coarse	Fine	Coarse
Unified Soil Classification System					

Soil Description	Gravel (%)	Sand (%)	Clay & Silt (%)
	1	5	94
Silt-size particles (%):	54		
Clay-size particles (%) (<0.002mm):	40		

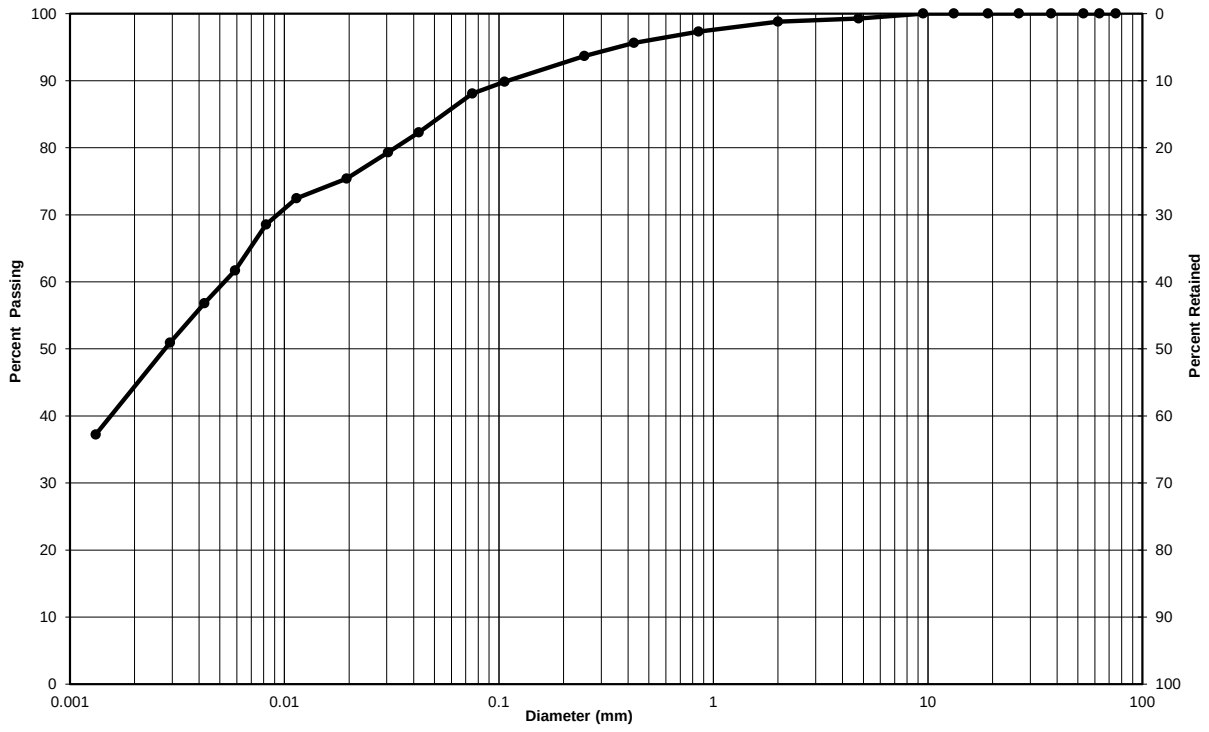
Remarks:

Performed by:	Josh Sullivan	**Date:**	March 10, 2021
Verified by:	Joe Sullivan	**Date:**	March 12, 2021

Particle-Size Analysis of Soils (Geotechnical) (USCS) (ASTM D422)

Client:	Bromont Group	**Lab no.:**	SS-21-17
Project/Site:	Fallis Line	**Project no.:**	11224019

Borehole no.:	BH3-21	Sample no.:	SS3
Depth:	1.5 - 2.1 m	Enclosure:	A-34



Clay & Silt	Sand			Gravel	
	Fine	Medium	Coarse	Fine	Coarse
Unified Soil Classification System					

Soil Description	Gravel (%)	Sand (%)	Clay & Silt (%)
	1	11	88
Silt-size particles (%):	45		
Clay-size particles (%) (<0.002mm):	43		

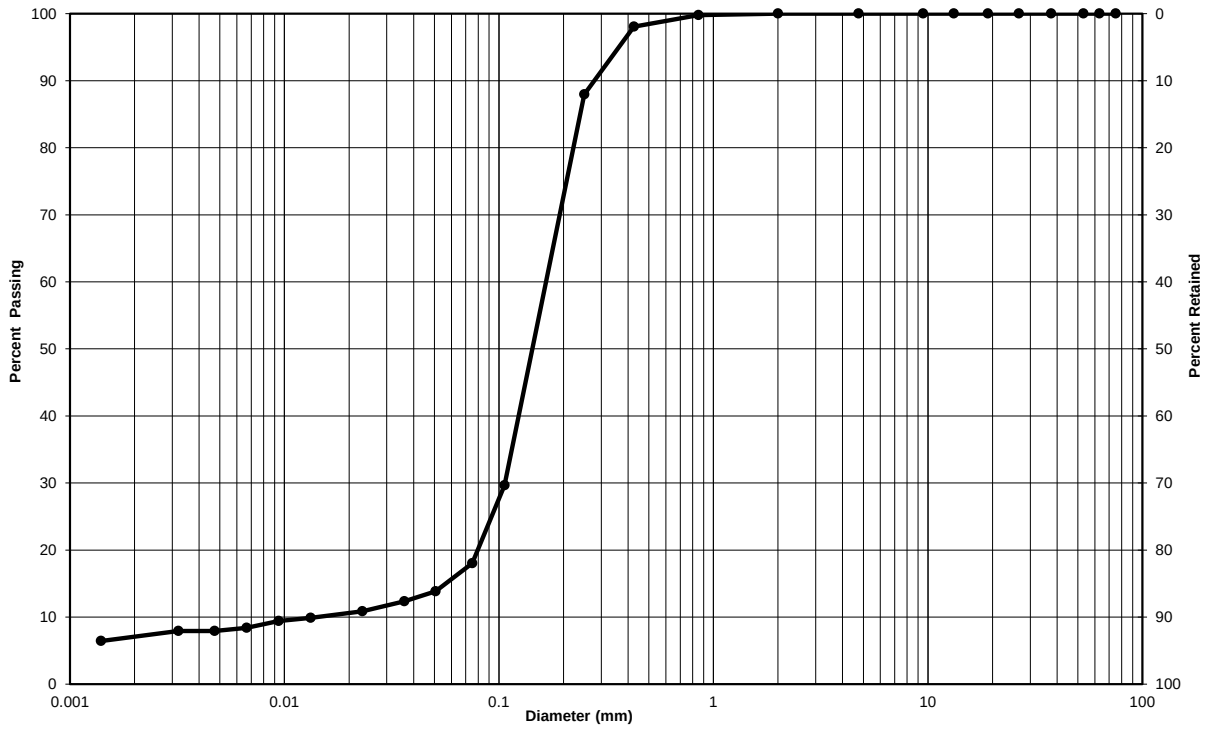
Remarks:

Performed by:	Josh Sullivan	**Date:**	March 10, 2021
Verified by:	Joe Sullivan	**Date:**	March 12, 2021

Particle-Size Analysis of Soils (Geotechnical) (USCS) (ASTM D422)

Client:	Bromont Group	**Lab no.:**	SS-21-17
Project/Site:	Fallis Line	**Project no.:**	11224019

Borehole no.:	BH5-21	Sample no.:	SS4
Depth:	2.3 - 2.9 m	Enclosure:	A-35



Clay & Silt	Sand			Gravel	
	Fine	Medium	Coarse	Fine	Coarse
Unified Soil Classification System					

Soil Description	Gravel (%)	Sand (%)	Clay & Silt (%)
	0	82	18
Silt-size particles (%):	11		
Clay-size particles (%) (<0.002mm):	7		

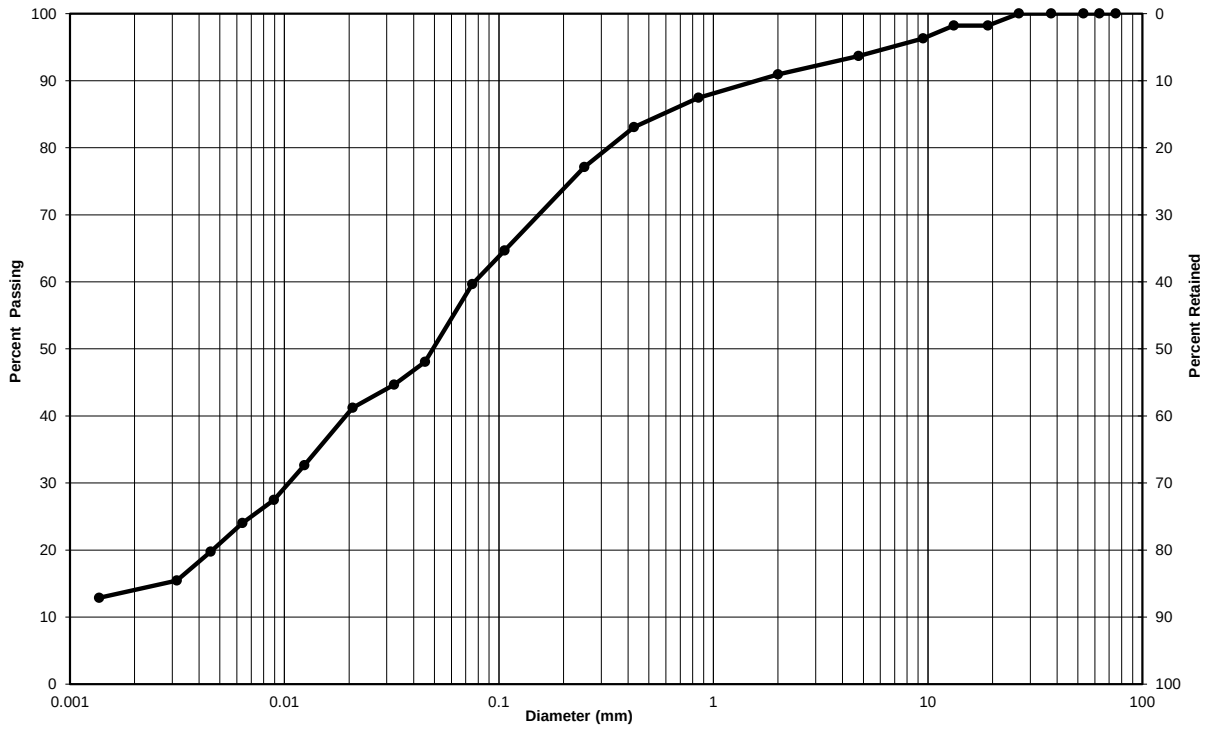
Remarks:

Performed by:	Josh Sullivan	**Date:**	March 10, 2021
Verified by:	Joe Sullivan	**Date:**	March 12, 2021

Particle-Size Analysis of Soils (Geotechnical) (USCS) (ASTM D422)

Client:	Bromont Group	**Lab no.:**	SS-21-17
Project/Site:	Fallis Line	**Project no.:**	11224019

Borehole no.:	BH7-21	Sample no.:	SS5
Depth:	3.1 - 3.7 m	Enclosure:	A-36



Clay & Silt	Sand			Gravel	
	Fine	Medium	Coarse	Fine	Coarse
Unified Soil Classification System					

Soil Description	Gravel (%)	Sand (%)	Clay & Silt (%)
	6	34	60
Silt-size particles (%):	46		
Clay-size particles (%) (<0.002mm):	14		

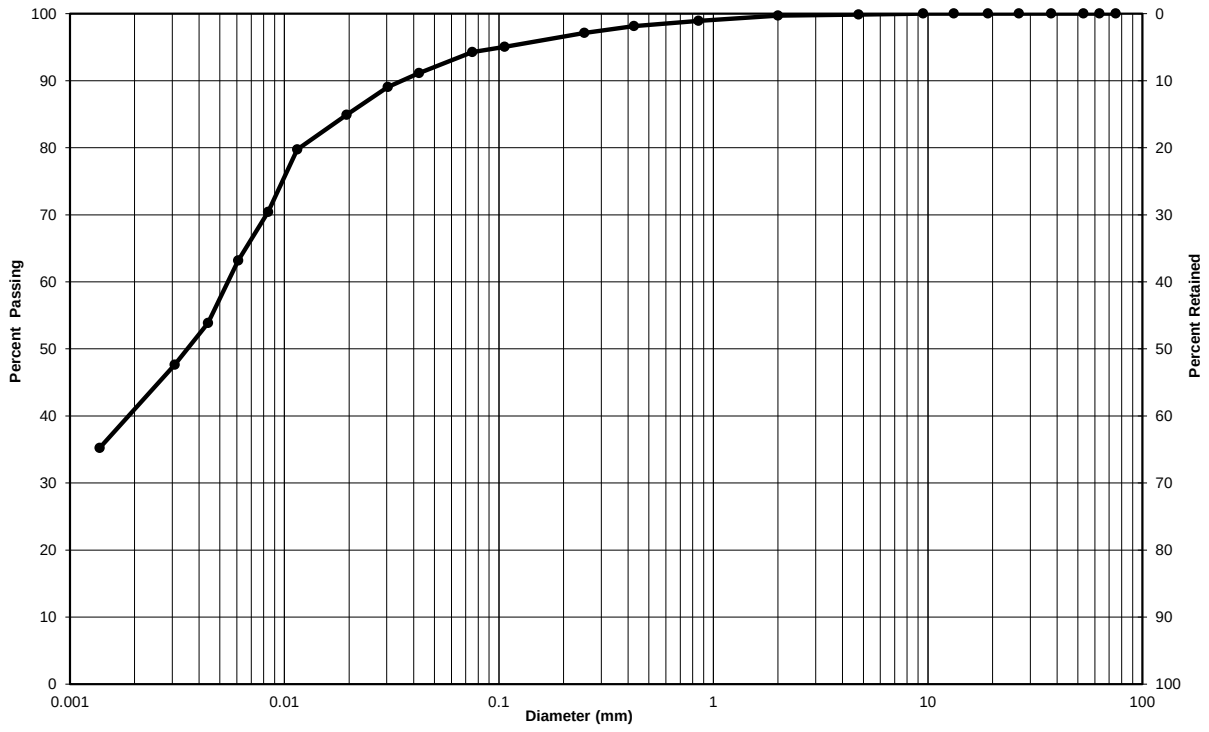
Remarks:

Performed by:	Josh Sullivan	**Date:**	March 10, 2021
Verified by:	Joe Sullivan	**Date:**	March 12, 2021

Particle-Size Analysis of Soils (Geotechnical) (USCS) (ASTM D422)

Client:	Bromont Group	**Lab no.:**	SS-21-17
Project/Site:	Fallis Line	**Project no.:**	11224019

Borehole no.:	BH11-21	Sample no.:	SS2B
Depth:	0.9 - 1.35 m	Enclosure:	A-37



Clay & Silt	Sand			Gravel	
	Fine	Medium	Coarse	Fine	Coarse
Unified Soil Classification System					

Soil Description	Gravel (%)	Sand (%)	Clay & Silt (%)
	0	6	94
Silt-size particles (%):	54		
Clay-size particles (%) (<0.002mm):	40		

Remarks:

Performed by:	Josh Sullivan	**Date:**	March 10, 2021
Verified by:	Joe Sullivan	**Date:**	March 12, 2021

Appendix B
Photographs

Photo 1 - View of residence at 787 Fallis Line.

Photo 2 - View looking east along Fallis Line.

Site Photographs

Photo 3 - View looking southwest across agricultural fields on the Site.

Photo 4 - View looking east towards newer residential development.

Site Photographs

Photo 5 - View north along historical rail line corridor.

Photo 6 - Seepage areas on the Site becoming tributaries of Baxter Creek.

Site Photographs

Photo 7 - View looking west along Fallis Line.

Photo 8 - Seepage areas on the Site becoming tributaries of Baxter Creek.

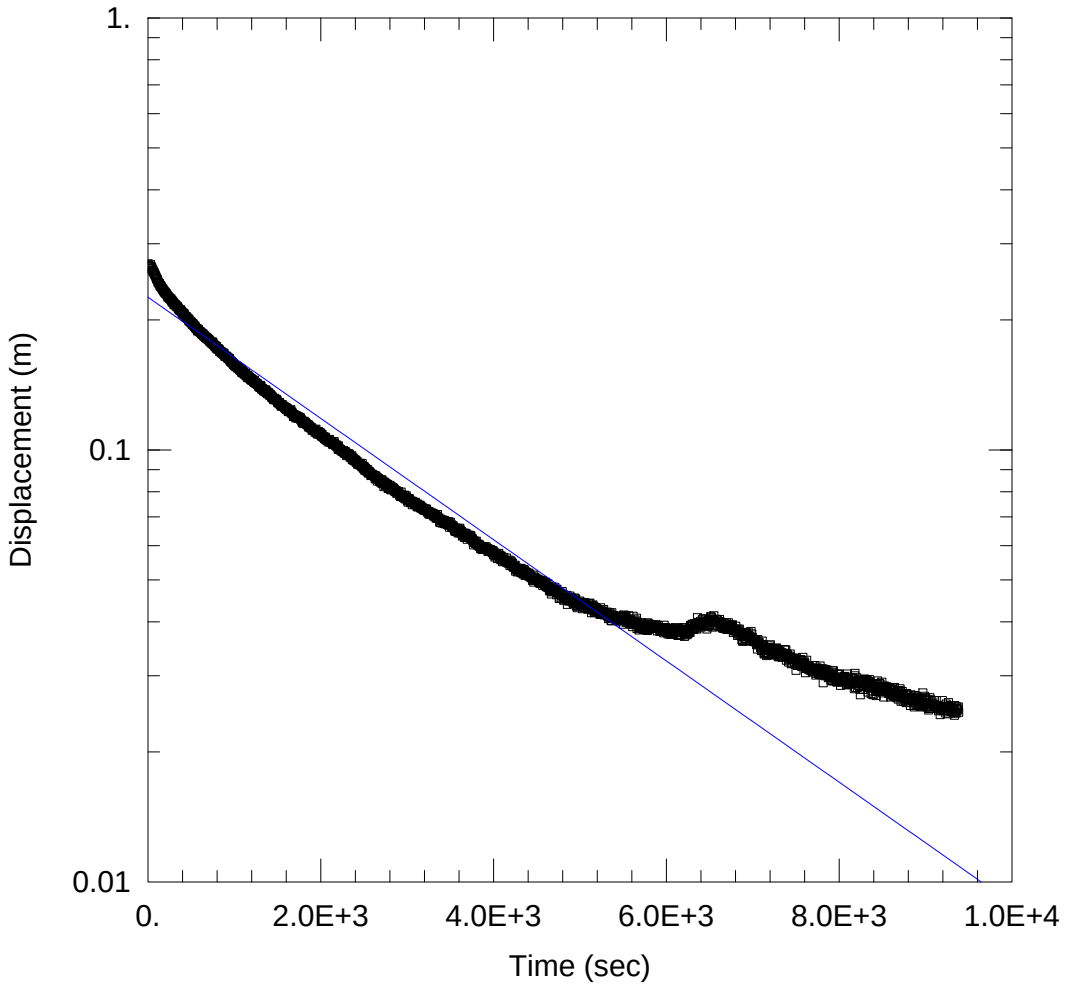
Site Photographs

Photo 9 - View looking south toward forested areas in southern portion of the Site.

Photo 10 - View north looking across agricultural lands at 787 Fallis Line.

Site Photographs

Appendix C
Single Well Response Testing Data



BH11-17 - FALLING HEAD TEST

Data Set: I:\...\11148475-01, 17-10-16, BH-11 Falling Head Test.aqt
Date: 10/16/17 Time: 15:04:37

PROJECT INFORMATION

Company: GHD
Client: Bromont Group
Project: 11148475-01
Location: 825 Fallis Line, Millbrook
Test Well: BH11-17
Test Date: September 7, 2017

AQUIFER DATA

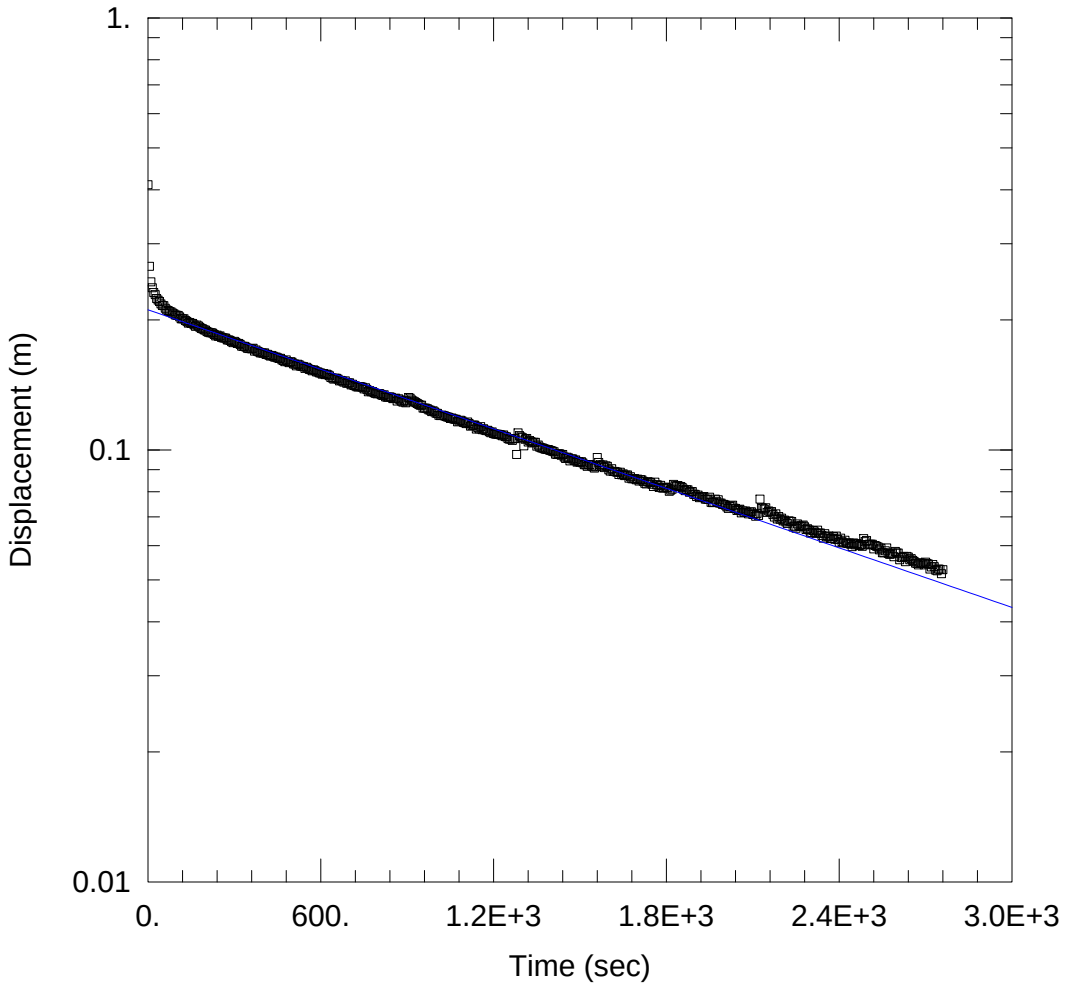
Saturated Thickness: 1.4 m
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (BH-11)

Initial Displacement: 0.2698 m
Total Well Penetration Depth: 6.1 m
Casing Radius: 0.025 m
Static Water Column Height: 1.4 m
Screen Length: 1.5 m
Well Radius: 0.025 m

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 2.874E-5 cm/sec
y0 = 0.2257 m



BH11-17 - RISING HEAD TEST

Data Set: I:\...\11148475-01, 17-10-16, BH-11 Rising Head Test.aqt
Date: 10/16/17 Time: 15:03:57

PROJECT INFORMATION

Company: GHD
Client: Bromont Group
Project: 11148475-01
Location: 825 Fallis Line, Millbrook
Test Well: BH11-17
Test Date: September 7, 2017

AQUIFER DATA

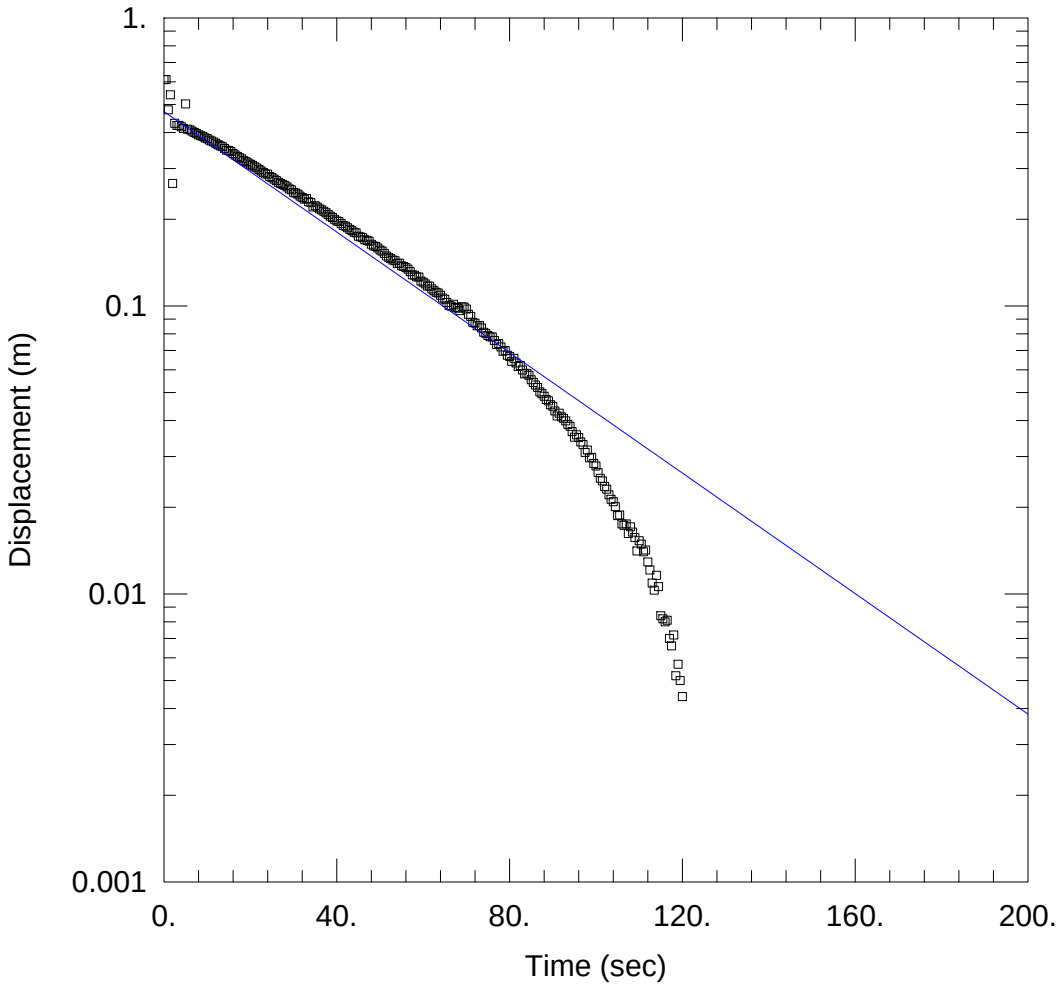
Saturated Thickness: 1.4 m Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (BH-11)

Initial Displacement: 0.4112 m
Total Well Penetration Depth: 6.1 m
Casing Radius: 0.025 m
Static Water Column Height: 1.4 m
Screen Length: 1.5 m
Well Radius: 0.025 m

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 4.703E-5 cm/sec
y0 = 0.2111 m



SWRT - FALLING HEAD

Data Set: N:\...\BH1S-21_T1_falling.aqt
Date: 03/20/21 Time: 21:41:45

PROJECT INFORMATION

Company: GHD Limited
Client: The Bromont Group
Project: 11224019-01
Location: Fallis Line, Millbrook ON
Test Well: BH1S-21
Test Date: March 17, 2021

AQUIFER DATA

Saturated Thickness: 2.1 m Anisotropy Ratio (Kz/Kr): 0.5

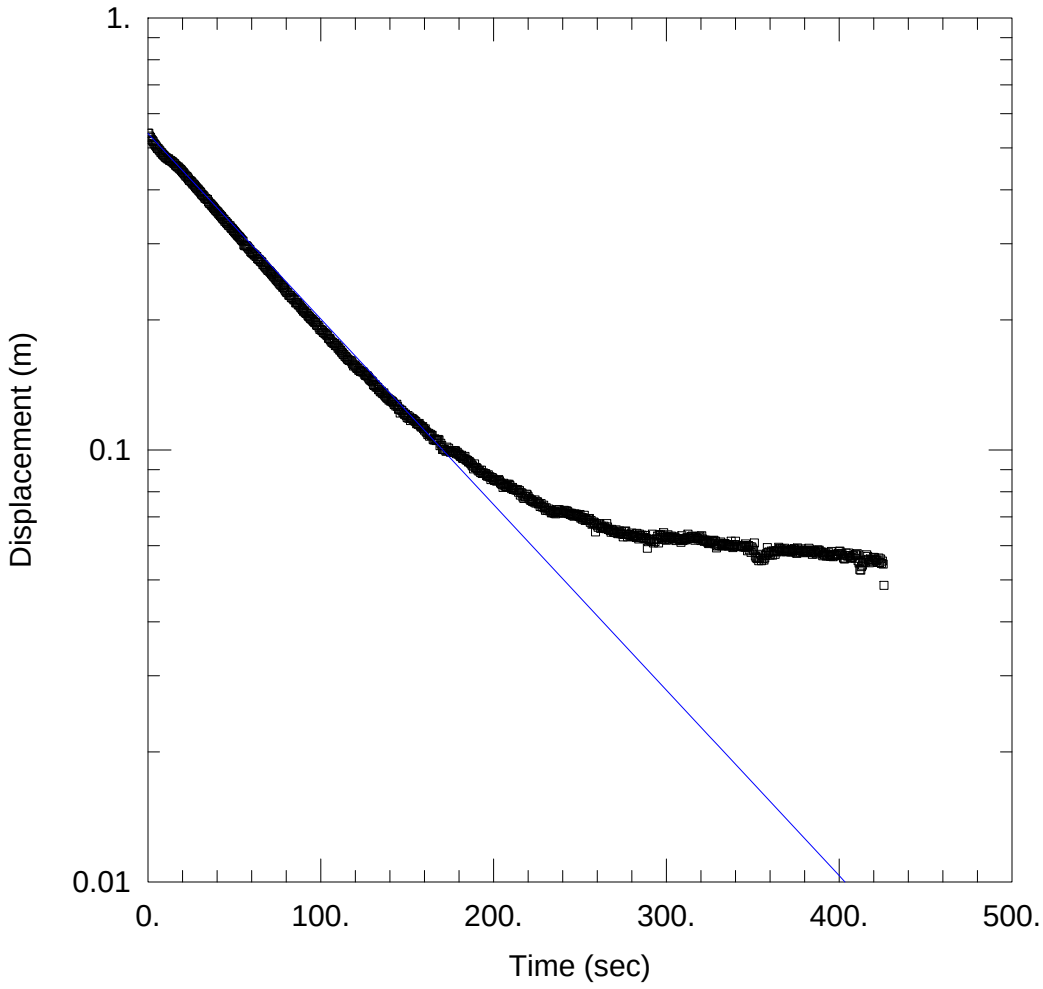
WELL DATA (BH1S-21)

Initial Displacement: 0.6104 m
Total Well Penetration Depth: 2.3 m
Casing Radius: 0.025 m
Static Water Column Height: 2.1 m
Screen Length: 1.5 m
Well Radius: 0.025 m
Gravel Pack Porosity: 0.3

SOLUTION

Aquifer Model: Unconfined Solution Method: Bouwer-Rice

K = 1.85E-5 m/sec y0 = 0.473 m



SWRT - RISING HEAD

Data Set: N:\...\BH1S-21_T1_rising.aqt
Date: 03/20/21 Time: 21:52:01

PROJECT INFORMATION

Company: GHD Limited
Client: The Bromont Group
Project: 11224019-01
Location: Fallis Line, Millbrook ON
Test Well: BH1S-21
Test Date: March 17, 2021

AQUIFER DATA

Saturated Thickness: 2.1 m Anisotropy Ratio (Kz/Kr): 0.5

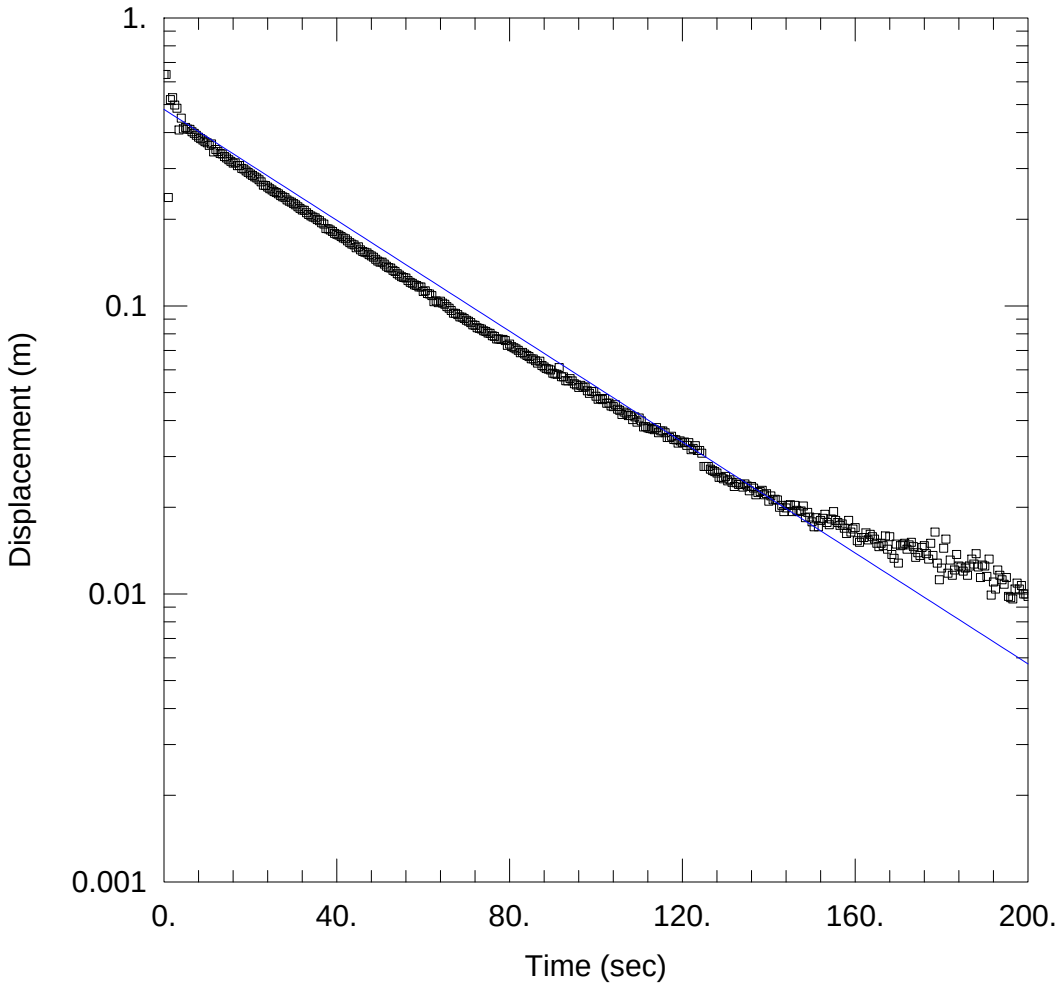
WELL DATA (BH1S-21)

Initial Displacement: 0.5411 m
Total Well Penetration Depth: 2.3 m
Casing Radius: 0.025 m
Static Water Column Height: 2.1 m
Screen Length: 1.5 m
Well Radius: 0.025 m
Gravel Pack Porosity: 0.3

SOLUTION

Aquifer Model: Unconfined Solution Method: Bouwer-Rice

K = 7.597E-6 m/sec y0 = 0.5401 m



SWRT - FALLING HEAD

Data Set: N:\...\BH1S-21_T2_falling.aqt
Date: 03/20/21 Time: 22:20:48

PROJECT INFORMATION

Company: GHD Limited
Client: The Bromont Group
Project: 11224019-01
Location: Fallis Line, Millbrook ON
Test Well: BH1S-21
Test Date: March 17, 2021

AQUIFER DATA

Saturated Thickness: 2.1 m Anisotropy Ratio (Kz/Kr): 0.5

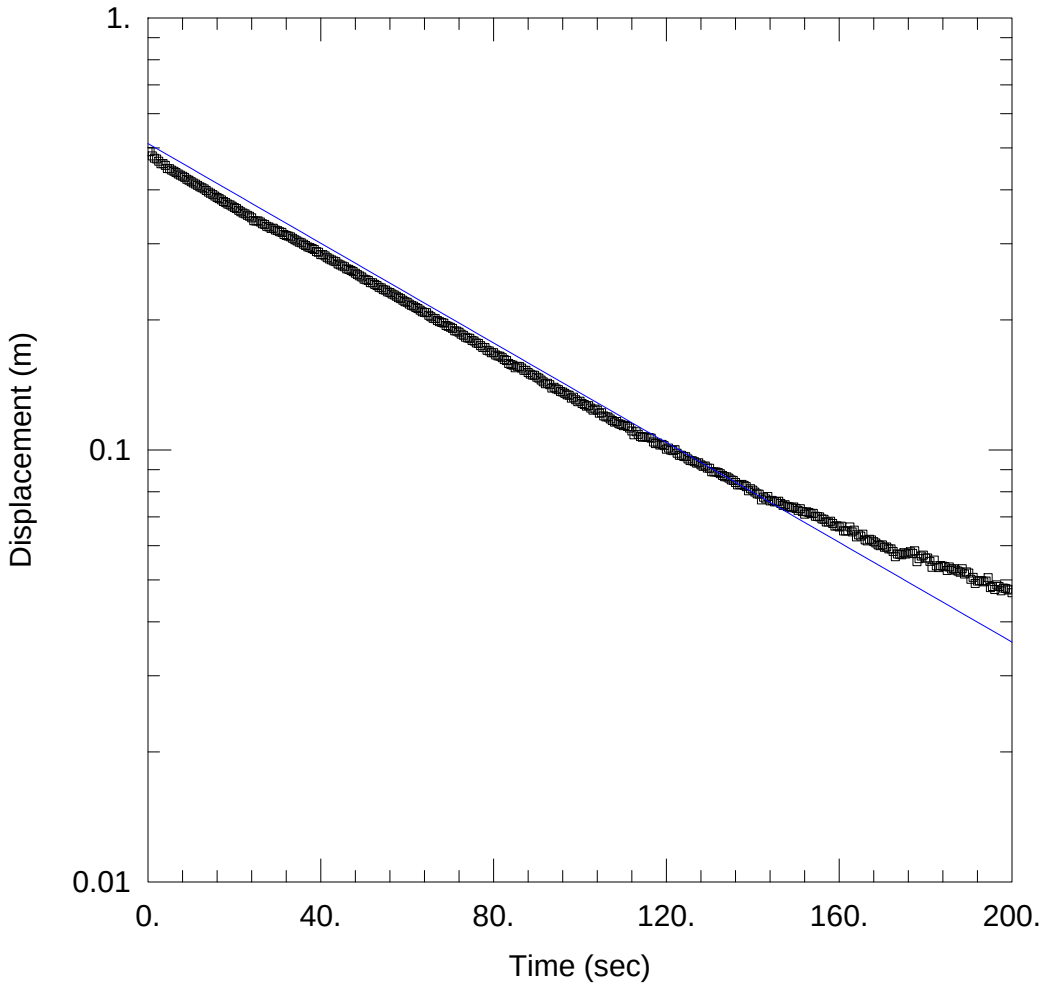
WELL DATA (BH1S-21)

Initial Displacement: 0.6362 m
Total Well Penetration Depth: 2.3 m
Casing Radius: 0.025 m
Static Water Column Height: 2.1 m
Screen Length: 1.5 m
Well Radius: 0.025 m
Gravel Pack Porosity: 0.3

SOLUTION

Aquifer Model: Unconfined Solution Method: Bouwer-Rice

K = 1.703E-5 m/sec y0 = 0.4813 m



SWRT - RISING HEAD

Data Set: N:\...\BH1S-21_T2_rising.aqt
Date: 03/20/21 Time: 22:22:58

PROJECT INFORMATION

Company: GHD Limited
Client: The Bromont Group
Project: 11224019-01
Location: Fallis Line, Millbrook ON
Test Well: BH1S-21
Test Date: March 17, 2021

AQUIFER DATA

Saturated Thickness: 2.1 m Anisotropy Ratio (Kz/Kr): 0.5

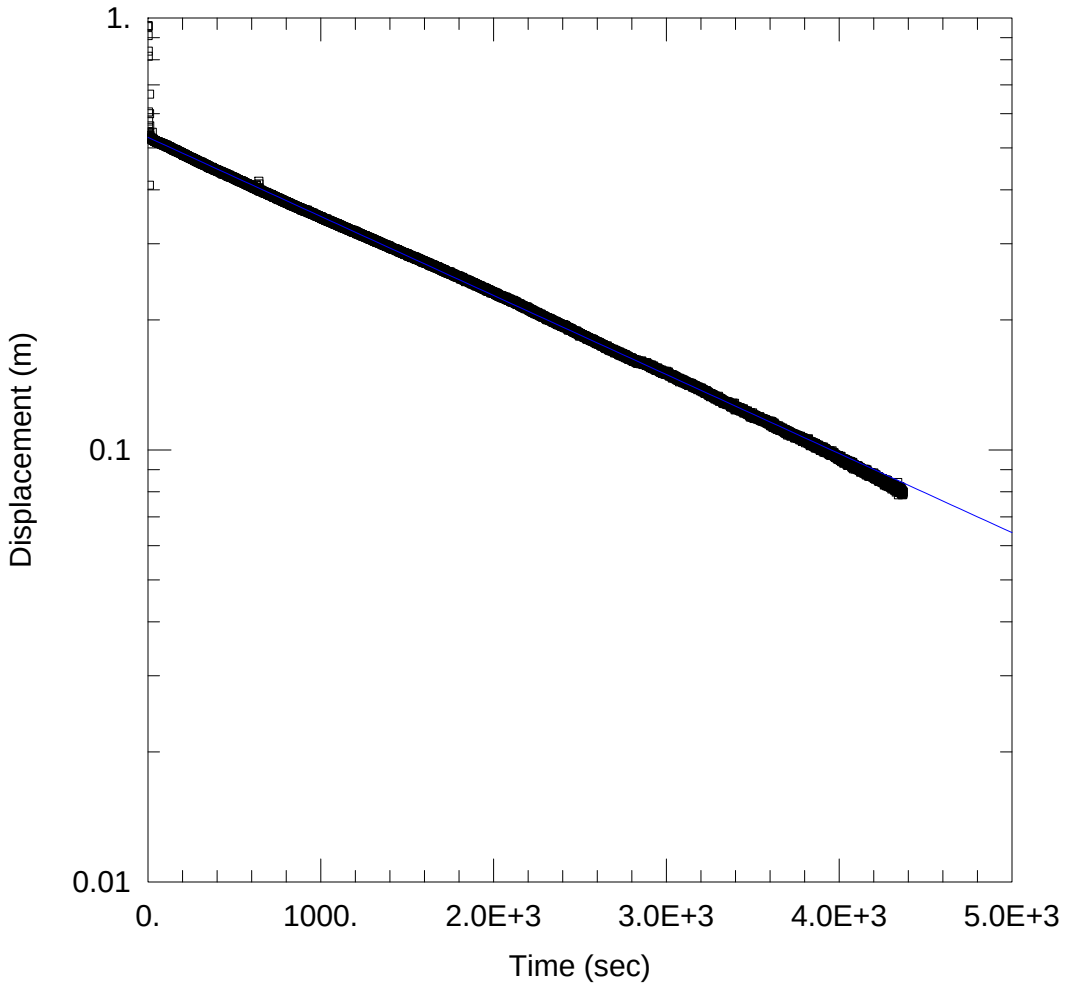
WELL DATA (BH1S-21)

Initial Displacement: 0.4905 m
Total Well Penetration Depth: 2.3 m
Casing Radius: 0.025 m
Static Water Column Height: 2.1 m
Screen Length: 1.5 m
Well Radius: 0.025 m
Gravel Pack Porosity: 0.3

SOLUTION

Aquifer Model: Unconfined Solution Method: Bouwer-Rice

K = 1.021E-5 m/sec y0 = 0.5119 m



SWRT - FALLING HEAD

Data Set: N:\...\BH1D-21_falling.aqt
Date: 03/20/21 Time: 21:45:58

PROJECT INFORMATION

Company: GHD Limited
Client: The Bromont Group
Project: 11224019-01
Location: Fallis Line, Millbrook ON
Test Well: BH1D-21
Test Date: March 17, 2021

AQUIFER DATA

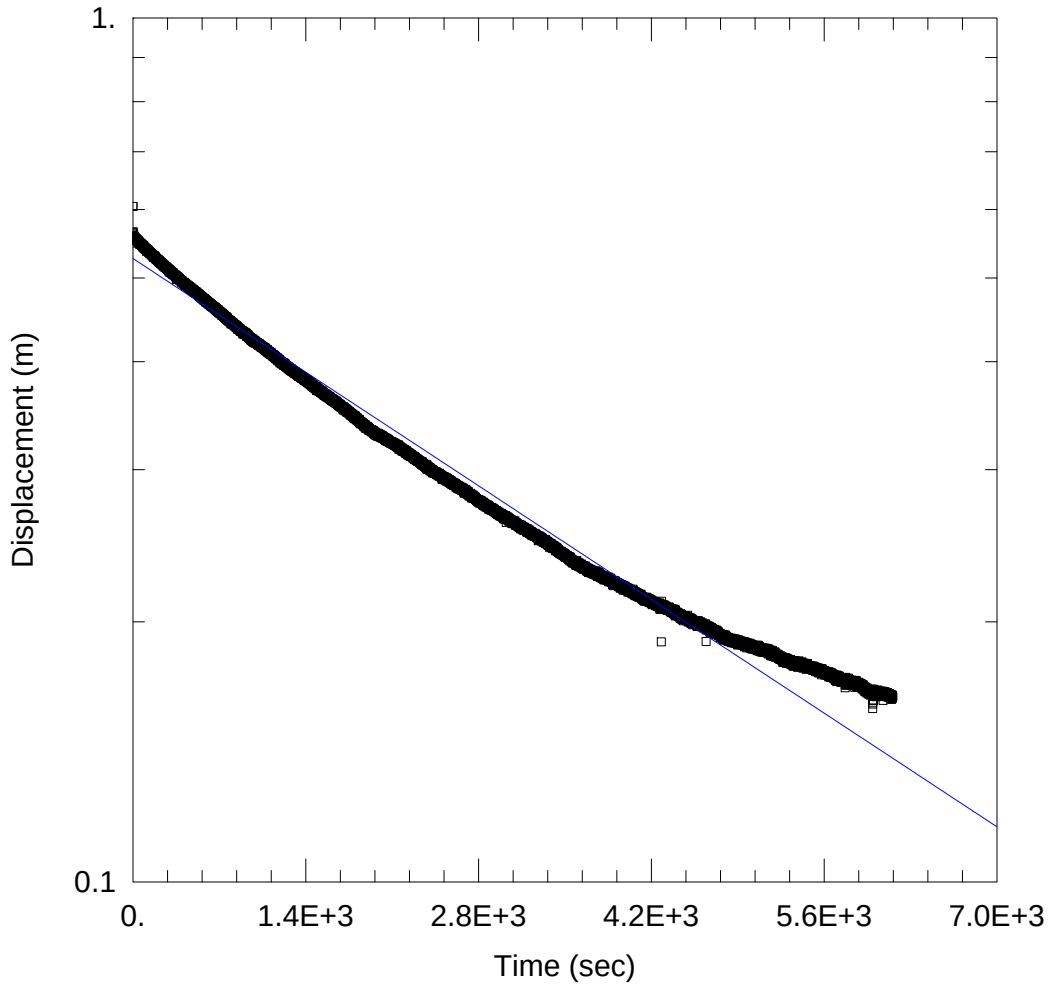
Saturated Thickness: 5.875 m
Anisotropy Ratio (Kz/Kr): 0.5

WELL DATA (BH1D-21)

Initial Displacement: 0.9594 m
Total Well Penetration Depth: 6.1 m
Casing Radius: 0.025 m
Static Water Column Height: 5.875 m
Screen Length: 3.1 m
Well Radius: 0.025 m
Gravel Pack Porosity: 0.3

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 1.892E-7 m/sec
y0 = 0.5291 m



SWRT - RISING HEAD

Data Set: N:\...\BH1D-21_rising.aqt
Date: 03/20/21 Time: 21:47:46

PROJECT INFORMATION

Company: GHD Limited
Client: The Bromont Group
Project: 11224019-01
Location: Fallis Line, Millbrook ON
Test Well: BH1D-21
Test Date: March 17, 2021

AQUIFER DATA

Saturated Thickness: 5.875 m Anisotropy Ratio (Kz/Kr): 0.5

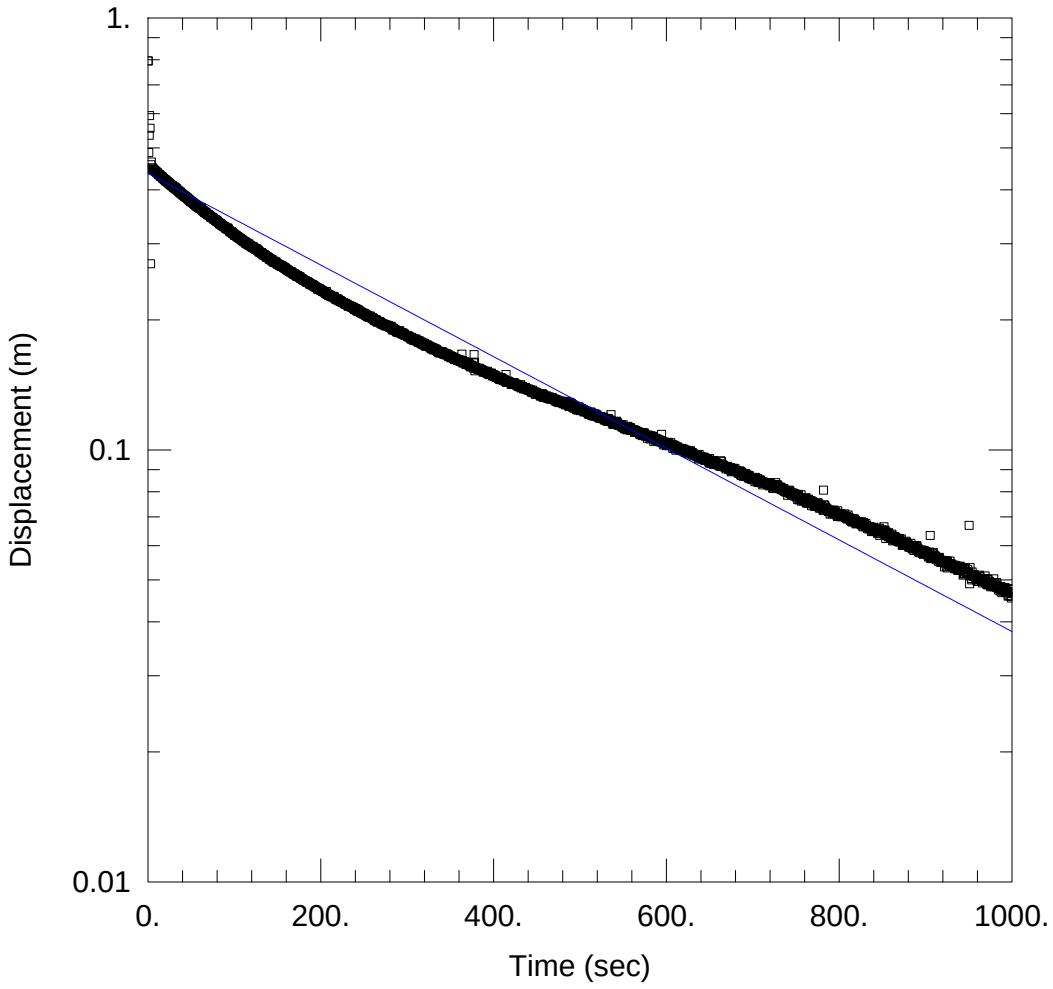
WELL DATA (BH1D-21)

Initial Displacement: 0.6051 m
Total Well Penetration Depth: 6.1 m
Casing Radius: 0.025 m
Static Water Column Height: 5.875 m
Screen Length: 3.1 m
Well Radius: 0.025 m
Gravel Pack Porosity: 0.3

SOLUTION

Aquifer Model: Unconfined Solution Method: Bouwer-Rice

K = 9.714E-8 m/sec y0 = 0.5267 m



SWRT - FALLING HEAD

Data Set: C:\Users\rneck\Desktop\BH11-17\BH11-17_falling.aqt
Date: 03/21/21 Time: 11:50:37

PROJECT INFORMATION

Company: GHD Limited
Client: The Bromont Group
Project: 11224019-01
Location: Fallis Line, Millbrook ON
Test Well: BH11-17
Test Date: March 17, 2021

AQUIFER DATA

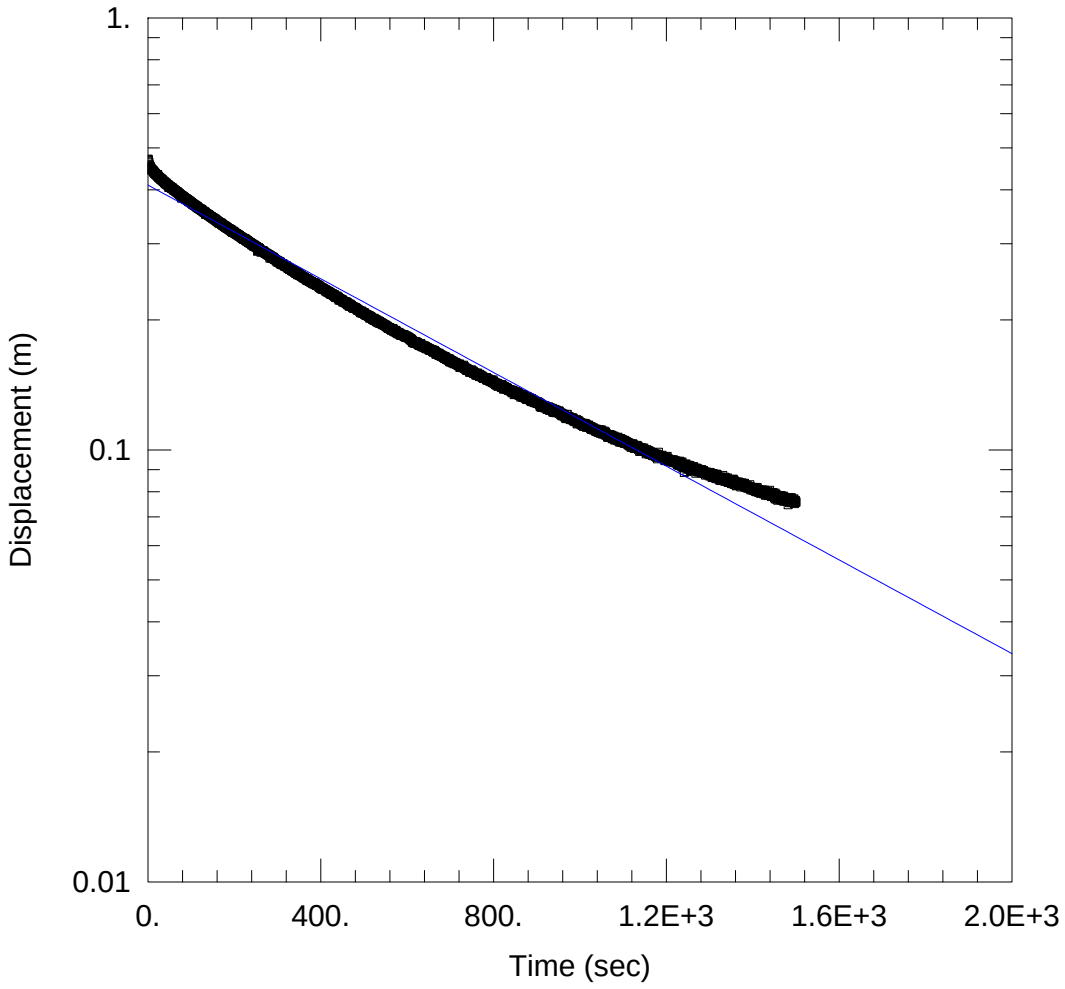
Saturated Thickness: 4.14 m
Anisotropy Ratio (Kz/Kr): 0.5

WELL DATA (BH11-17)

Initial Displacement: 0.7951 m
Total Well Penetration Depth: 6.1 m
Casing Radius: 0.025 m
Static Water Column Height: 4.14 m
Screen Length: 1.5 m
Well Radius: 0.025 m
Gravel Pack Porosity: 0.3

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 2.179E-6 m/sec
y0 = 0.4366 m



SWRT - RISING HEAD

Data Set: C:\Users\rneck\Desktop\BH11-17\BH11-17_rising.aqt
Date: 03/21/21 Time: 11:53:46

PROJECT INFORMATION

Company: GHD Limited
Client: The Bromont Group
Project: 11224019-01
Location: Fallis Line, Millbrook ON
Test Well: BH11-17
Test Date: March 17, 2021

AQUIFER DATA

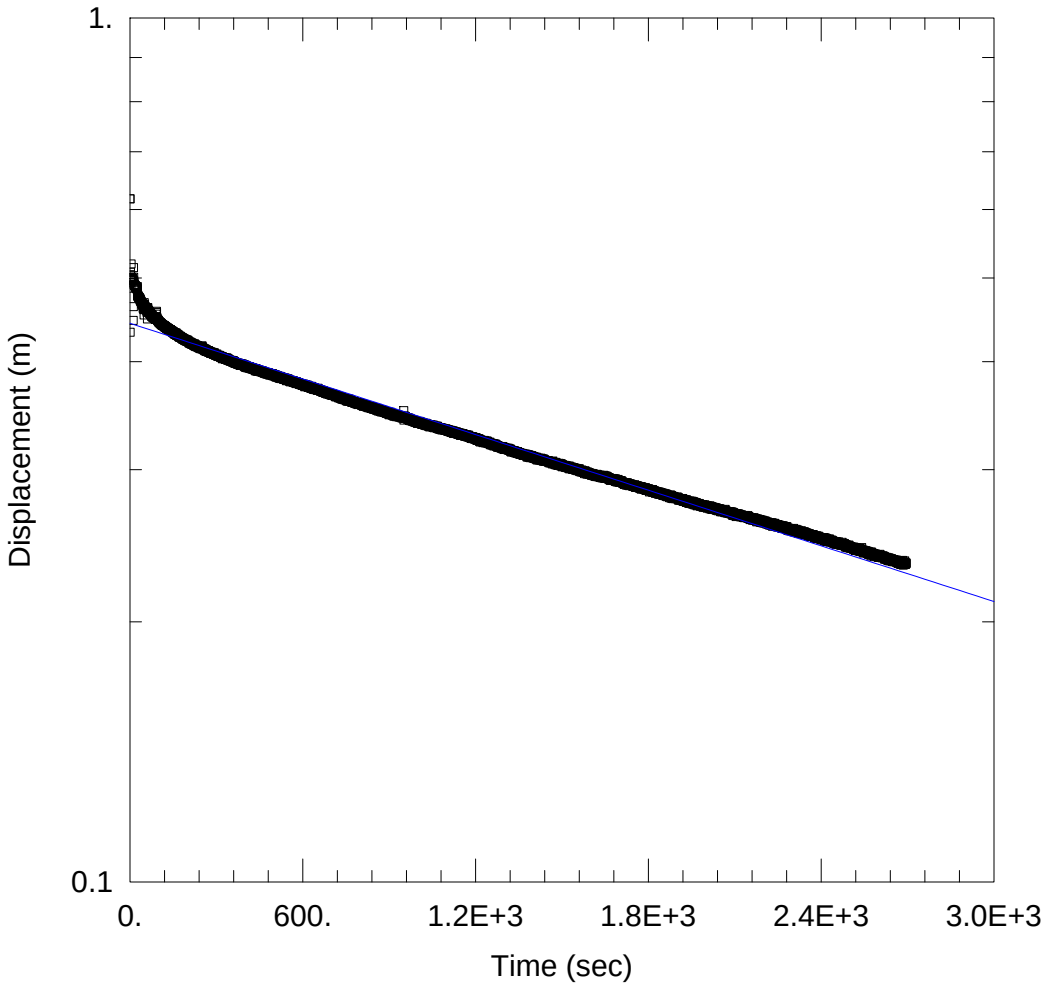
Saturated Thickness: 4.14 m
Anisotropy Ratio (Kz/Kr): 0.5

WELL DATA (BH11-17)

Initial Displacement: 0.4706 m
Total Well Penetration Depth: 4.5 m
Casing Radius: 0.025 m
Static Water Column Height: 4.14 m
Screen Length: 1.5 m
Well Radius: 0.025 m
Gravel Pack Porosity: 0.3

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 1.067E-6 m/sec
y0 = 0.4102 m



SWRT - FALLING HEAD

Data Set: C:\Users\rneck\Desktop\BH11-21 shallow\BH11S-21_falling.aqt
Date: 03/21/21 Time: 11:57:40

PROJECT INFORMATION

Company: GHD Limited
Client: The Bromont Group
Project: 11224019-01
Location: Fallis Line, Millbrook ON
Test Well: BH11S-21
Test Date: March 17, 2021

AQUIFER DATA

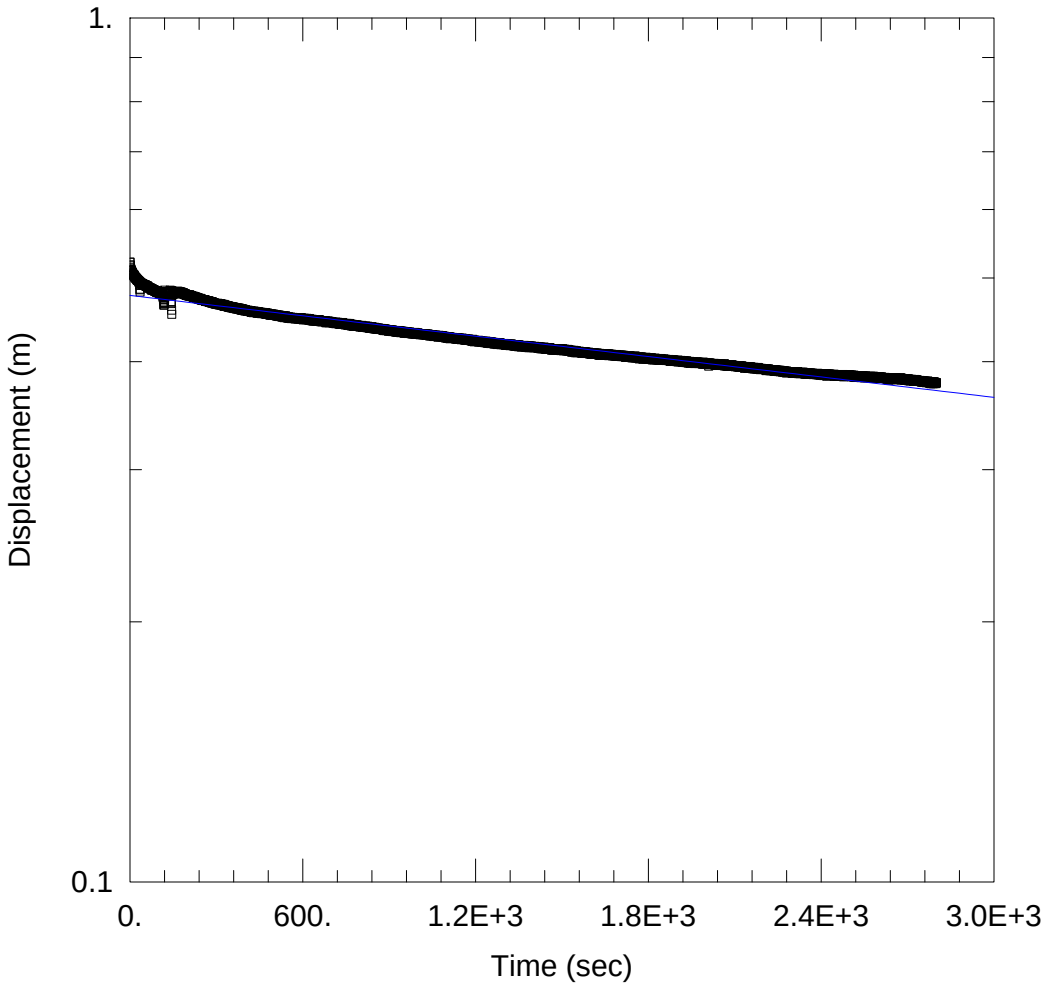
Saturated Thickness: 1.76 m
Anisotropy Ratio (Kz/Kr): 0.5

WELL DATA (BH11S-21)

Initial Displacement: 0.6175 m
Total Well Penetration Depth: 2.3 m
Casing Radius: 0.025 m
Static Water Column Height: 1.76 m
Screen Length: 1.5 m
Well Radius: 0.025 m
Gravel Pack Porosity: 0.3

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 1.899E-7 m/sec
y0 = 0.4431 m



SWRT - RISING HEAD

Data Set: C:\Users\rneck\Desktop\BH11-21 shallow\BH11S-21_rising.aqt
Date: 03/21/21 Time: 12:00:02

PROJECT INFORMATION

Company: GHD Limited
Client: The Bromont Group
Project: 11224019-01
Location: Fallis Line, Millbrook ON
Test Well: BH11S-21
Test Date: March 17, 2021

AQUIFER DATA

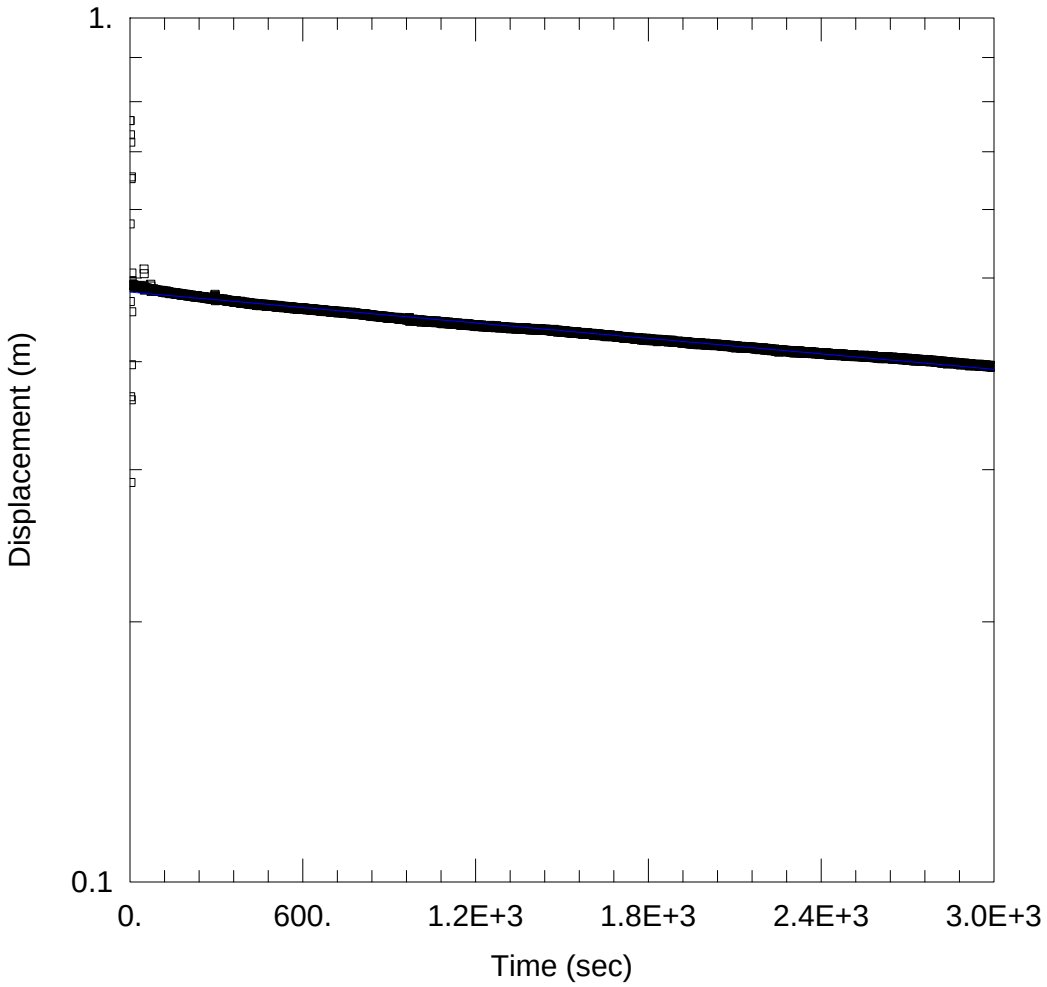
Saturated Thickness: 1.76 m
Anisotropy Ratio (Kz/Kr): 0.5

WELL DATA (BH11S-21)

Initial Displacement: 0.5215 m
Total Well Penetration Depth: 2.3 m
Casing Radius: 0.025 m
Static Water Column Height: 1.76 m
Screen Length: 1.5 m
Well Radius: 0.025 m
Gravel Pack Porosity: 0.3

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 6.954E-8 m/sec
y0 = 0.4773 m



SWRT - FALLING HEAD

Data Set: C:\Users\rneck\Desktop\BH11-21 deep\BH11D-21_falling.aqt
Date: 03/21/21 Time: 12:02:25

PROJECT INFORMATION

Company: GHD Limited
Client: The Bromont Group
Project: 11224019-01
Location: Fallis Line, Millbrook ON
Test Well: BH11D-21
Test Date: March 17, 2021

AQUIFER DATA

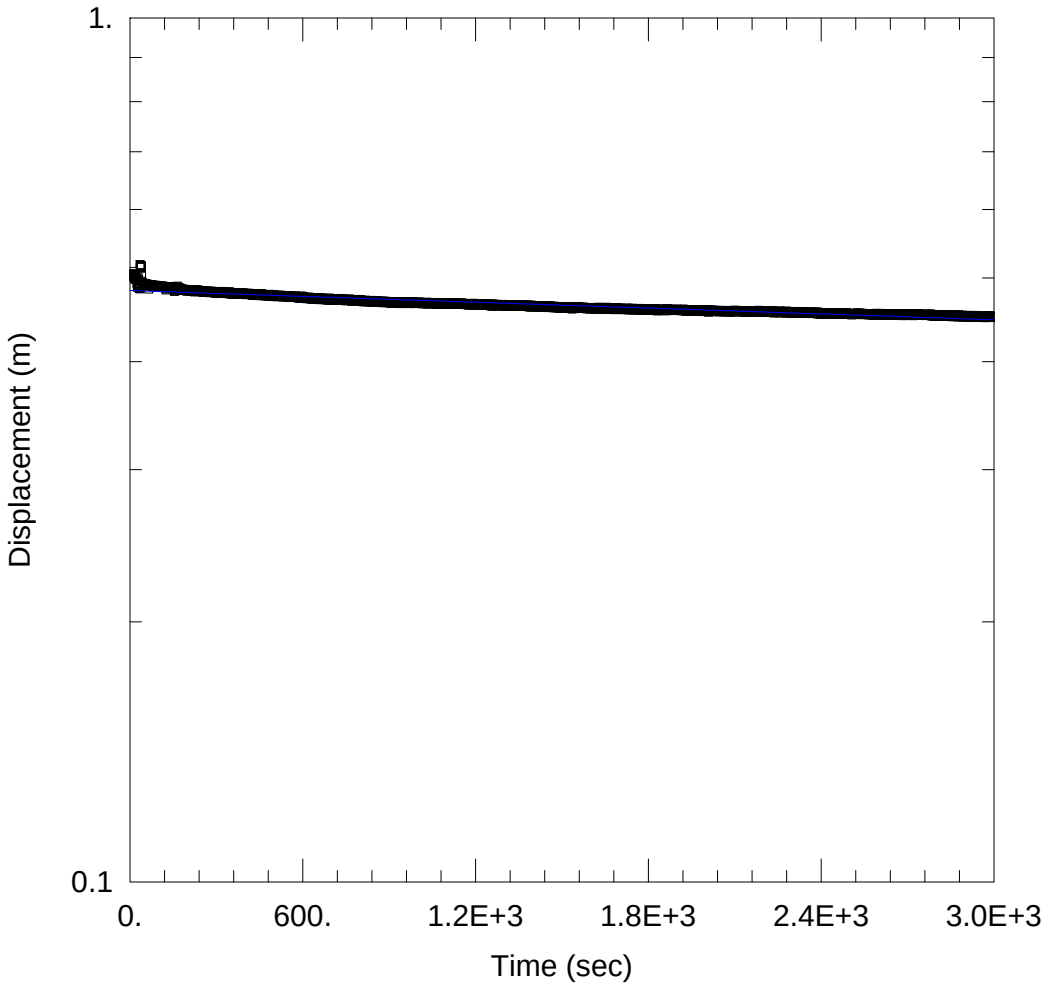
Saturated Thickness: 3.51 m
Anisotropy Ratio (Kz/Kr): 0.5

WELL DATA (BH11D-21)

Initial Displacement: 0.7607 m
Total Well Penetration Depth: 6. m
Casing Radius: 0.025 m
Static Water Column Height: 3.51 m
Screen Length: 3. m
Well Radius: 0.025 m
Gravel Pack Porosity: 0.3

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 3.168E-8 m/sec
y0 = 0.4816 m



SWRT - RISING HEAD

Data Set: C:\Users\rneck\Desktop\BH11-21 deep\BH11D-21_rising.aqt
Date: 03/21/21 Time: 12:03:58

PROJECT INFORMATION

Company: GHD Limited
Client: The Bromont Group
Project: 11224019-01
Location: Fallis Line, Millbrook ON
Test Well: BH11D-21
Test Date: March 17, 2021

AQUIFER DATA

Saturated Thickness: 3.51 m
Anisotropy Ratio (Kz/Kr): 0.5

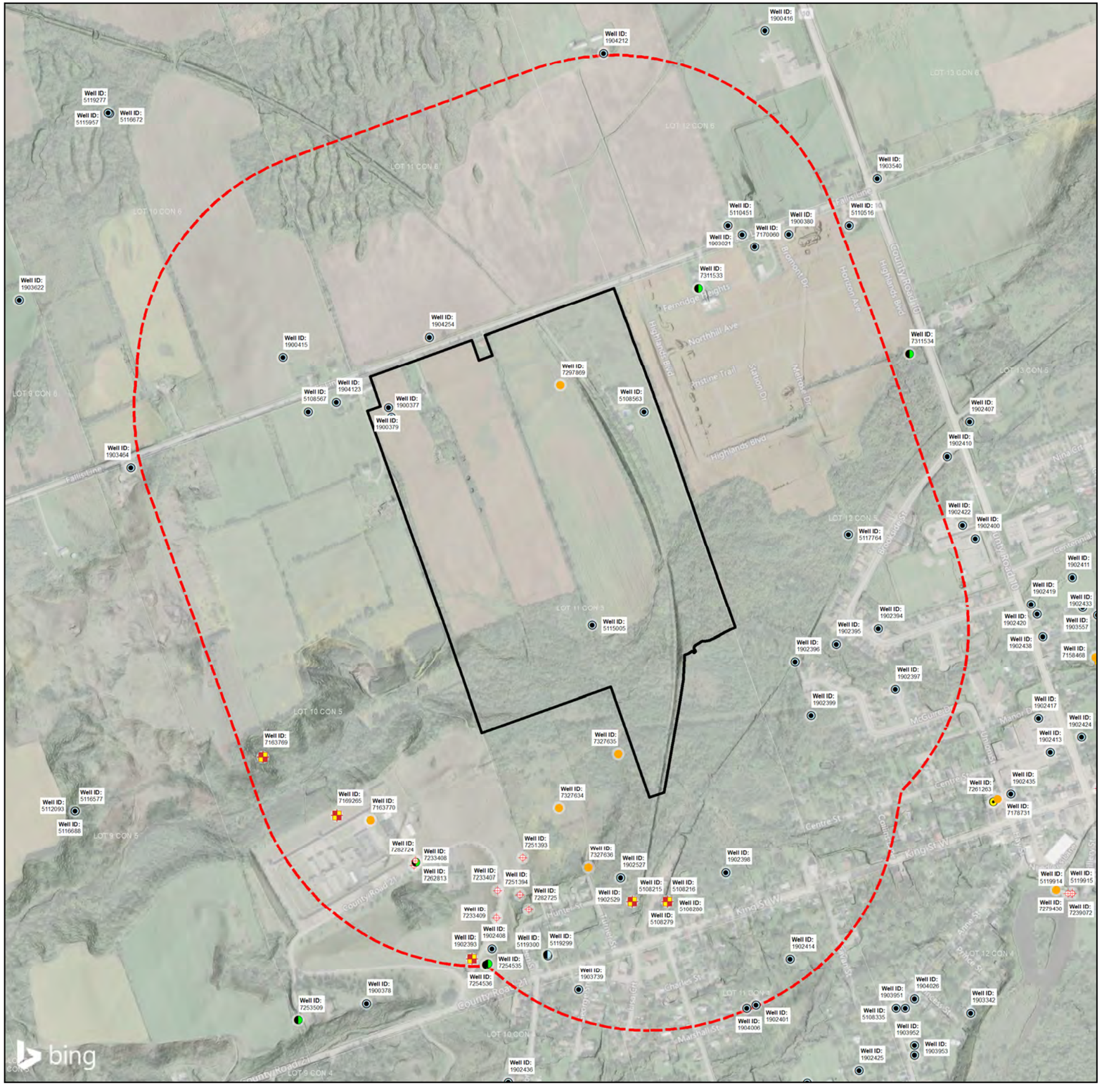
WELL DATA (BH11D-21)

Initial Displacement: 0.5058 m
Total Well Penetration Depth: 6. m
Casing Radius: 0.025 m
Static Water Column Height: 3.51 m
Screen Length: 3. m
Well Radius: 0.025 m
Gravel Pack Porosity: 0.3

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 1.201E-8 m/sec
y0 = 0.4836 m

Appendix D
MECP Well Records and Well Survey



ADMINISTRATIVE BOUNDARIES

- Property Limit
- 500 m Radius
- Municipal, Lower Tier Boundary
- Geographic Lot Boundary

WELL LOCATIONS LEGEND

Ministry of the Environment, Conservation, and Parks (MECP)

- Abandoned Monitoring and Test Hole
- Abandoned-Other
- Abandoned-Quality
- Abandoned-Supply
- Alteration
- Dewatering
- Monitoring and Test Hole
- Observation Wells
- Recharge Well
- Replacement Well
- Test Hole
- Unfinished
- Water Supply
- Other Status
- No Data; Not A Well

Citation(s)

Service Layer Credits: © 2021 Microsoft Corporation © 2021 Maxar ©CNES (2021) Distribution Airbus DS © 2021 TomTom

Water Well Information System (WWIS). Ministry of the Environment, Conservation, and Parks. 2020-07-01.

Map Projection: Transverse Mercator
Horizontal Datum: North American 1983
Grid: NAD 1983 UTM Zone 17N

Paper Size ANSI B

0 125 250 375 500

Meters

N

Data Disclaimer(s)

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GHD

THE BROMONT GROUP
787 & 825 FALLIS LINE, MILLBROOK, ON
TOWNSHIP OF CAVAN-MONAGHAN
COUNTY OF PETERBOROUGH

HYDROGEOLOGY ASSESSMENT

MECP WELL LOCATIONS

Project No. 11224019
Revision No. -
Date Mar 2021

APPENDIX C

Q:\gis2\GIS\PROJECTS\11224000s\11224019\202102_HYG_001\11224019_202102_HYG001_GIS001.mxd
Print date: 16 Feb 2021 - 19:30

WELL RECORD LISTINGS

Ministry of the Environment Conservation & Parks (MECP)

Database Currency: 2020-04-30

Date Accessed: 2021-02-16

Project ID: 11224019 **Office:** Peterborough, ON

Lot:	LOT 11	**Well ID:**	1904006
Con:	CON 4	**Borehole ID:**	10073031
Township:	CAVAN	**Completion Date:**	10/10/1974
County:	PETERBOROUGH	**Received Date:**	1/11/1974
Street:		**Tag:**	
City:		**Audit No:**	
Site:		**Contractor License:**	1572
Elevation:	230.74 *masl.*		
UTM:	17 E 703435 N 4891343 **Long/Lat:** -78.456 , 44.147		

DETAILS

Primary Use: Domestic **Secondary Use:** **Final Status:** Water Supply

Well Depth: 46.6 m **Depth to Bedrock:** 45.7 m **Static Level:** 15. m **Well Type:** Bedrock

Pump Rate: 5 GPM **Boring Method:** Cable Tool

CASING DETAILS / DEPTH IN METERS

Material	Diameter (cm)	Top	-	Bottom
	15.24			45.72

FORMATION DETAILS / DEPTH IN METERS

Colour	Material	Top	-	Bottom
BROWN	TOPSOIL	0.00		1.52
BLUE	CLAY	1.52		35.05
GREY	SAND	35.05		42.67
BLUE	CLAY	42.67		45.72
	LIMESTONE	45.72		46.63

Lot:	LOT 11	**Well ID:**	1902401
Con:	CON 4	**Borehole ID:**	10071463
Township:	CAVAN	**Completion Date:**	5/24/1951
County:	PETERBOROUGH	**Received Date:**	26/09/1951
Street:		**Tag:**	
City:		**Audit No:**	

Site: **Contractor License:** 2116

Elevation: 236.80 *masl.*

UTM: 17 E 703455 N 4891350 **Long/Lat:** -78.456 , 44.147

DETAILS

Primary Use: Domestic **Secondary Use:** **Final Status:** Water Supply

Well Depth: 47.5 m **Depth to Bedrock:** 46.6 m **Static Level:** 2.4 m **Well Type:** Overburden

Pump Rate: GPM **Boring Method:** Cable Tool

CASING DETAILS — DEPTH IN METERS

Material	Diameter (cm)	Top	-	Bottom
STEEL	15.24			24.38

FORMATION DETAILS — DEPTH IN METERS

Colour	Material	Top	-	Bottom
	TOPSOIL	0.00		1.52
BLUE	CLAY	1.52		24.38

Lot: LOT 10 **Well ID:** 1903739

Con: CON 4 **Borehole ID:** 10072777

Township: CAVAN **Completion Date:** 6/5/1973

County: PETERBOROUGH **Received Date:** 8/01/1974

Street: **Tag:**

City: **Audit No:**

Site: **Contractor License:** 2342

Elevation: 236.80 *masl.*

UTM: 17 E 703075 N 4891383 **Long/Lat:** -78.461 , 44.147

DETAILS

Primary Use: Domestic **Secondary Use:** **Final Status:** Water Supply

Well Depth: 24.4 m **Depth to Bedrock:** 0 m **Static Level:** 0 m **Well Type:** Overburden

Pump Rate: GPM **Boring Method:** Cable Tool

CASING DETAILS — DEPTH IN METERS

Material	Diameter (cm)	Top	-	Bottom
STEEL	15.24			24.38

FORMATION DETAILS — DEPTH IN METERS

Colour	Material	Top	-	Bottom
	FILL	0.00		0.30
GREY	CLAY	0.30		41.15
	MEDIUM SAND	41.15		42.67
BLUE	CLAY	42.67		46.02
	LIMESTONE	46.02		46.63

Lot: LOT 11
Con: CON 4
Township: CAVAN
County: PETERBOROUGH
Street:
City:
Site:
Elevation: 220.86 *masl.*
UTM: 17 E 703528 N 4891449 **Long/Lat:** -78.455 , 44.148

Well ID: 1902414
Borehole ID: 10071476
Completion Date: 12/11/1956
Received Date: 28/01/1957
Tag:
Audit No:
Contractor License: 2113

DETAILS

Primary Use: Domestic **Secondary Use:** **Final Status:** Water Supply

Well Depth: 46.6 m **Depth to Bedrock:** 46 m **Static Level:** 3.4 m **Well Type:** Bedrock

Pump Rate: 7 GPM **Boring Method:** Cable Tool

CASING DETAILS / DEPTH IN METERS

Material	Diameter (cm)	Top	-	Bottom
STEEL	12.70			46.02
OPEN HOLE	12.70			46.63

FORMATION DETAILS / DEPTH IN METERS

Colour	Material	Top	-	Bottom
	FILL	0.00		0.30
GREY	CLAY	0.30		41.15
	MEDIUM SAND	41.15		42.67
BLUE	CLAY	42.67		46.02
	LIMESTONE	46.02		46.63

Lot: LOT 10
Con: CON 5

Well ID: 7254536
Borehole ID: 1005840370

Township: CAVAN
County: PETERBOROUGH
Street: 706 COUNTY RD 21
City: MILLBROOK
Site:
Elevation: 247.02 *masl.*
UTM: 17 E 702877 N 4891437 **Long/Lat:** -78.463 , 44.148

Completion Date: 10/15/2015
Received Date: 18/12/2015
Tag:
Audit No: Z215538
Contractor License: 1413

DETAILS

Primary Use: **Secondary Use:** **Final Status:** Abandoned-Other

Well Depth: 0 m **Depth to Bedrock:** 0 m **Static Level:** 0 m **Well Type:**

Pump Rate: GPM **Boring Method:**

CASING DETAILS		DEPTH IN METERS	
Material	**Diameter (cm)**	**Top**	**Bottom**
STEEL	30.48	0.00	19.51

FORMATION DETAILS		DEPTH IN METERS	
Colour	**Material**	**Top**	**Bottom**

Lot: LOT 10
Con: CON 5
Township: CAVAN
County: PETERBOROUGH
Street: 706 COUNTY RD 21
City: MILLBROOK
Site:
Elevation: 247.02 *masl.*
UTM: 17 E 702881 N 4891439 **Long/Lat:** -78.463 , 44.148

Well ID: 7254535
Borehole ID: 1005840367
Completion Date: 10/15/2015
Received Date: 18/12/2015
Tag:
Audit No: Z215538
Contractor License: 1413

DETAILS

Primary Use: **Secondary Use:** **Final Status:** Abandoned-Other

Well Depth: 0 m **Depth to Bedrock:** 0 m **Static Level:** 1.8 m **Well Type:**

Pump Rate: GPM **Boring Method:**

CASING DETAILS	DEPTH IN METERS

Material	Diameter (cm)	Top	-	Bottom
STEEL	5.08			26.52

FORMATION DETAILS		DEPTH IN METERS		
Colour	**Material**	**Top**	-	**Bottom**
	TOPSOIL	0.00		0.30
BROWN	CLAY	0.30		0.91
BLUE	CLAY	0.91		1.52
	GRAVEL	1.52		2.13
	GRAVEL	2.13		3.05
BLUE	CLAY	3.05		6.71
	MEDIUM SAND	6.71		9.75
	CLAY	9.75		16.46
	MEDIUM SAND	16.46		17.37
	BOULDERS	17.37		17.98
	MEDIUM SAND	17.98		18.29
	CLAY	18.29		21.03
	CLAY	21.03		21.64
	MEDIUM SAND	21.64		22.25
	BOULDERS	22.25		24.99
	CLAY	24.99		27.74
	GRAVEL	27.74		29.57
	BOULDERS	29.57		29.87
	CLAY	29.87		30.48

Lot: LOT 10
Con: CON 5
Township: CAVAN
County: PETERBOROUGH
Street:
City:
Site:
Elevation: 249.14 *masl.*
UTM: 17 E 702846 N 4891450 **Long/Lat:** -78.464 , 44.148

Well ID: 1902393
Borehole ID: 10071455
Completion Date: 7/27/1953
Received Date: 26/02/1954
Tag:
Audit No:
Contractor License: 2801

DETAILS

Primary Use: Not Used **Secondary Use:** **Final Status:** Test Hole

Well Depth: 30.5 m **Depth to Bedrock:** 0 m **Static Level:** 1.2 m **Well Type:** Overburden

Pump Rate: 350 GPM **Boring Method:** Rotary (Convent.)

CASING DETAILS		DEPTH IN METERS		
Material	**Diameter (cm)**	**Top**	-	**Bottom**
STEEL	35.56			6.10
STEEL	25.40			25.91

FORMATION DETAILS		DEPTH IN METERS		
Colour	**Material**	**Top**	-	**Bottom**
BLACK	TOPSOIL	0.00		0.61
GREY	CLAY	0.61		1.52
GREY	CLAY	1.52		8.53
BROWN	SAND	8.53		10.06
BROWN	COARSE SAND	10.06		22.56
BROWN	GRAVEL	22.56		32.00
GREY	CLAY	32.00		32.31

Lot: LOT 10
Con: CON 5
Township: CAVAN
County: PETERBOROUGH
Street:
City:
Site:
Elevation: 239.40 *masl.*
UTM: 17 E 703009 N 4891456 **Long/Lat:** -78.462 , 44.148

Well ID: 5119299
Borehole ID: 10540707
Completion Date: 11/21/2002
Received Date: 19/02/2003
Tag:
Audit No: 252383
Contractor License: 2662

DETAILS

Primary Use: Municipal **Secondary Use:** **Final Status:** Water Supply

Well Depth: 32.3 m **Depth to Bedrock:** 0 m **Static Level:** -5.2 m **Well Type:** Overburden

Pump Rate: 350 GPM **Boring Method:** Rotary (Convent.)

CASING DETAILS		DEPTH IN METERS		
Material	**Diameter (cm)**	**Top**	-	**Bottom**
STEEL	35.56			6.10
STEEL	25.40			25.91

FORMATION DETAILS		DEPTH IN METERS	
Colour	**Material**	**Top** -	**Bottom**
BLACK	TOPSOIL	0.00	0.61
GREY	CLAY	0.61	1.52
GREY	CLAY	1.52	7.92
BROWN	SAND	7.92	8.84

Lot: LOT 10
Con: CON 5
Township: CAVAN
County: PETERBOROUGH
Street:
City:
Site:
Elevation: 239.50 *masl.*
UTM: 17 E 703008 N 4891459 **Long/Lat:** -78.462 , 44.148

Well ID: 5119300
Borehole ID: 10540708
Completion Date: 10/15/2002
Received Date: 19/02/2003
Tag:
Audit No: 252384
Contractor License: 2662

DETAILS

Primary Use: **Secondary Use:** **Final Status:** Abandoned-Quality

Well Depth: 8.8 m **Depth to Bedrock:** 0 m **Static Level:** 0 m **Well Type:** Overburden

Pump Rate: **Boring Method:** Rotary (Convent.)

CASING DETAILS		DEPTH IN METERS	
Material	**Diameter (cm)**	**Top** -	**Bottom**

FORMATION DETAILS		DEPTH IN METERS	
Colour	**Material**	**Top** -	**Bottom**
BLACK	TOPSOIL	0.00	0.61
GREY	CLAY	0.61	1.52
GREY	CLAY	1.52	7.92
BROWN	SAND	7.92	8.84

Lot: LOT 10
Con: CON 5
Township: CAVAN
County: PETERBOROUGH
Street:
City:

Well ID: 1902408
Borehole ID: 10071470
Completion Date: 7/1/1955
Received Date: 8/08/1955
Tag:
Audit No:

Site: **Contractor License:** 2415

Elevation: 253.39 *masl.*

UTM: 17 E 702889 N 4891471 **Long/Lat:** -78.463 , 44.148

DETAILS

Primary Use: Monitoring and Te Hole **Secondary Use:** **Final Status:** Observation Wells

Well Depth: 29.9 m **Depth to Bedrock:** 0 m **Static Level:** 1.8 m **Well Type:**

Pump Rate: **Boring Method:** Auger

CASING DETAILS — DEPTH IN METERS

Material	Diameter (cm)	Top	-	Bottom
PLASTIC	5.08	0.00		14.22

FORMATION DETAILS — DEPTH IN METERS

Colour	Material	Top	-	Bottom
BROWN	SAND	0.00		3.05
BROWN	SILT	3.05		8.23
GREY	CLAY	8.23		12.50
GREY	SAND	12.50		17.88

Lot: LOT 10 **Well ID:** 7233409

Con: CON 5 **Borehole ID:** 1005282633

Township: CAVAN **Completion Date:** 11/19/2014

County: PETERBOROUGH **Received Date:** 12/12/2014

Street: HIGHWAY 21 WEST OF QUEENS ST. **Tag:** A169899

City: MILLBROOK **Audit No:** Z188646

Site: **Contractor License:** 7238

Elevation: 253.39 *masl.*

UTM: 17 E 702899 N 4891537 **Long/Lat:** -78.463 , 44.149

DETAILS

Primary Use: Monitoring and Te Hole **Secondary Use:** **Final Status:** Observation Wells

Well Depth: 17.9 m **Depth to Bedrock:** 0 m **Static Level:** 0 m **Well Type:**

Pump Rate: **Boring Method:** Auger

CASING DETAILS — DEPTH IN METERS

Material	Diameter (cm)	Top	-	Bottom
PLASTIC	5.08	0.00		14.22

FORMATION DETAILS		DEPTH IN METERS		
Colour	**Material**	**Top**	-	**Bottom**
	SAND	0.00		6.10
	SAND	6.10		9.14
	FINE SAND	9.14		17.68
	CLAY	17.68		19.51
	CLAY	19.51		22.86
	SAND	22.86		39.62
	SAND	39.62		44.50
	CLAY	44.50		44.81

Lot: LOT 10
Con: CON 5
Township: CAVAN
County: PETERBOROUGH
Street: 706 COUNTY RD 21
City: MILLBROOK
Site:
Elevation: 247.58 *masl.*
UTM: 17 E 702968 N 4891555 **Long/Lat:** -78.462 , 44.149

Well ID: 7282725
Borehole ID: 1006364070
Completion Date: 2/27/2017
Received Date: 8/03/2017
Tag: A213571
Audit No: Z252010
Contractor License: 7238

DETAILS

Primary Use: Monitoring **Secondary Use:** **Final Status:** Observation Wells

Well Depth: 44.8 m **Depth to Bedrock:** 0 m **Static Level:** 0 m **Well Type:**

Pump Rate: **Boring Method:**

CASING DETAILS		DEPTH IN METERS		
Material	**Diameter (cm)**	**Top**	-	**Bottom**
PLASTIC	2.54	0.00		31.70
PLASTIC	2.54	0.00		41.45

FORMATION DETAILS		DEPTH IN METERS		
Colour	**Material**	**Top**	-	**Bottom**
	SAND	0.00		6.10
	SAND	6.10		9.14
	FINE SAND	9.14		17.68

CLAY	17.68	19.51
CLAY	19.51	22.86
SAND	22.86	39.62
SAND	39.62	44.50
CLAY	44.50	44.81

Lot: LOT 11 **Well ID:** 5108216
Con: CON 5 **Borehole ID:** 10336350
Township: CAVAN **Completion Date:** 6/1/1976
County: PETERBOROUGH **Received Date:** 6/10/1976
Street: **Tag:**
City: **Audit No:**
Site: **Contractor License:** 2517
Elevation: 231.98 *masl.*
UTM: 17 E 703265 N 4891573 **Long/Lat:** -78.458 , 44.149

DETAILS

Primary Use: Municipal **Secondary Use:** **Final Status:** Water Supply

Well Depth: 33.5 m **Depth to Bedrock:** 0 m **Static Level:** 0 m **Well Type:** Overburden

Pump Rate: 300 GPM **Boring Method:** Cable Tool

CASING DETAILS / DEPTH IN METERS

Material	Diameter (cm)	Top	-	Bottom
STEEL	25.40			26.82

FORMATION DETAILS / DEPTH IN METERS

Colour	Material	Top	-	Bottom
GREY	CLAY	0.00		9.14
GREY	CLAY	9.14		16.15
BROWN	SAND	16.15		17.07
BROWN	GRAVEL	17.07		32.92
BROWN	CLAY	32.92		33.53

Lot: LOT 11 **Well ID:** 5108280
Con: CON 5 **Borehole ID:** 10336414
Township: CAVAN **Completion Date:** 4/1/1976
County: PETERBOROUGH **Received Date:** 10/12/1976
Street: **Tag:**

City: **Audit No:**

Site: **Contractor License:** 2517

Elevation: 231.98 *masl.*

UTM: 17 E 703265 N 4891573 **Long/Lat:** -78.458 , 44.149

DETAILS

Primary Use: Municipal **Secondary Use:** **Final Status:** Water Supply

Well Depth: 31.1 m **Depth to Bedrock:** 0 m **Static Level:** -6.1 m **Well Type:** Overburden

Pump Rate: 300 GPM **Boring Method:** Cable Tool

CASING DETAILS — DEPTH IN METERS

Material	Diameter (cm)	Top	-	Bottom
STEEL	25.40			27.43

FORMATION DETAILS — DEPTH IN METERS

Colour	Material	Top	-	Bottom
GREY	CLAY	0.00		8.53
GREY	CLAY	8.53		16.76
BROWN	GRAVEL	16.76		32.00

Lot: LOT 11 **Well ID:** 5108215

Con: CON 5 **Borehole ID:** 10336349

Township: CAVAN **Completion Date:** 6/1/1976

County: PETERBOROUGH **Received Date:** 6/10/1976

Street: **Tag:**

City: **Audit No:**

Site: **Contractor License:** 2517

Elevation: 231.98 *masl.*

UTM: 17 E 703265 N 4891573 **Long/Lat:** -78.458 , 44.149

DETAILS

Primary Use: Municipal **Secondary Use:** **Final Status:** Water Supply

Well Depth: 32 m **Depth to Bedrock:** 0 m **Static Level:** -4.9 m **Well Type:** Overburden

Pump Rate: 300 GPM **Boring Method:** Cable Tool

CASING DETAILS — DEPTH IN METERS

Material	Diameter (cm)	Top	-	Bottom
STEEL	25.40			27.43

FORMATION DETAILS		DEPTH IN METERS		
Colour	**Material**	**Top**	-	**Bottom**
GREY	CLAY	0.00		8.84
GREY	CLAY	8.84		10.97
BROWN	CLAY	10.97		14.02
BROWN	FINE SAND	14.02		18.29
BROWN	GRAVEL	18.29		22.56
BROWN	FINE SAND	22.56		23.77
BROWN	GRAVEL	23.77		33.83

Lot: LOT 11
Con: CON 5
Township: CAVAN
County: PETERBOROUGH
Street:
City:
Site:
Elevation: 231.98 *masl.*
UTM: 17 E 703265 N 4891573 **Long/Lat:** -78.458 , 44.149

Well ID: 5108279
Borehole ID: 10336413
Completion Date: 5/1/1976
Received Date: 10/12/1976
Tag:
Audit No:
Contractor License: 2517

DETAILS

Primary Use: Not Used **Secondary Use:** Municipal **Final Status:** Test Hole

Well Depth: 33.8 m **Depth to Bedrock:** 0 m **Static Level:** -4.5 m **Well Type:** Overburden

Pump Rate: 170 GPM **Boring Method:** Cable Tool

CASING DETAILS		DEPTH IN METERS		
Material	**Diameter (cm)**	**Top**	-	**Bottom**
CONCRETE	33.02			7.62
STEEL	20.32			7.92

FORMATION DETAILS		DEPTH IN METERS		
Colour	**Material**	**Top**	-	**Bottom**
GREY	CLAY	0.00		8.84
GREY	CLAY	8.84		10.97
BROWN	CLAY	10.97		14.02
BROWN	FINE SAND	14.02		18.29
BROWN	GRAVEL	18.29		22.56

BROWN	FINE SAND	22.56	23.77
BROWN	GRAVEL	23.77	33.83

Lot: LOT 11
Con: CON 5
Township: CAVAN
County: PETERBOROUGH
Street:
City:
Site:
Elevation: 233.66 *masl.*
UTM: 17 E 703190 N 4891573 **Long/Lat:** -78.459 , 44.149

Well ID: 1902529
Borehole ID: 10071590
Completion Date: 2/23/1968
Received Date: 16/04/1968
Tag:
Audit No:
Contractor License: 2801

DETAILS

Primary Use: Not Used **Secondary Use:** **Final Status:** Test Hole

Well Depth: 36 m **Depth to Bedrock:** 0 m **Static Level:** -7 m **Well Type:** Overburden

Pump Rate: GPM **Boring Method:** Cable Tool

CASING DETAILS / DEPTH IN METERS

Material	Diameter (cm)	Top	-	Bottom
	5.08			

FORMATION DETAILS / DEPTH IN METERS

Colour	Material	Top	-	Bottom
	TOPSOIL	0.00		0.30
	GRAVEL	0.30		3.66
	CLAY	3.66		20.12
	CLAY	20.12		22.56
	FINE SAND	22.56		23.77
	CLAY	23.77		25.91
	FINE SAND	25.91		30.78
	MEDIUM SAND	30.78		31.70
	CLAY	31.70		35.97

Lot: LOT 10
Con: CON 5
Township: CAVAN
County: PETERBOROUGH

Well ID: 7251394
Borehole ID: 1005775621
Completion Date: 7/14/2015
Received Date: 2/11/2015

Street: PETERBOROUGH COUNTY RD WEST OF QUEEN
Tag: A169898
City: MILLBROOK
Audit No: Z188641
Site:
Contractor License: 7238
Elevation: 257.18 *masl.*
UTM: 17 E 702949 N 4891587 **Long/Lat:** -78.462 , 44.149

DETAILS

Primary Use: Monitoring and Te Hole
Secondary Use:
Final Status: Observation Wells
Well Depth: 0 m **Depth to Bedrock:** 0 m **Static Level:** 0 m **Well Type:**
Pump Rate: **Boring Method:** Auger

CASING DETAILS		DEPTH IN METERS	
Material	**Diameter (cm)**	**Top**	**Bottom**
PLASTIC	5.08	0.00	23.47

FORMATION DETAILS		DEPTH IN METERS	
Colour	**Material**	**Top**	**Bottom**
BROWN	SAND	0.00	9.14
BROWN	SILT	9.14	14.63
GREY	CLAY	14.63	21.95
GREY	SAND	21.95	26.82

Lot: LOT 10
Well ID: 7233407
Con: CON 5
Borehole ID: 1005282621
Township: CAVAN
Completion Date: 11/19/2014
County: PETERBOROUGH
Received Date: 12/12/2014
Street: HIGHWAY 21 WEST OF QUEEN ST.
Tag: A169898
City: MILLBROOK
Audit No: Z188641
Site:
Contractor License: 7238
Elevation: 257.18 *masl.*
UTM: 17 E 702901 N 4891596 **Long/Lat:** -78.463 , 44.149

DETAILS

Primary Use: Monitoring and Te Hole
Secondary Use:
Final Status: Observation Wells
Well Depth: 26.8 m **Depth to Bedrock:** 0 m **Static Level:** 0 m **Well Type:**
Pump Rate: **Boring Method:** Auger

CASING DETAILS	DEPTH IN METERS

Material	Diameter (cm)	Top	-	Bottom
	5.08			

FORMATION DETAILS		DEPTH IN METERS		
Colour	Material	Top	-	Bottom
	TOPSOIL	0.00		0.30
	GRAVEL	0.30		3.35
	MEDIUM SAND	3.35		13.72
	BOULDERS	13.72		14.02
	CLAY	14.02		19.20
	CLAY	19.20		22.25
	FINE SAND	22.25		24.69
	GRAVEL	24.69		27.74
	FINE SAND	27.74		28.96
	MEDIUM SAND	28.96		31.09
	CLAY	31.09		32.61
	CLAY	32.61		35.97
	CLAY	35.97		36.58
	CLAY	36.58		38.10
	CLAY	38.10		44.50
	FINE SAND	44.50		47.85
	CLAY	47.85		48.77
	CLAY	48.77		49.38
	SHALE	49.38		49.99

Lot: LOT 11
Con: CON 5
Township: CAVAN
County: PETERBOROUGH
Street:
City:
Site:
Elevation: 236.50 *masl.*
UTM: 17 E 703165 N 4891623 **Long/Lat:** -78.460 , 44.150

Well ID: 1902527
Borehole ID: 10071589
Completion Date: 2/14/1968
Received Date: 16/04/1968
Tag:
Audit No:
Contractor License: 2801

DETAILS

Primary Use: Domestic **Secondary Use:** **Final Status:** Water Supply

Well Depth: 50 m **Depth to Bedrock:** 48.8 m **Static Level:** -7 m **Well Type:** Bedrock

Pump Rate: 280 GPM **Boring Method:** Cable Tool

CASING DETAILS		DEPTH IN METERS	
Material	**Diameter (cm)**	**Top** -	**Bottom**
STEEL	55.88		19.51

FORMATION DETAILS		DEPTH IN METERS	
Colour	**Material**	**Top** -	**Bottom**
	TOPSOIL	0.00	0.61
	CLAY	0.61	1.83
	MEDIUM SAND	1.83	8.53
GREY	CLAY	8.53	9.75
	COARSE SAND	9.75	15.24
	MEDIUM SAND	15.24	18.59
	GRAVEL	18.59	22.25
	CLAY	22.25	23.77

Lot: LOT 11 **Well ID:** 1902398
Con: CON 5 **Borehole ID:** 10071460
Township: CAVAN **Completion Date:** 7/15/1955
County: PETERBOROUGH **Received Date:** 8/08/1955
Street: **Tag:**
City: **Audit No:**
Site: **Contractor License:** 2415
Elevation: 228.70 *masl.*
UTM: 17 E 703390 N 4891634 **Long/Lat:** -78.457 , 44.150

DETAILS

Primary Use: Public **Secondary Use:** **Final Status:** Water Supply

Well Depth: 23.8 m **Depth to Bedrock:** 0 m **Static Level:** 1.8 m **Well Type:** Overburden

Pump Rate: 280 GPM **Boring Method:** Cable Tool

CASING DETAILS		DEPTH IN METERS	
Material	**Diameter (cm)**	**Top** -	**Bottom**
STEEL	55.88		19.51

FORMATION DETAILS	DEPTH IN METERS

Colour	Material	Top	-	Bottom
BROWN	SAND	0.00		0.30
BROWN	SAND	0.30		1.52
BROWN	SAND	1.52		3.05
BROWN	SAND	3.05		4.57

Lot: LOT 11
Con: CON 5
Township: CAVAN
County: PETERBOROUGH
Street: TURNER ST
City: MILLBROOK
Site:
Elevation: *masl.*
UTM: 17 E 703096 N 4891645 **Long/Lat:** -78.460 , 44.150

Well ID: 7327636
Borehole ID: 1007364151
Completion Date: <null>
Received Date: 24/01/2019
Tag: A253291
Audit No: Z293831
Contractor License: 7654

DETAILS

Primary Use: Test Hole **Secondary Use:** Monitoring **Final Status:**

Well Depth: 4.6 m **Depth to Bedrock:** 0 m **Static Level:** 0 m **Well Type:**

Pump Rate: **Boring Method:** Rotary (Convent.)

CASING DETAILS / DEPTH IN METERS

Material	Diameter (cm)	Top	-	Bottom
PLASTIC	5.08	0.00		3.05

FORMATION DETAILS / DEPTH IN METERS

Colour	Material	Top	-	Bottom
BROWN	SAND	0.00		0.30
BROWN	SAND	0.30		1.52
BROWN	SAND	1.52		3.05
BROWN	SAND	3.05		4.57

Lot: LOT 10
Con: CON 5
Township: CAVAN
County: PETERBOROUGH
Street: HIGHWAY 21 WEST OF QUEEN ST.
City: MILLBROOK

Well ID: 7233408
Borehole ID: 1005282627
Completion Date: 11/19/2014
Received Date: 12/12/2014
Tag: A169910
Audit No: Z188647

Site: **Contractor License:** 7238

Elevation: 273.54 *masl.*

UTM: 17 E 702722 N 4891649 **Long/Lat:** -78.465 , 44.150

DETAILS

Primary Use: Monitoring **Secondary Use:** **Final Status:** Abandoned-Other

Well Depth: 30.5 m **Depth to Bedrock:** 0 m **Static Level:** 0 m **Well Type:**

Pump Rate: **Boring Method:**

CASING DETAILS		DEPTH IN METERS		
Material	**Diameter (cm)**	**Top**	-	**Bottom**

FORMATION DETAILS		DEPTH IN METERS		
Colour	**Material**	**Top**	-	**Bottom**

Lot: LOT 10 **Well ID:** 7282724

Con: CON 5 **Borehole ID:** 1006364067

Township: CAVAN **Completion Date:** 2/24/2017

County: PETERBOROUGH **Received Date:** 8/03/2017

Street: 706 COUNTY RD 21 **Tag:**

City: MILLBROOK **Audit No:** Z252009

Site: **Contractor License:** 7238

Elevation: 273.54 *masl.*

UTM: 17 E 702726 N 4891656 **Long/Lat:** -78.465 , 44.150

DETAILS

Primary Use: Monitoring **Secondary Use:** **Final Status:** Abandoned-Other

Well Depth: 0 m **Depth to Bedrock:** 0 m **Static Level:** 0 m **Well Type:**

Pump Rate: **Boring Method:**

CASING DETAILS		DEPTH IN METERS		
Material	**Diameter (cm)**	**Top**	-	**Bottom**

FORMATION DETAILS	DEPTH IN METERS

Colour	Material	Top	-	Bottom

Lot: LOT 10
Con: CON 5
Township: CAVAN
County: PETERBOROUGH
Street: PETERBOROUGH COUNTY RD 21 WEST OF QUEEN
City: MILLBROOK
Site:
Elevation: 260.21 *masl.*
UTM: 17 E 702955 N 4891666 **Long/Lat:** -78.462 , 44.150

Well ID: 7251393
Borehole ID: 1005775618
Completion Date: 7/21/2015
Received Date: 2/11/2015
Tag: A185307
Audit No: Z217111
Contractor License: 7238

DETAILS

Primary Use: Monitoring **Secondary Use:** **Final Status:** Observation Wells

Well Depth: 0 m **Depth to Bedrock:** 0 m **Static Level:** 0 m **Well Type:**

Pump Rate: **Boring Method:**

CASING DETAILS | DEPTH IN METERS

Material	Diameter (cm)	Top	-	Bottom

FORMATION DETAILS | DEPTH IN METERS

Colour	Material	Top	-	Bottom

Lot: LOT 10
Con: CON 5
Township: CAVAN
County: PETERBOROUGH
Street: 706 PETERBOROUGH COUNTY RD 21
City: MILLBROOK
Site:
Elevation: 273.53 *masl.*
UTM: 17 E 702725 N 4891659 **Long/Lat:** -78.465 , 44.150

Well ID: 7262813
Borehole ID: 1005973779
Completion Date: 1/8/2016
Received Date: 9/05/2016
Tag: A185375
Audit No: Z217191
Contractor License: 7238

DETAILS

Primary Use: Monitoring and Te Hole **Secondary Use:** **Final Status:**

Well Depth: 0 m **Depth to Bedrock:** 0 m **Static Level:** 0 m **Well Type:**

Pump Rate: **Boring Method:** Rotary (Convent.)

CASING DETAILS		DEPTH IN METERS	
Material	**Diameter (cm)**	**Top**	**Bottom**
PLASTIC	4.03	0.00	17.98

FORMATION DETAILS		DEPTH IN METERS	
Colour	**Material**	**Top**	**Bottom**
BROWN	FINE SAND	0.00	1.86
BROWN	FINE SAND	1.86	4.65
BROWN	FINE SAND	4.65	6.13

Lot: LOT 10
Con: CON 5
Township: CAVAN
County: PETERBOROUGH
Street: 706 CR-21
City: MILLBROOK
Site:
Elevation: 273.73 *masl.*
UTM: 17 E 702629 N 4891747 **Long/Lat:** -78.466 , 44.151

Well ID: 7163770
Borehole ID: 1003516576
Completion Date: 4/25/2011
Received Date: 2/06/2011
Tag: A115631
Audit No: Z131001
Contractor License: 7241

DETAILS

Primary Use: Monitoring and Te Hole **Secondary Use:** **Final Status:**

Well Depth: 20.1 m **Depth to Bedrock:** 0 m **Static Level:** 0 m **Well Type:**

Pump Rate: **Boring Method:** Rotary (Convent.)

CASING DETAILS		DEPTH IN METERS	
Material	**Diameter (cm)**	**Top**	**Bottom**
PLASTIC	4.03	0.00	17.98

FORMATION DETAILS		DEPTH IN METERS	
Colour	**Material**	**Top**	**Bottom**
BROWN	FINE SAND	0.00	1.86
BROWN	FINE SAND	1.86	4.65

BROWN	FINE SAND	4.65	6.13

Lot: LOT 10
Con: CON 5
Township: CAVAN
County: PETERBOROUGH
Street: 706 COUNTY RD. 21
City:
Site:
Elevation: 266.27 *masl.*
UTM: 17 E 702557 N 4891757 **Long/Lat:** -78.467 , 44.151

Well ID: 7169265
Borehole ID: 1003571406
Completion Date: 8/22/2011
Received Date: 28/09/2011
Tag: A120751
Audit No: Z136603
Contractor License: 7247

DETAILS

Primary Use: Test Hole **Secondary Use:** **Final Status:** Test Hole

Well Depth: 29 m **Depth to Bedrock:** 0 m **Static Level:** 0 m **Well Type:**

Pump Rate: **Boring Method:** Rotary (Convent.)

CASING DETAILS / **DEPTH IN METERS**

Material	Diameter (cm)	Top	-	Bottom
	5.08	0.00		27.43

FORMATION DETAILS / **DEPTH IN METERS**

Colour	Material	Top	-	Bottom
BROWN	SAND	0.00		1.52
BROWN	SAND	1.52		27.43
BROWN	SAND	27.43		28.96

Lot: LOT 11
Con: CON 5
Township: CAVAN
County: PETERBOROUGH
Street: TURNER ST
City: MILLBROOK
Site:
Elevation: *masl.*
UTM: 17 E 703033 N 4891773 **Long/Lat:** -78.461 , 44.151

Well ID: 7327634
Borehole ID: 1007364145
Completion Date: <null>
Received Date: 24/01/2019
Tag: A253290
Audit No: Z293832
Contractor License: 7654

DETAILS

Primary Use: Test Hole **Secondary Use:** Monitoring **Final Status:**

Well Depth: 8.4 m **Depth to Bedrock:** 0 m **Static Level:** 0 m **Well Type:**

Pump Rate: **Boring Method:** Rotary (Convent.)

CASING DETAILS		DEPTH IN METERS	
Material	**Diameter (cm)**	**Top** -	**Bottom**
PLASTIC	5.08	0.00	3.05

FORMATION DETAILS		DEPTH IN METERS	
Colour	**Material**	**Top** -	**Bottom**
BROWN	SAND	0.00	0.30
BROWN	SAND	0.30	1.52
BROWN	SAND	1.52	3.05
BROWN	SAND	3.05	4.57

Lot: LOT 11
Con: CON 5
Township: CAVAN
County: PETERBOROUGH
Street: TURNER ST
City: MILLBROOK
Site:
Elevation: *masl.*
UTM: 17 E 703160 N 4891889 **Long/Lat:** -78.460 , 44.152

Well ID: 7327635
Borehole ID: 1007364148
Completion Date: <null>
Received Date: 24/01/2019
Tag: A253289
Audit No: Z293833
Contractor License: 7654

DETAILS

Primary Use: Test Hole **Secondary Use:** Monitoring **Final Status:**

Well Depth: 4.6 m **Depth to Bedrock:** 0 m **Static Level:** 0 m **Well Type:**

Pump Rate: **Boring Method:** Rotary (Convent.)

CASING DETAILS		DEPTH IN METERS	
Material	**Diameter (cm)**	**Top** -	**Bottom**
PLASTIC	5.08	0.00	3.05

FORMATION DETAILS		DEPTH IN METERS	
Colour	**Material**	**Top** -	**Bottom**
BROWN	SAND	0.00	0.30

BROWN	SAND	0.30	1.52
BROWN	SAND	1.52	3.05
BROWN	SAND	3.05	4.57

Lot: LOT 10
Con: CON 5
Township: CAVAN
County: PETERBOROUGH
Street: 706 CR-21
City: MILLBROOK
Site:
Elevation: 269.64 *masl.*
UTM: 17 E 702398 N 4891882 **Long/Lat:** -78.469 , 44.152

Well ID: 7163769
Borehole ID: 1003516574
Completion Date: 4/20/2011
Received Date: 2/06/2011
Tag: A102983
Audit No: Z111747
Contractor License: 7241

DETAILS

Primary Use: Monitoring and Te Hole
Secondary Use:
Final Status: Test Hole
Well Depth: 13.4 m
Depth to Bedrock: 0 m
Static Level: 0 m
Well Type:
Pump Rate:
Boring Method: Rotary (Convent.)

CASING DETAILS / **DEPTH IN METERS**

Material	Diameter (cm)	Top	-	Bottom
PLASTIC	4.03	0.00		11.80

FORMATION DETAILS / **DEPTH IN METERS**

Colour	Material	Top	-	Bottom
BROWN	FINE SAND	0.00		1.86
BROWN	FINE SAND	1.86		3.28
BROWN	FINE SAND	3.28		4.08

Lot: LOT 12
Con: CON 5
Township: CAVAN
County: PETERBOROUGH
Street:
City:
Site:
Elevation: 224.32 *masl.*
UTM: 17 E 703573 N 4891971 **Long/Lat:** -78.454 , 44.153

Well ID: 1902399
Borehole ID: 10071461
Completion Date: 7/6/1955
Received Date: 24/08/1955
Tag:
Audit No:
Contractor License: 2415

DETAILS

Primary Use: Public **Secondary Use:** **Final Status:** Water Supply

Well Depth: 17.7 m **Depth to Bedrock:** 0 m **Static Level:** 14. m **Well Type:** Overburden

Pump Rate: 5 GPM **Boring Method:** Cable Tool

CASING DETAILS — DEPTH IN METERS

Material	Diameter (cm)	Top	-	Bottom
STEEL	12.70			64.92

FORMATION DETAILS — DEPTH IN METERS

Colour	Material	Top	-	Bottom
	BOULDERS	0.00		25.91
	FINE SAND	25.91		54.86
	COARSE SAND	54.86		66.45

Lot: LOT 12 **Well ID:** 1902397
Con: CON 5 **Borehole ID:** 10071459
Township: CAVAN **Completion Date:** 7/13/1955
County: PETERBOROUGH **Received Date:** 6/09/1956
Street: **Tag:**
City: **Audit No:**
Site: **Contractor License:** 2415
Elevation: 219.90 *masl.*
UTM: 17 E 703754 N 4892027 **Long/Lat:** -78.452 , 44.153

DETAILS

Primary Use: Public **Secondary Use:** **Final Status:** Water Supply

Well Depth: 66.5 m **Depth to Bedrock:** 0 m **Static Level:** 30. m **Well Type:** Overburden

Pump Rate: 5 GPM **Boring Method:** Cable Tool

CASING DETAILS — DEPTH IN METERS

Material	Diameter (cm)	Top	-	Bottom
STEEL	12.70			64.92

FORMATION DETAILS — DEPTH IN METERS

Colour	Material	Top	-	Bottom
	BOULDERS	0.00		25.91

	FINE SAND	25.91	54.86
	COARSE SAND	54.86	66.45

Lot: LOT 12
Con: CON 5
Township: CAVAN
County: PETERBOROUGH
Street:
City:
Site:
Elevation: 228.40 *masl.*
UTM: 17 E 703539 N 4892087 **Long/Lat:** -78.455 , 44.154

Well ID: 1902396
Borehole ID: 10071458
Completion Date: 7/15/1955
Received Date: 24/08/1955
Tag:
Audit No:
Contractor License: 2415

DETAILS

Primary Use: Public **Secondary Use:** **Final Status:** Water Supply

Well Depth: 62.5 m **Depth to Bedrock:** 0 m **Static Level:** 28. m **Well Type:** Overburden

Pump Rate: 6 GPM **Boring Method:** Cable Tool

CASING DETAILS / DEPTH IN METERS

Material	Diameter (cm)	Top	-	Bottom
STEEL	10.16			60.96

FORMATION DETAILS / DEPTH IN METERS

Colour	Material	Top	-	Bottom
	BOULDERS	0.00		25.91
	FINE SAND	25.91		54.86
	COARSE SAND	54.86		62.48

Lot: LOT 12
Con: CON 5
Township: CAVAN
County: PETERBOROUGH
Street:
City:
Site:
Elevation: 222.66 *masl.*
UTM: 17 E 703627 N 4892124 **Long/Lat:** -78.454 , 44.154

Well ID: 1902395
Borehole ID: 10071457
Completion Date: 7/14/1955
Received Date: 24/08/1955
Tag:
Audit No:
Contractor License: 2415

DETAILS

Primary Use: Public **Secondary Use:** **Final Status:** Water Supply

Well Depth: 42.7 m **Depth to Bedrock:** 0 m **Static Level:** 29. m **Well Type:** Overburden

Pump Rate: 60 GPM **Boring Method:** Cable Tool

CASING DETAILS		DEPTH IN METERS	
Material	**Diameter (cm)**	**Top** -	**Bottom**
STEEL	12.70		65.53

FORMATION DETAILS		DEPTH IN METERS	
Colour	**Material**	**Top** -	**Bottom**
	BOULDERS	0.00	27.43
	FINE SAND	27.43	56.39
	COARSE SAND	56.39	67.97

Lot: LOT 12 **Well ID:** 1902394
Con: CON 5 **Borehole ID:** 10071456
Township: CAVAN **Completion Date:** 7/20/1955
County: PETERBOROUGH **Received Date:** 24/08/1955
Street: **Tag:**
City: **Audit No:**
Site: **Contractor License:** 2415
Elevation: 222.76 *masl.*
UTM: 17 E 703717 N 4892157 **Long/Lat:** -78.452 , 44.154

DETAILS

Primary Use: Public **Secondary Use:** **Final Status:** Water Supply

Well Depth: 68 m **Depth to Bedrock:** 0 m **Static Level:** 29. m **Well Type:** Overburden

Pump Rate: 60 GPM **Boring Method:** Cable Tool

CASING DETAILS		DEPTH IN METERS	
Material	**Diameter (cm)**	**Top** -	**Bottom**
STEEL	12.70		65.53

FORMATION DETAILS		DEPTH IN METERS	
Colour	**Material**	**Top** -	**Bottom**
	BOULDERS	0.00	27.43
	FINE SAND	27.43	56.39

	COARSE SAND	56.39	67.97

Lot: LOT 11
Con: CON 5
Township: CAVAN
County: PETERBOROUGH
Street:
City:
Site:
Elevation: 246.83 *masl.*
UTM: 17 E 703104 N 4892165 **Long/Lat:** -78.460 , 44.154

Well ID: 5115005
Borehole ID: 10343049
Completion Date: 9/13/1990
Received Date: 10/12/1990
Tag:
Audit No: 76225
Contractor License: 4332

DETAILS

Primary Use: Domestic **Secondary Use:** **Final Status:** Water Supply

Well Depth: 32 m **Depth to Bedrock:** 0.3 m **Static Level:** 0 m **Well Type:** Bedrock

Pump Rate: 7 GPM **Boring Method:** Cable Tool

CASING DETAILS / DEPTH IN METERS

Material	Diameter (cm)	Top	-	Bottom
STEEL	15.24			13.11
STEEL	12.70			32.00

FORMATION DETAILS / DEPTH IN METERS

Colour	Material	Top	-	Bottom
	TOPSOIL	0.00		0.30
BROWN	CLAY	0.30		3.66
GREY	CLAY	3.66		23.16
GREY	CLAY	23.16		32.00

Lot: LOT 12
Con: CON 5
Township: CAVAN
County: PETERBOROUGH
Street:
City:
Site:
Elevation: 226.84 *masl.*
UTM: 17 E 703653 N 4892360 **Long/Lat:** -78.453 , 44.156

Well ID: 5117764
Borehole ID: 10345793
Completion Date: 4/9/1998
Received Date: 17/04/1998
Tag:
Audit No: 186950
Contractor License: 2104

DETAILS

Primary Use: Domestic **Secondary Use:** **Final Status:** Water Supply

Well Depth: 71 m **Depth to Bedrock:** 65.2 m **Static Level:** 30. m **Well Type:** Overburden

Pump Rate: 7 GPM **Boring Method:** Cable Tool

CASING DETAILS		DEPTH IN METERS	
Material	**Diameter (cm)**	**Top** -	**Bottom**
STEEL	15.24		18.59

FORMATION DETAILS		DEPTH IN METERS	
Colour	**Material**	**Top** -	**Bottom**
	TOPSOIL	0.00	0.30
BROWN	CLAY	0.30	13.72
	SAND	13.72	14.63
	COARSE SAND	14.63	19.81

Lot: LOT 11 **Well ID:** 5108563
Con: CON 5 **Borehole ID:** 10336694
Township: CAVAN **Completion Date:** 6/29/1976
County: PETERBOROUGH **Received Date:** 31/08/1977
Street: **Tag:**
City: **Audit No:**
Site: **Contractor License:** 1904
Elevation: 251.06 *masl.*
UTM: 17 E 703215 N 4892623 **Long/Lat:** -78.459 , 44.159

DETAILS

Primary Use: Domestic **Secondary Use:** **Final Status:** Water Supply

Well Depth: 19.8 m **Depth to Bedrock:** 0 m **Static Level:** 9.8 m **Well Type:** Overburden

Pump Rate: 7 GPM **Boring Method:** Cable Tool

CASING DETAILS		DEPTH IN METERS	
Material	**Diameter (cm)**	**Top** -	**Bottom**
STEEL	15.24		18.59

FORMATION DETAILS		DEPTH IN METERS	
Colour	**Material**	**Top** -	**Bottom**

	TOPSOIL	0.00	0.30
BROWN	CLAY	0.30	13.72
	SAND	13.72	14.63
	COARSE SAND	14.63	19.81

Lot: LOT 11
Con: CON 5
Township: CAVAN
County: PETERBOROUGH
Street:
City:
Site:
Elevation: 261.63 *masl.*
UTM: 17 E 702673 N 4892611 **Long/Lat:** -78.465 , 44.159

Well ID: 1900377
Borehole ID: 10069445
Completion Date: 10/19/1951
Received Date: 22/01/1952
Tag:
Audit No:
Contractor License: 2116

DETAILS

Primary Use: Livestock **Secondary Use:** Domestic **Final Status:** Water Supply

Well Depth: 38.1 m **Depth to Bedrock:** 0 m **Static Level:** 18. m **Well Type:** Overburden

Pump Rate: 8 GPM **Boring Method:** Cable Tool

CASING DETAILS		DEPTH IN METERS		
Material	**Diameter (cm)**	**Top**	-	**Bottom**
STEEL	15.24			38.10

FORMATION DETAILS		DEPTH IN METERS		
Colour	**Material**	**Top**	-	**Bottom**
BLUE	CLAY	0.00		12.19
	MEDIUM SAND	12.19		18.29
	COARSE SAND	18.29		36.58
	GRAVEL	36.58		38.10

Lot: LOT 10
Con: CON 5
Township: CAVAN
County: PETERBOROUGH
Street:
City:
Site:

Well ID: 5108567
Borehole ID: 10336698
Completion Date: 7/14/1976
Received Date: 31/08/1977
Tag:
Audit No:
Contractor License: 1904

Elevation: 263.84 *masl.*

UTM: 17 E 702495 N 4892623 **Long/Lat:** -78.468 , 44.159

DETAILS

Primary Use: Livestock **Secondary Use:** Domestic **Final Status:** Water Supply

Well Depth: 28.4 m **Depth to Bedrock:** 0 m **Static Level:** 15. m **Well Type:** Overburden

Pump Rate: 10 GPM **Boring Method:** Cable Tool

CASING DETAILS		DEPTH IN METERS	
Material	**Diameter (cm)**	**Top**	**Bottom**
STEEL	15.24		30.48

FORMATION DETAILS		DEPTH IN METERS	
Colour	**Material**	**Top**	**Bottom**
	PREVIOUSLY DUG	0.00	15.24
	MEDIUM SAND	15.24	31.70
	GRAVEL	31.70	32.00

Lot: LOT 11 **Well ID:** 1900379

Con: CON 5 **Borehole ID:** 10069447

Township: CAVAN **Completion Date:** 6/12/1964

County: PETERBOROUGH **Received Date:** 8/09/1964

Street: **Tag:**

City: **Audit No:**

Site: **Contractor License:** 1415

Elevation: 261.44 *masl.*

UTM: 17 E 702667 N 4892632 **Long/Lat:** -78.465 , 44.159

DETAILS

Primary Use: Livestock **Secondary Use:** Domestic **Final Status:** Water Supply

Well Depth: 32 m **Depth to Bedrock:** 0 m **Static Level:** 15. m **Well Type:** Overburden

Pump Rate: 10 GPM **Boring Method:** Cable Tool

CASING DETAILS		DEPTH IN METERS	
Material	**Diameter (cm)**	**Top**	**Bottom**
STEEL	15.24		30.48

FORMATION DETAILS	DEPTH IN METERS

Colour	Material	Top	-	Bottom
BROWN	CLAY	0.00		4.57
BROWN	GRAVEL	4.57		16.76
BROWN	GRAVEL	16.76		17.98

Lot: LOT 10
Con: CON 5
Township: CAVAN
County: PETERBOROUGH
Street:
City:
Site:
Elevation: 263.20 *masl.*
UTM: 17 E 702555 N 4892643 **Long/Lat:** -78.467 , 44.159

Well ID: 1904123
Borehole ID: 10073130
Completion Date: 4/29/1975
Received Date: 5/07/1975
Tag:
Audit No:
Contractor License: 2104

DETAILS

Primary Use: Domestic **Secondary Use:** **Final Status:** Water Supply

Well Depth: 18 m **Depth to Bedrock:** 0 m **Static Level:** 13. m **Well Type:** Overburden

Pump Rate: 5 GPM **Boring Method:** Cable Tool

CASING DETAILS / DEPTH IN METERS

Material	Diameter (cm)	Top	-	Bottom
STEEL	15.24			18.59

FORMATION DETAILS / DEPTH IN METERS

Colour	Material	Top	-	Bottom
BROWN	CLAY	0.00		4.57
BROWN	GRAVEL	4.57		16.76
BROWN	GRAVEL	16.76		17.98

Lot: LOT 11
Con: CON 5
Township: CAVAN
County: PETERBOROUGH
Street:
City:
Site:
Elevation: 249.35 *masl.*

Well ID: 7297869
Borehole ID: 1006776221
Completion Date: 8/22/2017
Received Date: 23/10/2017
Tag: A231688
Audit No: C38737
Contractor License: 7464

UTM: 17 E 703036 N 4892680 **Long/Lat:** -78.461 , 44.159

DETAILS

Primary Use: Livestock **Secondary Use:** Domestic **Final Status:** Water Supply

Well Depth: 0 m **Depth to Bedrock:** 0 m **Static Level:** 0 m **Well Type:** Overburden

Pump Rate: 2 GPM **Boring Method:** Cable Tool

CASING DETAILS		DEPTH IN METERS	
Material	**Diameter (cm)**	**Top** -	**Bottom**
STEEL	15.24		37.49

FORMATION DETAILS		DEPTH IN METERS	
Colour	**Material**	**Top** -	**Bottom**
	MEDIUM SAND	0.00	4.27
	CLAY	4.27	8.53
BLUE	CLAY	8.53	21.34
BROWN	CLAY	21.34	36.58
BROWN	COARSE SAND	36.58	37.49

Lot: LOT 10
Con: CON 6
Township: CAVAN
County: PETERBOROUGH
Street:
City:
Site:
Elevation: 256.92 *masl.*
UTM: 17 E 702441 N 4892740 **Long/Lat:** -78.468 , 44.160

Well ID: 1900415
Borehole ID: 10069483
Completion Date: 5/5/1961
Received Date: 25/09/1961
Tag:
Audit No:
Contractor License: 5422

DETAILS

Primary Use: Livestock **Secondary Use:** Domestic **Final Status:** Water Supply

Well Depth: 37.5 m **Depth to Bedrock:** 0 m **Static Level:** 18. m **Well Type:** Overburden

Pump Rate: 2 GPM **Boring Method:** Cable Tool

CASING DETAILS		DEPTH IN METERS	
Material	**Diameter (cm)**	**Top** -	**Bottom**
STEEL	15.24		37.49

FORMATION DETAILS		DEPTH IN METERS	
Colour	**Material**	**Top** -	**Bottom**
	TOPSOIL	0.00	0.30
BROWN	GRAVEL	0.30	10.06
BROWN	CLAY	10.06	12.50
BROWN	FINE SAND	12.50	17.07

Lot: LOT 11
Con: CON 6
Township: CAVAN
County: PETERBOROUGH
Street:
City:
Site:
Elevation: 256.16 *masl.*
UTM: 17 E 702755 N 4892783 **Long/Lat:** -78.464 , 44.160

Well ID: 1904254
Borehole ID: 10073241
Completion Date: 10/17/1975
Received Date: 16/12/1975
Tag:
Audit No:
Contractor License: 4635

DETAILS

Primary Use: Domestic **Secondary Use:** **Final Status:** Water Supply

Well Depth: 17.1 m **Depth to Bedrock:** 0 m **Static Level:** 1.8 m **Well Type:** Overburden

Pump Rate: 5 GPM **Boring Method:** Cable Tool

CASING DETAILS		DEPTH IN METERS	
Material	**Diameter (cm)**	**Top** -	**Bottom**
STEEL	15.24		17.07

FORMATION DETAILS		DEPTH IN METERS	
Colour	**Material**	**Top** -	**Bottom**
	TOPSOIL	0.00	0.30
BROWN	GRAVEL	0.30	10.06
BROWN	CLAY	10.06	12.50
BROWN	FINE SAND	12.50	17.07

Lot: LOT 12
Con: CON 5
Township: CAVAN
County: PETERBOROUGH
Street: 879 FALLIS LINE

Well ID: 7311533
Borehole ID: 1007060253
Completion Date: 3/26/2018
Received Date: 25/05/2018
Tag:

City: MILLBROOK **Audit No:** Z277113

Site: **Contractor License:** 1413

Elevation: 252.59 *masl.*

UTM: 17 E 703332 N 4892888 **Long/Lat:** -78.457 , 44.161

DETAILS

Primary Use: Domestic **Secondary Use:** **Final Status:** Water Supply

Well Depth: 0 m **Depth to Bedrock:** 0 m **Static Level:** 13. m **Well Type:**

Pump Rate: 10 GPM **Boring Method:** Rotary (Convent.)

CASING DETAILS		DEPTH IN METERS	
Material	**Diameter (cm)**	**Top**	**Bottom**
STEEL	15.88	0.00	61.87

FORMATION DETAILS		DEPTH IN METERS	
Colour	**Material**	**Top**	**Bottom**
BROWN	CLAY	0.00	4.57
BROWN	SAND	4.57	11.58
GREY	CLAY	11.58	33.53
GREY	SILT	33.53	51.21
GREY	CLAY	51.21	59.44
GREY	FINE SAND	59.44	61.87
GREY	SAND	61.87	63.40

Lot: LOT 12 **Well ID:** 7170060

Con: CON 5 **Borehole ID:** 1003580073

Township: CAVAN **Completion Date:** 7/12/2011

County: PETERBOROUGH **Received Date:** 14/10/2011

Street: 893 FALLIS LINE **Tag:** A108386

City: MILLBROOK **Audit No:** Z128143

Site: **Contractor License:** 1413

Elevation: 252.59 *masl.*

UTM: 17 E 703452 N 4892976 **Long/Lat:** -78.455 , 44.162

DETAILS

Primary Use: Domestic **Secondary Use:** **Final Status:** Water Supply

Well Depth: 63.4 m **Depth to Bedrock:** 0 m **Static Level:** 22. m **Well Type:**

Pump Rate: 10 GPM **Boring Method:** Rotary (Convent.)

CASING DETAILS		DEPTH IN METERS		
Material	**Diameter (cm)**	**Top**	-	**Bottom**
STEEL	15.24			16.46

FORMATION DETAILS		DEPTH IN METERS		
Colour	**Material**	**Top**	-	**Bottom**
	TOPSOIL	0.00		0.61
BROWN	CLAY	0.61		6.10
BLUE	CLAY	6.10		16.15
	GRAVEL	16.15		16.46

Lot: LOT 12
Con: CON 5
Township: CAVAN
County: PETERBOROUGH
Street:
City:
Site:
Elevation: 253.44 *masl.*
UTM: 17 E 703525 N 4893004 **Long/Lat:** -78.455 , 44.162

Well ID: 1900380
Borehole ID: 10069448
Completion Date: 12/9/1953
Received Date: 22/02/1954
Tag:
Audit No:
Contractor License: 4713

DETAILS

Primary Use: Livestock **Secondary Use:** **Final Status:** Water Supply

Well Depth: 16.5 m **Depth to Bedrock:** 0 m **Static Level:** 12. m **Well Type:** Overburden

Pump Rate: 12 GPM **Boring Method:** Cable Tool

CASING DETAILS		DEPTH IN METERS		
Material	**Diameter (cm)**	**Top**	-	**Bottom**
STEEL	15.24			16.46

FORMATION DETAILS		DEPTH IN METERS		
Colour	**Material**	**Top**	-	**Bottom**
	TOPSOIL	0.00		0.61
BROWN	CLAY	0.61		6.10
BLUE	CLAY	6.10		16.15
	GRAVEL	16.15		16.46

Lot:	<null>	**Well ID:**	1903021
Con:		**Borehole ID:**	10072073
Township:	CAVAN	**Completion Date:**	9/17/1970
County:	PETERBOROUGH	**Received Date:**	4/02/1971
Street:		**Tag:**	
City:		**Audit No:**	
Site:		**Contractor License:**	4713
Elevation:	252.56 *masl.*		
UTM:	17 E 703425 N 4893003	**Long/Lat:**	-78.456 , 44.162

DETAILS

Primary Use: Domestic **Secondary Use:** **Final Status:** Water Supply

Well Depth: 72.2 m **Depth to Bedrock:** 65.5 m **Static Level:** 20. m **Well Type:** Bedrock

Pump Rate: 3 GPM **Boring Method:** Cable Tool

CASING DETAILS		DEPTH IN METERS		
Material	**Diameter (cm)**	**Top**	-	**Bottom**
STEEL	15.24			65.84
OPEN HOLE				72.24

FORMATION DETAILS		DEPTH IN METERS		
Colour	**Material**	**Top**	-	**Bottom**
BROWN	CLAY	0.00		8.23
BLUE	CLAY	8.23		39.62
BLUE	CLAY	39.62		41.15
BLUE	CLAY	41.15		65.53
GREY	LIMESTONE	65.53		72.24

Lot:	LOT 12	**Well ID:**	5110451
Con:	CON 6	**Borehole ID:**	10338528
Township:	CAVAN	**Completion Date:**	4/16/1982
County:	PETERBOROUGH	**Received Date:**	11/05/1982
Street:		**Tag:**	
City:		**Audit No:**	
Site:		**Contractor License:**	2104
Elevation:	251.75 *masl.*		
UTM:	17 E 703395 N 4893023	**Long/Lat:**	-78.456 , 44.162

DETAILS

Primary Use: Domestic **Secondary Use:** **Final Status:** Water Supply

Well Depth: 64 m **Depth to Bedrock:** 63.4 m **Static Level:** 25 m **Well Type:** Bedrock

Pump Rate: 5 GPM **Boring Method:** Cable Tool

CASING DETAILS		DEPTH IN METERS		
Material	**Diameter (cm)**	**Top**	-	**Bottom**
STEEL	15.24			64.01

FORMATION DETAILS		DEPTH IN METERS		
Colour	**Material**	**Top**	-	**Bottom**
BROWN	CLAY	0.00		4.88
GREY	SAND	4.88		11.28
GREY	MEDIUM SAND	11.28		29.87
BLACK	SAND	29.87		37.49
GREY	CLAY	37.49		39.32
GREY	SAND	39.32		44.50
GREY	MEDIUM SAND	44.50		63.40
BLACK	SHALE	63.40		63.70
	UNKNOWN TYPE	63.70		64.01

APPENDIX D.1: WELL SUMMARY
Well Record Summary - Drilled Overburden Wells
Project Number: 11224019-01
The Bromont Group, Hydrogeological Assessment, Millbrook ON

MECP Well No.	Well Use	Water Found		Static Level		Test Rate		Well Depth		Depth to Bedrock		Comments
		Feet	Metres	Feet	Metres	GPM	LPM	Feet	Metres	Feet	Metres	
1902401	Domestic	102.0	31.1	8.0	2.4	13.0	49.1	156.0	47.5	153.0	46.6	0-2' Brown Topsoil; 2-102' Blue clay; 102'-103' Medium sand&clay; 103'-145' blue clay; 145'-153' clay&medium sand&stones ; 153'-156' Limestone
1903739	Domestic	79.0	24.1	0.0	0.0	--	--	80.0	24.4	--	--	0-5' Topsoil; 5-80' Blue clay
1902393	Not Used - Test Hole	--	--	4.0	1.2	64.0	241.9	97.0	29.6	--	--	0-1' Topsoil; 1-5' Clay; 5-10' Gravel; 10-22' Blue Clay&gravel; 22-32' Medium sand&gravel; 32-54' Clay&medium sand; 54-57' Medium Sand&gravel; 57-59' Boulders&gravel&medium sand; 59-60' Medium Sand&gravel; 60-71' Clay; 71-73' Medium Sand&gravel; 73-82' Boulders&gravel&medium sand; 82-91' Clay&gravel&medium sand; 91-97' Gravel&medium sand&boulders; 97-98' Boulders&gravel&medium sand; 98-100' Clay
5119299	Municipal	101.0	30.8	-17.0	-5.2	350.0	1323.0	101.0	30.8	--	--	0-2' Black Topsoil; 2'-5' Grey Clay&stones; 5'-28' Grey Clay&gravel; 28'-105' Brown Sand&gravel; 105'-106' Grey Clay
1902408	Public	60.0	18.3	6.0	1.8	280.0	1058.4	74.0	22.6	--	--	0-2' Topsoil, 2-6' Clay&medium sand; 6'-28' Medium sand; 28'-32' Grey Clay; 32'-61' Sand; 61'-73' Gravel; 73'-78' Clay&gravel; 78'-98' Gravel
5108216	Municipal	30.0	9.1	--	--	300.0	1134.0	103.0	31.4	--	--	0-30' Grey Clay&stones; 30'-53' Grey Clay&sand&gravel; 53'-56' Brown Sand; 56'-108' Brown Gravel; 108'-110' Brown Clay&gravel
5108280	Municipal - Not Used	25.0	7.6	-20.0	-6.1	150.0	567.0	102.0	31.1	--	--	0-30' Grey Clay&stones; 30'-51' Brown Clay&gravel; 51'-56' Brown Gravel&sand; 56'-102' Brown Gravel
5108215	Municipal	30.0	9.1	-16.0	-4.9	300.0	1134.0	101.0	30.8	--	--	0-28' Grey Clay&stones; 28'-55' Grey Clay&sand&gravel; 55'-105' Brown Gravel&sand
5108279	Municipal - Not Used	18.0	5.5	-16.0	-4.9	170.0	642.6	111.0	33.8	--	--	0-36' Grey Clay&stones; 36'-46' Brown Clay&gravel; 46'-60' Brown sand&gravel; 60'-74' Gravel; 74'-78' Fine Sand; 78'-111' Gravel
1902527	Domestic	73.0	22.3	-23.0	-7.0	31.0	117.2	164.0	50.0	160.0	48.8	0-1' Topsoil; 1'-11' Gravel&clay; 11'-45' Sand&clay; 45'-46' Boulders&clay; 46'-73' Clay; 73'-81' Sand&gravel; 81'-91' Gravel&sand&clay; 91'-102' Sand; 102'-146' Clay; 146'-157' Sand&gravel; 157'-162' Clay; 162'-164' Shale
1902398	Public	60.0	18.3	6.0	1.8	280.0	1058.4	74.0	22.6	--	--	0-2' Topsoil; 2'-6' Clay&sand; 6'-28' Medium Sand; 28'-32' Grey Clay; 32'-61' Sand; 61'-73' Gravel; 73'-78' Clay&gravel
1902399	Public	48.0	14.6	48.0	14.6	5.0	18.9	58.0	17.7	--	--	0-50' Clay; 50'-58' Coarse Sand
1902397	Public	100.0	30.5	100.0	30.5	5.0	18.9	218.0	66.4	--	--	0-85' Boulders&medium sand&clay; 85'-180' Fine Sand; 180'-218' Coarse Sand
1902396	Public	94.0	28.7	94.0	28.7	6.00	22.7	205.0	62.5	--	--	0-85' Boulders&medium sand&clay; 85'-180' Fine Sand; 180'-205' Coarse Sand
1902395	Public	96.0	29.3	96.0	29.3	6.0	22.7	140.0	42.7	--	--	0-80' Boulders&medium sand&clay; 80'-115' Fine Sand; 115'-140' Coarse Sand
1902394	Public	98.0	29.9	98.0	29.9	60.0	226.8	220.0	67.1	--	--	0-90' Boulders&medium sand&clay; 90'-185' Fine Sand&clay; 185'-223' Coarse Sand
5115005	Domestic	47.0	14.3	--	--	7.0	26.5	105.0	32.0	--	--	0-1' Topsoil; 1'-12' Brown Clay; 12'-105' Grey Clay&sand
1900377	Domestic/Livestock	65.0	19.8	60.0	18.3	8.0	30.2	125.0	38.1	--	--	0-40' Blue Clay; 40'-60' Medium Sand; 60'-120' Coarse Sand&clay; 120'-125' Gravel
1904123	Domestic	55.0	16.8	45.0	13.7	5.0	18.9	61.0	18.6	--	--	0-15' Brown Clay&boulders&gravel; 15'-59' Gravel&sand
1900415	Domestic/Livestock	120.0	36.6	60.0	18.3	2.0	7.6	123.0	37.5	--	--	0-14' Medium sand&gravel; 14'-28' Clay&medium sand&boulders; 28'-70' Blue Clay; 70'-120' Brown clay&medium sand; 120'-123' Coarse Sand
1904254	Domestic	50.0	15.2	6.0	1.8	5.0	18.9	56.0	17.1	--	--	0-1' Topsoil; 1'-33' Brown Gravel; 33'-41' Sandy Clay; 41'-56' Fine Sand
5108567	Domestic	90.0	27.4	50.0	15.2	20.0	75.6	93.0	28.3	--	--	0-1' Topsoil; 1'-8' Brown Clay&gravel&fine sand; 8'-70' Fine Sand; 70'-72' Gravel; 72'-83' Fine Sand; 83'-90' Grey Clay&gravel&fine sand; 90'-93' Gravel&coarse sand
1900380	Livestock	53.0	16.2	40.0	12.2	12.0	45.4	54.0	16.5	--	--	0-2' Topsoil; 2'-20' Brown Clay&medium sand&stones; 20'-53' Blue Clay&stones; 53'-54' Gravel
1900379	Domestic/Livestock	105.0	32.0	50.0	15.2	10.0	37.8	100.0	30.5	--	--	0-50' Previously dug; 50'-104' Medium sand; 104'-105' Gravel
5108563	Domestic	61.0	18.6	32.0	9.8	7.0	26.5	61.0	18.6	--	--	0-1' Topsoil; 1'-45' Brown Clay&gravel; 45'-48' Sand&silt; 48'-65' Coarse Sand&fine gravel
7170060	Domestic	208.0	63.4	75.0	22.9	10.0	37.8	208.0	63.4	--	--	0-15' Brown Clay&stones; 15'-38' Sand&gravel; 38'-110' Grey Clay; 110'-168' Silt&clay; 168'-195' Clay; 195'-203' Sand&silt; 203'-208' Sand

Total Number of Wells = 26

	Water Found		Static Level		Test Rate		Well Depth		Depth to Bedrock	
	Feet	Metres	Feet	Metres	GPM	LPM	Feet	Metres	Feet	Metres
AVERAGE	74.7	22.8	32.8	10.0	84.2	318.4	115.0	35.1	156.5	47.7
MAXIMUM	208.0	63.4	100.0	30.5	350.0	1323.0	220.0	67.1	160.0	48.8
MINIMUM	18.0	5.5	-23.0	-7.0	2.0	7.6	54.0	16.5	153.0	46.6

Notes:
-- indicates no data available
GPM: US Gallons per Minute
LPM: Litres per Minute

APPENDIX D.2: WELL SUMMARY

Well Record Summary - Drilled Bedrock Wells
Project Number: 11224019-01
The Bromont Group, Hydrogeological Assessment, Millbrook ON

MECP Well No.	Well Use	Water Found		Static Level		Test Rate		Well Depth		Depth to Bedrock		Comments
		Feet	Metres	Feet	Metres	GPM	LPM	Feet	Metres	Feet	Metres	
1904006	Domestic	150.0	45.7	50.0	15.2	5.0	18.9	153.0	46.6	150.0	45.7	0-5' Brown Topsoil; 5'-115' Blue Clay; 115'-140' Grey Sand; 140'-150' Blue Clay; 150'-153' Limestone
1902414	Domestic	153.0	46.6	11.0	3.4	7.0	26.5	153.0	46.6	151.0	46.0	0-1' Fill; 1'-135' Grey Clay; 135'-140' Medium Sand; 140'-151' Blue Clay; 151'-153' Limestone
5110451	Domestic	209.0	63.7	82.0	25.0	5.0	18.9	210.0	64.0	208.0	63.4	0-16' Brown Clay&stones; 16'-98' Grey Sand; 98'-123' Black Sand; 123'-129' Grey Clay&gravel; 129'-208' Sand; 208'-209' Black Shale
1903021	Domestic	216.0	65.8	66.0	20.1	3.0	11.3	237.0	72.2	215.0	65.5	0-27' Brown clay&stones; 27'-130' Blue clay&stones; 130'-135' Clay&medium sand; 135'-215' Clay&stones; 215'-237' Grey Limestone
5117764	Domestic	219.0	66.8	100.0	30.5	5.0	18.9	233.0	71.0	214.0	65.2	0-214' Existing well; 214'-226' Grey Shale; 226'-233' Limestone

Total Number of Wells = 5

	Water Found		Static Level		Test Rate		Well Depth		Depth to Bedrock	
	Feet	Metres	Feet	Metres	GPM	LPM	Feet	Metres	Feet	Metres
AVERAGE	189.4	57.7	61.8	18.8	5.0	18.9	197.2	60.1	187.6	57.2
MAXIMUM	219.0	66.8	100.0	30.5	7.0	26.5	237.0	72.2	215.0	65.5
MINIMUM	150.0	45.7	11.0	3.4	3.0	11.3	153.0	46.6	150.0	45.7

Notes:
-- indicates no data available
GPM: US Gallons per Minute
LPM: Litres per Minute

APPENDIX D.3: WELL SUMMARY
Well Record Summary - Monitoring Wells and Abandonments
Project Number: 11215634-01
The Bromont Group, Hydrogeological Assessment, Millbrook ON

MECP Well No.	Well Use	Water Found		Static Level		Test Rate		Well Depth		Depth to Bedrock		Comments
		Feet	Metres	Feet	Metres	GPM	LPM	Feet	Metres	Feet	Metres	
7254536	Abandoned-Other	--	--	--	--	--	--	20.0	6.1	--	--	--
7254535	Abandoned-Other	--	--	6.0	1.8	--	--	64.0	19.5	--	--	--
5119300	Abandoned-Quality	--	--	--	--	--	--	29.0	8.8	--	--	0-2' Black Topsoil; 2'-5' Grey Clay&stones; 5'-26' Grey Clay&gravel; 26'-29' Brown Sand&gravel
7233409	Monitoring and Test Hole	17.0	5.2	--	--	--	--	58.7	17.9	--	--	0-10' Brown Sand&gravel; 10'-27' Brown Silt&sand; 27-41' Grey Clay&silt&sand; 41-58.7' Grey Sand&silt
7282725	Monitoring	--	--	--	--	--	--	141.0	43.0	--	--	0-20' Sand&gravel; 20'-58' Sand; 58-75' Clay; 75-146' Sand; 146-147' Clay
1902529	Not used - Test Hole	74.0	22.6	-23.0	-7.0	--	--	118.0	36.0	--	--	0-1' Topsoil; 1'-12' Gravel&boulders&clay; 12-74' Clay; 74'-78' Sand&silt&gravel; 78'-85' Clay&sand&stones; 85'-104' Sand; 104'-118' Clay&silt&gravel
7251394	Monitoring	--	--	--	--	--	--	--	--	--	--	--
7233407	Monitoring and Test Hole	34.0	10.4	--	--	--	--	87.0	26.5	--	--	0-30' Brown Sand&gravel&silt; 30'-48' Silt&sand; 48'-72' Grey Clay&silt&sand; 72'-88' Sand&silt
7327636	Monitoring - Test Hole	10.0	3.0	--	--	--	--	15.0	4.6	--	--	0-1' Brown Topsoil; 1'-5' Sand&gravel; 5'-10' Sand&silt; 10'-15' Sand
7233408	Monitoring and Test Hole	89.0	27.1	--	--	--	--	97.0	29.6	--	--	0-77' Brown Sand&gravel&silt; 77'-100' Sand&silt
7282724	Monitoring	--	--	--	--	--	--	--	--	--	--	--
7251393	Monitoring	--	--	--	--	--	--	--	--	--	--	--
7262813	Monitoring	--	--	--	--	--	--	123.0	37.5	--	--	--
7163770	Monitoring and Test Hole	--	--	--	--	--	--	66.0	20.1	--	--	0-66' Brown Fine Sand
7169265	Test Hole	90	27.4	--	--	--	--	95	29.0	--	--	0'-5' Brown Sand&gravel; 5'-90' Sand; 90'-95' Sand&gravel
7327634	Monitoring - Test Hole	22	6.7	--	--	--	--	27.5	8.4	--	--	0-1' Brown Topsoil; 1'-5' Sand&gravel; 5'-10' Sand&silt; 10'-20' Sand; 20-27.5' Sand&silt
7327635	Monitoring - Test Hole	10	3.0	--	--	--	--	15	4.6	--	--	0-1' Brown Topsoil; 1'-5' Sand&gravel; 5'-10' Sand&silt; 10'-15' Sand
7163769	Monitoring and Test Hole	--	--	--	--	--	--	44	13.4	--	--	0-44' Brown Fine Sand
7297869	Unknown	--	--	--	--	--	--	--	--	--	--	--
7311533	Not Used - Decomissioned	--	--	43.0	13.1	--	--	53	16.2	--	--	No previous existing well record found on MECP database

Total Number of Wells = 20

	Water Found		Static Level		Test Rate		Well Depth		Depth to Bedrock	
	Feet	Metres	Feet	Metres	GPM	LPM	Feet	Metres	Feet	Metres
AVERAGE	43.3	13.2	8.7	2.6	--	--	65.8	20.1	--	--
MAXIMUM	90.0	27.4	43.0	13.1	--	--	141.0	43.0	--	--
MINIMUM	10.0	3.0	-23.0	-7.0	--	--	15.0	4.6	--	--

Notes:
-- indicates no data available
GPM: US Gallons per Minute
LPM: Litres per Minute

Source: Image obtained from Google Earth Maps. © 2021 Google.

Scale:
Refer to Scale Bar
Coordinate System:
NAD 1983 UTM Zone 17

The Bromont Group
Fallis Line, Millbrook, ON
Hydrogeological Assessment

11224019-01
March 2021

Well Survey Plan

Appendix D

Appendix E
Laboratory Certificates of Analysis

CADUCEON ENVIRONMENTAL LABORATORIES
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CERTIFICATE OF ANALYSIS

Final Report

C.O.C.: G66463 **REPORT No. B17-26435**

Report To:

GHD Limited
651 Colby Drive,
Waterloo Ontario N2V 1C2 Canada
Attention: Shaun Shepherd

Caduceon Environmental Laboratories
110 West Beaver Creek Rd Unit 14
Richmond Hill ON L4B 1J9
Tel: 289-475-5442
Fax: 289-562-1963

DATE RECEIVED: 08-Sep-17
DATE REPORTED: 13-Sep-17
SAMPLE MATRIX: Groundwater

JOB/PROJECT NO.: Fallis Line Subdivision
P.O. NUMBER: 73508859
WATERWORKS NO.

			Client I.D.		BH-11, GWS-1			
			Sample I.D.		B17-26435-1			
			Date Collected		07-Sep-17			
Parameter	**Units**	**R.L.**	**Reference Method**	**Date/Site Analyzed**				
pH @25°C	pH Units		SM 4500H	11-Sep-17/O	7.99			
Conductivity @25°C	µmho/cm	1	SM 2510B	11-Sep-17/O	604			
Alkalinity(CaCO3) to pH4.5	mg/L	5	SM 2320B	11-Sep-17/O	229			
Hardness (as CaCO3)	mg/L	1	SM 3120	12-Sep-17/O	332			
Chloride	mg/L	0.5	SM4110C	11-Sep-17/O	15.3			
Fluoride	mg/L	0.1	SM4110C	11-Sep-17/O	< 0.1			
Nitrite (N)	mg/L	0.1	SM4110C	11-Sep-17/O	< 0.1			
Nitrate (N)	mg/L	0.1	SM4110C	11-Sep-17/O	18.6			
Sulphate	mg/L	1	SM4110C	11-Sep-17/O	7			
Colour	TCU	2	SM 2120C	11-Sep-17/O	4			
Turbidity	NTU	0.1	SM 2130	12-Sep-17/O	879			
Ammonia (N)-Total	mg/L	0.01	MOEE 3364	11-Sep-17/O	< 0.01			
o-Phosphate (P)	mg/L	0.01	MOEE 3366	11-Sep-17/O	< 0.01			
Potassium	mg/L	0.1	SM 3120	12-Sep-17/O	3.5			
Sodium	mg/L	0.2	SM 3120	12-Sep-17/O	7.0			
Calcium	mg/L	0.02	SM 3120	12-Sep-17/O	116			
Magnesium	mg/L	0.01	SM 3120	12-Sep-17/O	10.2			
Iron	mg/L	0.005	SM 3120	12-Sep-17/O	0.067			
Copper	mg/L	0.002	SM 3120	12-Sep-17/O	0.010			
Manganese	mg/L	0.001	SM 3120	12-Sep-17/O	0.037			
Zinc	mg/L	0.005	SM 3120	12-Sep-17/O	0.020			
Anion Sum	meq/L		Calc.	12-Sep-17/O	6.49			
Cation Sum	meq/L		Calc.	12-Sep-17/O	7.02			
% Difference	%		Calc.	12-Sep-17/O	3.95			

Christine Burke
Lab Manager

R.L. = Reporting Limit
Test methods may be modified from specified reference method unless indicated by an *
Site Analyzed=K-Kingston,W-Windsor,O-Ottawa,R-Richmond Hill,B-Barrie

CADUCEON ENVIRONMENTAL LABORATORIES
Client committed. Quality assured.

CERTIFICATE OF ANALYSIS

Final Report

C.O.C.: G66463 **REPORT No. B17-26435**

Report To:

GHD Limited
651 Colby Drive,
Waterloo Ontario N2V 1C2 Canada
Attention: Shaun Shepherd

Caduceon Environmental Laboratories
110 West Beaver Creek Rd Unit 14
Richmond Hill ON L4B 1J9
Tel: 289-475-5442
Fax: 289-562-1963

DATE RECEIVED: 08-Sep-17
DATE REPORTED: 13-Sep-17
SAMPLE MATRIX: Groundwater

JOB/PROJECT NO.: Fallis Line Subdivision
P.O. NUMBER: 73508859
WATERWORKS NO.

			Client I.D.		BH-11, GWS-1			
			Sample I.D.		B17-26435-1			
			Date Collected		07-Sep-17			
Parameter	**Units**	**R.L.**	**Reference Method**	**Date/Site Analyzed**				
Ion Ratio	AS/CS		Calc.	12-Sep-17/O	0.924			
Sodium Adsorption Ratio	-		Calc.	12-Sep-17/O	0.166			
TDS(ion sum calc.)	mg/L	1	Calc.	12-Sep-17/O	379			
Conductivity (calc.)	µmho/cm		Calc.	12-Sep-17/O	659			
TDS(calc.)/EC(actual)	-		Calc.	12-Sep-17/O	0.628			
EC(calc.)/EC(actual)	-		Calc.	12-Sep-17/O	1.09			
Langelier Index(25°C)	S.I.		Calc.	12-Sep-17/O	0.962			

Christine Burke
Lab Manager

R.L. = Reporting Limit
Test methods may be modified from specified reference method unless indicated by an *
Site Analyzed=K-Kingston,W-Windsor,O-Ottawa,R-Richmond Hill,B-Barrie

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CERTIFICATE OF ANALYSIS

Final Report

C.O.C.: G66465 **REPORT No. B17-26754**

Report To:

GHD Limited
651 Colby Drive,
Waterloo Ontario N2V 1C2 Canada
Attention: Leandro Ramos

Caduceon Environmental Laboratories
110 West Beaver Creek Rd Unit 14
Richmond Hill ON L4B 1J9
Tel: 289-475-5442
Fax: 289-562-1963

DATE RECEIVED: 12-Sep-17
DATE REPORTED: 15-Sep-17
SAMPLE MATRIX: Groundwater

JOB/PROJECT NO.: Fallis Line/11148475-01
P.O. NUMBER: 73508859
WATERWORKS NO.

			Client I.D.		811 Fallis Line			
			Sample I.D.		B17-26754-1			
			Date Collected		11-Sep-17			
Parameter	**Units**	**R.L.**	**Reference Method**	**Date/Site Analyzed**				
pH @25°C	pH Units		SM 4500H	13-Sep-17/O	7.86			
Conductivity @25°C	µmho/cm	1	SM 2510B	13-Sep-17/O	599			
Alkalinity(CaCO3) to pH4.5	mg/L	5	SM 2320B	13-Sep-17/O	265			
Hardness (as CaCO3)	mg/L	1	SM 3120	14-Sep-17/O	325			
Chloride	mg/L	0.5	SM4110C	13-Sep-17/O	11.9			
Fluoride	mg/L	0.1	SM4110C	13-Sep-17/O	< 0.1			
Nitrite (N)	mg/L	0.1	SM4110C	13-Sep-17/O	< 0.1			
Nitrate (N)	mg/L	0.1	SM4110C	13-Sep-17/O	6.1			
Sulphate	mg/L	1	SM4110C	13-Sep-17/O	9			
Colour	TCU	2	SM 2120C	14-Sep-17/O	2			
Turbidity	NTU	0.1	SM 2130	13-Sep-17/O	1.5			
Ammonia (N)-Total	mg/L	0.01	MOEE 3364	14-Sep-17/O	< 0.01			
o-Phosphate (P)	mg/L	0.01	MOEE 3366	14-Sep-17/O	< 0.01			
Potassium	mg/L	0.1	SM 3120	14-Sep-17/O	0.9			
Sodium	mg/L	0.2	SM 3120	14-Sep-17/O	8.8			
Calcium	mg/L	0.02	SM 3120	14-Sep-17/O	106			
Magnesium	mg/L	0.01	SM 3120	14-Sep-17/O	14.6			
Iron	mg/L	0.005	SM 3120	14-Sep-17/O	0.015			
Copper	mg/L	0.002	SM 3120	14-Sep-17/O	0.004			
Manganese	mg/L	0.001	SM 3120	14-Sep-17/O	0.001			
Zinc	mg/L	0.005	SM 3120	14-Sep-17/O	0.005			
Anion Sum	meq/L		Calc.	14-Sep-17/O	6.25			
Cation Sum	meq/L		Calc.	14-Sep-17/O	6.90			
% Difference	%		Calc.	14-Sep-17/O	4.95			

Christine Burke
Lab Manager

R.L. = Reporting Limit
Test methods may be modified from specified reference method unless indicated by an *
Site Analyzed=K-Kingston,W-Windsor,O-Ottawa,R-Richmond Hill,B-Barrie

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CERTIFICATE OF ANALYSIS

Final Report

C.O.C.: G66465 **REPORT No. B17-26754**

Report To:

GHD Limited
651 Colby Drive,
Waterloo Ontario N2V 1C2 Canada
Attention: Leandro Ramos

Caduceon Environmental Laboratories
110 West Beaver Creek Rd Unit 14
Richmond Hill ON L4B 1J9
Tel: 289-475-5442
Fax: 289-562-1963

DATE RECEIVED: 12-Sep-17
DATE REPORTED: 15-Sep-17
SAMPLE MATRIX: Groundwater

JOB/PROJECT NO.: Fallis Line/11148475-01
P.O. NUMBER: 73508859
WATERWORKS NO.

			Client I.D.		811 Fallis Line			
			Sample I.D.		B17-26754-1			
			Date Collected		11-Sep-17			
Parameter	**Units**	**R.L.**	**Reference Method**	**Date/Site Analyzed**				
Ion Ratio	AS/CS		Calc.	14-Sep-17/O	0.906			
Sodium Adsorption Ratio	-		Calc.	14-Sep-17/O	0.213			
TDS(ion sum calc.)	mg/L	1	Calc.	14-Sep-17/O	337			
Conductivity (calc.)	µmho/cm		Calc.	14-Sep-17/O	616			
TDS(calc.)/EC(actual)	-		Calc.	14-Sep-17/O	0.563			
EC(calc.)/EC(actual)	-		Calc.	14-Sep-17/O	1.03			
Langelier Index(25°C)	S.I.		Calc.	14-Sep-17/O	0.855			

Christine Burke
Lab Manager

R.L. = Reporting Limit
Test methods may be modified from specified reference method unless indicated by an *
Site Analyzed=K-Kingston,W-Windsor,O-Ottawa,R-Richmond Hill,B-Barrie

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CERTIFICATE OF ANALYSIS

Final Report

C.O.C.: G66464 **REPORT No. B17-26779**

Report To:

GHD Limited
651 Colby Drive,
Waterloo Ontario N2V 1C2 Canada
Attention: Leandro Ramos

Caduceon Environmental Laboratories
110 West Beaver Creek Rd Unit 14
Richmond Hill ON L4B 1J9
Tel: 289-475-5442
Fax: 289-562-1963

DATE RECEIVED: 12-Sep-17
DATE REPORTED: 25-Sep-17
SAMPLE MATRIX: Groundwater

JOB/PROJECT NO.: Fallis Line/11148475-01
P.O. NUMBER: 73508859
WATERWORKS NO.

			Client I.D.		811 Fallis Lane			
			Sample I.D.		B17-26779-1			
			Date Collected		11-Sep-17			
Parameter	**Units**	**R.L.**	**Reference Method**	**Date/Site Analyzed**				
Methane	L/m3	0.02	NA	25-Sep-17	< 0.02 [1]			

1 . Subcontracted to SGS Lakefield

Christine Burke
Lab Manager

R.L. = Reporting Limit
Test methods may be modified from specified reference method unless indicated by an *
Site Analyzed=K-Kingston,W-Windsor,O-Ottawa,R-Richmond Hill,B-Barrie

SGS Canada Inc.
P.O. Box 4300 - 185 Concession St.
Lakefield - Ontario - KOL 2HO
Phone: 705-652-2000 FAX: 705-652-6365

Project : 11224019, Millbrook

26-March-2021

GHD Limited - 735
Attn : Bob Neck

347 Pido Rd., Unit #29
Peterborough, ON
K9J 6Z8, Canada

Phone: 705-749-3317
Fax:

Date Rec. : 18 March 2021
LR Report: **CA14455-MAR21**
Reference: 73523171, Proj:11224019, Bob Neck

Copy: 1

CERTIFICATE OF ANALYSIS
Final Report

Analysis	1: Analysis Start Date	2: Analysis Start Time	3: Analysis Completed Date	4: Analysis Completed Time	7: BH11D-21
Sample Date & Time					17-Mar-21
Temp Upon Receipt [°C]	---	---	---	---	7.0
UV Transmittance [%T]	19-Mar-21	14:27	24-Mar-21	11:39	71.7
Alkalinity [mg/L as CaCO3]	19-Mar-21	07:55	23-Mar-21	08:56	306
Colour [TCU]	18-Mar-21	21:17	19-Mar-21	07:53	4
Conductivity [uS/cm]	19-Mar-21	07:55	23-Mar-21	08:56	566
pH [No unit]	19-Mar-21	07:55	23-Mar-21	08:56	7.91
TSS [mg/L]	19-Mar-21	09:18	23-Mar-21	09:16	85
TDS [mg/L]	19-Mar-21	18:35	23-Mar-21	15:10	329
Turbidity [NTU]	18-Mar-21	20:03	19-Mar-21	08:59	145
Organic N [mg/L]	18-Mar-21	17:41	22-Mar-21	13:50	1.16
TKN [as N mg/L]	18-Mar-21	17:41	22-Mar-21	13:49	1.16
NH3+NH4 [as N mg/L]	18-Mar-21	17:51	20-Mar-21	14:03	< 0.04
DOC [mg/L]	19-Mar-21	06:35	19-Mar-21	10:39	2
TOC [mg/L]	19-Mar-21	06:35	19-Mar-21	10:39	2
Cl [mg/L]	23-Mar-21	12:38	24-Mar-21	11:42	9.5
F [mg/L]	19-Mar-21	13:06	22-Mar-21	08:19	0.46
NO2 [as N mg/L]	22-Mar-21	22:39	24-Mar-21	15:53	0.004
NO3 [as N mg/L]	22-Mar-21	22:39	24-Mar-21	15:53	8.77
SO4 [mg/L]	23-Mar-21	12:38	24-Mar-21	11:42	10
Hardness [mg/L as CaCO3]	24-Mar-21	17:45	26-Mar-21	12:15	372
Al (diss) [mg/L]	24-Mar-21	17:45	26-Mar-21	12:15	0.324
Sb (diss) [mg/L]	24-Mar-21	17:45	26-Mar-21	12:15	< 0.0009
As (diss) [mg/L]	24-Mar-21	17:45	26-Mar-21	12:15	0.0004
Ba (diss) [mg/L]	24-Mar-21	17:45	26-Mar-21	12:15	0.0739
B (diss) [mg/L]	24-Mar-21	17:45	26-Mar-21	12:15	0.019
Cd (diss) [mg/L]	24-Mar-21	17:45	26-Mar-21	12:15	0.000020

SGS Canada Inc.
P.O. Box 4300 - 185 Concession St.
Lakefield - Ontario - KOL 2HO
Phone: 705-652-2000 FAX: 705-652-6365

Project : 11224019, Millbrook

LR Report : **CA14455-MAR21**

Analysis	1: Analysis Start Date	2: Analysis Start Time	3: Analysis Completed Date	4: Analysis Completed Time	7: BH11D-21
Ca (diss) [mg/L]	24-Mar-21	17:45	26-Mar-21	12:15	121
Cr (diss) [mg/L]	24-Mar-21	17:45	26-Mar-21	12:15	0.00094
Cu (diss) [mg/L]	24-Mar-21	17:45	26-Mar-21	12:15	0.0041
Fe (diss) [mg/L]	24-Mar-21	17:45	26-Mar-21	12:15	0.500
Pb (diss) [mg/L]	24-Mar-21	17:45	26-Mar-21	12:15	0.00082
Mg (diss) [mg/L]	24-Mar-21	17:45	26-Mar-21	12:15	17.2
Mn (diss) [mg/L]	24-Mar-21	17:45	26-Mar-21	12:15	0.0918
Na (diss) [mg/L]	24-Mar-21	17:45	26-Mar-21	12:15	13.4
Se (diss) [mg/L]	24-Mar-21	17:45	26-Mar-21	12:15	0.00023
U (diss) [mg/L]	24-Mar-21	17:45	26-Mar-21	12:15	0.0012
Zn (diss) [mg/L]	24-Mar-21	17:45	26-Mar-21	12:15	0.013

MAC - Maximum Acceptable Concentration
AO/OG - Aesthetic Objective / Operational Guideline
NR - Not reportable under applicable Provincial drinking water regulations as per client.

Temperature of Sample upon Receipt: 6 degrees C
Cooling Agent Present:Yes
Custody Seal Present:Yes

Chain of Custody Number:NA

Jill Campbell

Jill Campbell, B.Sc.,GISAS
Project Specialist,
Environment, Health & Safety

OnLine LIMS

0002442795

Appendix F
Water Balance Calculations

Appendix F.1

Revised Water Budget (Thornthwaite Method) - Average Values*

Weather Station: Peterborough A

Climate Station: 6166418 **Elevation:** 191 masl **Distance Away:** ~ 10.2 km

Month	Mean Temperature (^{o}C)	Heat Index	Unadjusted Potential ET (mm)	Daylight Correction Factor	Adjusted ET (mm)	Total Precipitation (mm)
January	-8.5	0	0	0.78	0	57.4
February	-7.5	0	0	0.88	0	51.5
March	-1.8	0	0	0.99	0	56.1
April	5.9	1.28	28.8	1.12	32.2	68.6
May	12.1	3.81	60.1	1.22	73.3	81.5
June	17	6.38	85.1	1.28	109.0	79.9
July	19.6	7.91	98.5	1.25	123.1	70.6
August	18.3	7.13	91.8	1.15	105.6	77
September	13.9	4.70	69.2	1.04	72.0	85.3
October	7.5	1.85	36.8	0.92	33.8	76.9
November	1.9	0.23	9.0	0.8	7.2	86.4
December	-4.4	0	0	0.76	0	64.2
TOTAL	6.2	33.3	479.3		556.2	855.4

TOTAL WATER SURPLUS: 299.2 mm

Notes:

*Average values of precipitation were used. Average values of temperature were also used.

Appendix F.2

Water Budget Pre-Development

Catchment Designation	PRE-DEVELOPMENT SITE							TOTAL
	Agricultural Area	Naturalized Areas	Forested Area	787 & 825 Residential Areas				
				Lawn	Rooftops	Pool/Concrete	Gravel Drive	
Area (m^2)	270855	30200	183400	4935	725	185	1900	492200
Pervious Area (m^2)	270855	30200	183400	4935	0	0	1900	491290
% Pervious	55.0%	6.1%	37.3%	1.0%	0%	0%	0.4%	99.8%
Impervious Area (m^2)	0	0	0	0	725	185	0	910
% Impervious	0%	0%	0%	0%	0.1%	0.04%	0%	0.2%
INFILTRATION FACTORS								
Topography Infiltration Factor	0.15	0.2	0.1	0.2	0	0	0.2	
Soil Infiltration Factor	0.2	0.2	0.2	0.2	0	0	0.3	
Land Cover Infiltration Factor	0.1	0.15	0.2	0.15	0	0	0	
MECP Infiltration Factor	0.45	0.55	0.5	0.55	0	0	0.5	
Actual Infiltration Factor	0.45	0.55	0.5	0.55	0	0	0.4	
Runoff Coefficient	0.55	0.45	0.5	0.45	1	1	0.6	
Runoff from Impervious Surfaces*	0	0	0	0	0.8	0.8	0.8	
INPUTS (PER UNIT AREA)								
Precipitation (mm/yr)	855	855	855	855	855	855	855	855
Run On (mm/yr)	0	0	0	0	0	0	0	0
Other Inputs (mm/yr)	0	0	0	0	0	0	0	0
Total Inputs (mm/yr)	855	855	855	855	855	855	855	855
OUTPUTS (PER UNIT AREA)								
Precipitation Surplus (mm/yr)	299	299	299	299	684	684	684	301
Net Surplus (mm/yr)	299	299	299	299	684	684	684	301
Evaportranspiration (mm/yr)	556	556	556	556	171	171	171	554
Infiltration (mm/yr)	135	165	150	165	0	0	274	143
Rooftop Infiltration (mm/yr)	0	0	0	0	171	171	0	0
Total Infiltration (mm/yr)	135	165	150	165	171	171	274	143
Runoff Pervious Areas	165	135	150	135	0	0	411	157
Runoff Impervious Areas	0	0	0	0	513	513	0	1
Total Runoff (mm/yr)	165	135	150	135	513	513	411	158
Total Outputs (mm/yr)	855	855	855	855	855	855	855	855
Difference (Inputs - Outputs)	0	0	0	0	0	0	0	0
INPUTS (VOLUMES)								
Precipitation (m^3/yr)	231689	25833	156880	4221	620	158	1625	421028
Run On (m^3/yr)	0	0	0	0	0	0	0	0
Other Inputs (m^3/yr)	0	0	0	0	0	0	0	0
Total Inputs (m^3/yr)	231689	25833	156880	4221	620	158	1625	421028
OUTPUTS (VOLUMES)								
Precipitation Surplus (m^3/yr)	81032	9035	54868	1476	496	127	1300	148335
Net Surplus (m^3/yr)	81032	9035	54868	1476	496	127	1300	148335
Evaportranspiration (m^3/yr)	150657	16798	102012	2745	124	32	325	272693
Infiltration (m^3/yr)	36465	4969	27434	812	0	0	520	70200
Rooftop Infiltration (m^3/yr)	0	0	0	0	124	32	0	156
Total Infiltration (m^3/yr)	36465	4969	27434	812	124	32	520	70356
Runoff Pervious Areas (m^3/yr)	44568	4066	27434	664	0	0	780	77512
Runoff Impervious Areas (m^3/yr)	0	0	0	0	372	95	0	467
Total Runoff (m^3/yr)	44568	4066	27434	664	372	95	780	77979
Total Outputs (m^3/yr)	231689	25833	156880	4221	620	158	1625	421028
Difference (Inputs - Outputs)	0	0	0	0	0	0	0	0

Notes:

Forested areas include hedge rows

Naturalized areas are open, vacant areas that are not used for agriculture and are not forested areas

Table 2: Infiltration Factors

Description of Area/Development Site	Value of Infiltration Factor
TOPOGRAPHY	
■ Flat land, average slope not exceeding 0.6 m per km	0.30
■ Rolling land, average slope of 2.8 m to 3.8 m per km	0.20
■ Hilly land, average slope of 28 m to 47 m per km	0.10
SOIL	
■ Tight impervious clay	0.10
■ Medium combinations of clay and loam	0.20
■ Open sandy loam	0.4
COVER	
■ Cultivated lands	0.1
■ Woodland	0.2

Table 3: Typical Ground Water Recharge Rates

Soil Texture	Ground Water Recharge Rate	
	(mm/yr)	*(L/Day/Hectare)*
■ coarse sand and gravel	250+	7000+
■ fine to medium sand	200 - 250	5600 - 7000
■ silty sand to sandy silt	150 - 200	4200 - 5600
■ silt	125 - 150	3500 - 4200
■ clayey silt	100 - 125	2800 - 3500
■ clay	less than 100	less than 2800

Appendix F.3

Water Budget Post-Development - No Mitigation Strategies

Catchment Designation	POST-DEVELOPMENT SITE																	TOTAL
	Low Density - Blocks A,B,C - 329 units			Med. Density - Townhouses			Natural	Road	Road ROWs		Parkland	Medium Density - 5-storey bldg			Easement	SWM Pond		
	Lawns	Rooftops	Driveways	Lawns	Rooftops	Driveways	Heritage	Widening	Asphalt	Grass	& Trails	Landscaping	Rooftops	Asphalt		Grass	Pond	
Area (m^2)	39650	95160	23790	7140	26775	1785	164300	1600	38200	38200	21000	1760	5280	1760	100	12850	12850	492200
Pervious Area (m^2)	39650	0	0	7140	0	0	164300	1600	0	38200	21000	1760	0	0	100	12850	0	286600
% Pervious	8.1%	0%	0%	1%	0%	0%	33.4%	0.3%	0%	7.8%	4.3%	0.4%	0%	0%	0.02%	2.6%	0%	58.2%
Impervious Area (m^2)	0	95160	23790	0	26775	1785	0	0	38200	0	0	0	5280	1760	0	0	12850	205600
% Impervious	0%	19.3%	4.8%	0%	5.4%	0.4%	0%	0%	7.8%	0%	0%	0%	1.1%	0.4%	0%	0%	2.6%	41.8%
	INFILTRATION FACTORS																	
Topography Infiltration Factor	0.15	0	0	0.15	0	0.2	0.1	0.2	0.2	0.2	0.2	0.2	0	0	0.2	0.1	0	
Soil Infiltration Factor	0.2	0	0	0.2	0	0	0.2	0.2	0	0.2	0.2	0.2	0	0	0.2	0.2	0	
Land Cover Infiltration Factor	0.15	0	0	0.15	0	0	0.2	0.15	0	0.15	0	0.15	0	0	0.15	0.15	0	
MECP Infiltration Factor	0.5	0	0	0.5	0	0.2	0.5	0.55	0.2	0.55	0.4	0.55	0	0	0.55	0.45	0	
Actual Infiltration Factor	0.5	0	0	0.5	0	0	0.5	0.55	0	0.55	0.4	0.55	0	0	0.55	0.45	0	
Runoff Coefficient	0.5	1	1	0.5	1	1	0.5	0.45	1	0.45	0.6	0.45	1	1	0.45	0.55	1	
Runoff from Impervious Surfaces*	0	0.8	0.8	0	0.8	0.8	0	0	0.8	0	0.8	0	0.8	0.8	0	0	0.8	
	INPUTS (PER UNIT AREA)																	
Precipitation (mm/yr)	855	855	855	855	855	855	855	855	855	855	855	855	855	855	855	855	855	855
Run On (mm/yr)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Other Inputs (mm/yr)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Inputs (mm/yr)	855	855	855	855	855	855	855	855	855	855	855	855	855	855	855	855	855	855
	OUTPUTS (PER UNIT AREA)																	
Precipitation Surplus (mm/yr)	299	684	684	299	684	684	299	299	684	299	299	299	684	684	299	299	684	460
Net Surplus (mm/yr)	299	684	684	299	684	684	299	299	684	299	299	299	684	684	299	299	684	460
Evaportranspiration (mm/yr)	556	171	171	556	171	171	556	556	171	556	556	556	171	171	556	556	171	395
Infiltration (mm/yr)	150	0	0	150	0	0	150	165	0	165	120	165	0	0	165	135	0	87
Rooftop Infiltration (mm/yr)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Infiltration (mm/yr)	150	0	0	150	0	0	150	165	0	165	120	165	0	0	165	135	0	87
Runoff Pervious Areas	150	0	0	150	0	0	150	135	0	135	180	135	0	0	135	165	0	88
Runoff Impervious Areas	0	684	684	0	684	684	0	0	684	0	0	0	684	684	0	0	684	286
Total Runoff (mm/yr)	150	684	684	150	684	684	150	135	684	135	180	135	684	684	135	165	684	373
Total Outputs (mm/yr)	855	855	855	855	855	855	855	855	855	855	855	855	855	855	855	855	855	855
Difference (Inputs - Outputs)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	INPUTS (VOLUMES)																	
Precipitation (m^3/yr)	33917	81400	20350	6108	22903	1527	140542	1369	32676	32676	17963	1506	4517	1506	86	10992	10992	421028
Run On (m^3/yr)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Other Inputs (m^3/yr)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Inputs (m^3/yr)	33917	81400	20350	6108	22903	1527	140542	1369	32676	32676	17963	1506	4517	1506	86	10992	10992	421028
	OUTPUTS (VOLUMES)																	
Precipitation Surplus (m^3/yr)	11862	65120	16280	2136	18323	1222	49154	479	26141	11428	6283	527	3613	1204	30	3844	8794	226439
Net Surplus (m^3/yr)	11862	65120	16280	2136	18323	1222	49154	479	26141	11428	6283	527	3613	1204	30	3844	8794	226439
Evaportranspiration (m^3/yr)	22054	16280	4070	3971	4581	305	91388	890	6535	21248	11681	979	903	301	56	7148	2198	194589
Infiltration (m^3/yr)	5931	0	0	1068	0	0	24577	263	0	6286	2513	290	0	0	16	1730	0	42674
Rooftop Infiltration (m^3/yr)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Infiltration (m^3/yr)	5931	0	0	1068	0	0	24577	263	0	6286	2513	290	0	0	16	1730	0	42674
Runoff Pervious Areas (m^3/yr)	5931	0	0	1068	0	0	24577	215	0	5143	3770	237	0	0	13	2114	0	43069
Runoff Impervious Areas (m^3/yr)	0	65120	16280	0	18323	1222	0	0	26141	0	0	0	3613	1204	0	0	8794	140696
Total Runoff (m^3/yr)	5931	65120	16280	1068	18323	1222	24577	215	26141	5143	3770	237	3613	1204	13	2114	8794	183765
Total Outputs (m^3/yr)	33917	81400	20350	6108	22903	1527	140542	1369	32676	32676	17963	1506	4517	1506	86	10992	10992	421028
Difference (Inputs - Outputs)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Notes:

*Evaporation from impervious areas was assumed to be 20% of precipitation.

Asphalt has 0% infiltration capability

Low Density Single Lots: Assume rooftops cover about 60% of the lot. Driveways cover about 15% of the lot; Grass (lawns) cover about 25% of the lot.

Medium Density 5-storey building lot: Assume rooftops cover about 60% of the lot. Parking areas cover about 20% of the lot; Grass (lawns) cover about 20% of the lot.

Medium Density Townhouse Lots: Assume rooftops cover about 75% of the lot. Driveways cover about 5% of the lot; Grass (lawns) cover about 20% of the lot.

Commercial Lots: Based upon information provided to GHD, assume rooftops covers about 13% of the lot. Asphalt parking covers about 80% of the lot; Landscaping covers about 7% of the lot.

Road ROWs assumed to be 50% asphalt and 50% grass

Appendix F.4

Water Budget Post-Development - With Downspout Disconnection Mitigation Strategies

Catchment Designation	**POST-DEVELOPMENT SITE**																	**TOTAL**
	Low Density - Blocks A,B,C - 329 units			**Med. Density - Townhouses**			**Natural**	**Road**	**Road ROWs**		**Parkland**	**Medium Density - 5-storey bldg**			**Easement**	**SWM Pond**		
	Lawns	Rooftops	Driveways	Lawns	Rooftops	Driveways	**Heritage**	**Widening**	Asphalt	Grass	**& Trails**	Landscaping	Rooftops	Asphalt		Grass	Pond	
Area (m^2)	39650	95160	23790	7140	26775	1785	164300	1600	38200	38200	21000	1760	5280	1760	100	12850	12850	492200
Pervious Area (m^2)	39650	0	0	7140	0	0	164300	1600	0	38200	21000	1760	0	0	100	12850	0	286600
% Pervious	8.1%	0%	0%	1%	0%	0%	33.4%	0.3%	0%	7.8%	4.3%	0.4%	0%	0%	0.02%	2.6%	0%	58.2%
Impervious Area (m^2)	0	95160	23790	0	26775	1785	0	0	38200	0	0	0	5280	1760	0	0	12850	205600
% Impervious	0%	19.3%	4.8%	0%	5.4%	0.4%	0%	0%	7.8%	0%	0%	0%	1.1%	0.4%	0%	0%	2.6%	41.8%
	INFILTRATION FACTORS																	
Topography Infiltration Factor	0.15	0	0	0.15	0	0.2	0.1	0.2	0.2	0.2	0.2	0.2	0	0	0.2	0.1	0	
Soil Infiltration Factor	0.2	0	0	0.2	0	0	0.2	0.2	0	0.2	0.2	0.2	0	0	0.2	0.2	0	
Land Cover Infiltration Factor	0.15	0	0	0.15	0	0	0.2	0.15	0	0.15	0	0.15	0	0	0.15	0.15	0	
MECP Infiltration Factor	0.5	0	0	0.5	0	0.2	0.5	0.55	0.2	0.55	0.4	0.55	0	0	0.55	0.45	0	
Actual Infiltration Factor	0.5	0	0	0.5	0	0	0.5	0.55	0	0.55	0.4	0.55	0	0	0.55	0.45	0	
Runoff Coefficient	0.5	1	1	0.5	1	1	0.5	0.45	1	0.45	0.6	0.45	1	1	0.45	0.55	1	
Runoff from Impervious Surfaces*	0	0.8	0.8	0	0.8	0.8	0	0	0.8	0	0.8	0	0.8	0.8	0	0	0.8	
	INPUTS (PER UNIT AREA)																	
Precipitation (mm/yr)	855	855	855	855	855	855	855	855	855	855	855	855	855	855	855	855	855	855
Run On (mm/yr)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Other Inputs (mm/yr)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Inputs (mm/yr)	855	855	855	855	855	855	855	855	855	855	855	855	855	855	855	855	855	855
	OUTPUTS (PER UNIT AREA)																	
Precipitation Surplus (mm/yr)	299	684	684	299	684	684	299	299	684	299	299	299	684	684	299	299	684	460
Net Surplus (mm/yr)	299	684	684	299	684	684	299	299	684	299	299	299	684	684	299	299	684	460
Evaportranspiration (mm/yr)	556	171	171	556	171	171	556	556	171	556	556	556	171	171	556	556	171	395
Infiltration (mm/yr)	150	0	0	150	0	0	150	165	0	165	120	165	0	0	165	135	0	87
%Rooftop Required to Meet Pre-Development	--	32%	--	--	32%	--	--	--	--	--	--	--	32%	--	--	--	--	
Rooftop Infiltration (mm/yr)	0	218	0	0	218	0	0	0	0	0	0	0	218	0	0	0	0	56
Total Infiltration (mm/yr)	150	218	0	150	218	0	150	165	0	165	120	165	218	0	165	135	0	143
Runoff Pervious Areas	150	0	0	150	0	0	150	135	0	135	180	135	0	0	135	165	0	88
Runoff Impervious Areas	0	467	684	0	467	684	0	0	684	0	0	0	467	684	0	0	684	230
Total Runoff (mm/yr)	150	467	684	150	467	684	150	135	684	135	180	135	467	684	135	165	684	317
Total Outputs (mm/yr)	855	855	855	855	855	855	855	855	855	855	855	855	855	855	855	855	855	855
Difference (Inputs - Outputs)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	INPUTS (VOLUMES)																	
Precipitation (m^3/yr)	33917	81400	20350	6108	22903	1527	140542	1369	32676	32676	17963	1506	4517	1506	86	10992	10992	421028
Run On (m^3/yr)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Other Inputs (m^3/yr)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Inputs (m^3/yr)	33917	81400	20350	6108	22903	1527	140542	1369	32676	32676	17963	1506	4517	1506	86	10992	10992	421028
	OUTPUTS (VOLUMES)																	
Precipitation Surplus (m^3/yr)	11862	65120	16280	2136	18323	1222	49154	479	26141	11428	6283	527	3613	1204	30	3844	8794	226439
Net Surplus (m^3/yr)	11862	65120	16280	2136	18323	1222	49154	479	26141	11428	6283	527	3613	1204	30	3844	8794	226439
Evaportranspiration (m^3/yr)	22054	16280	4070	3971	4581	305	91388	890	6535	21248	11681	979	903	301	56	7148	2198	194589
Infiltration (m^3/yr)	5931	0	0	1068	0	0	24577	263	0	6286	2513	290	0	0	16	1730	0	42674
Rooftop Infiltration (m^3/yr)	0	20707	0	0	5826	0	0	0	0	0	0	0	1149	0	0	0	0	27682
Total Infiltration (m^3/yr)	5931	20707	0	1068	5826	0	24577	263	0	6286	2513	290	1149	0	16	1730	0	70356
Runoff Pervious Areas (m^3/yr)	5931	0	0	1068	0	0	24577	215	0	5143	3770	237	0	0	13	2114	0	43069
Runoff Impervious Areas (m^3/yr)	0	44413	16280	0	12496	1222	0	0	26141	0	0	0	2464	1204	0	0	8794	113015
Total Runoff (m^3/yr)	5931	44413	16280	1068	12496	1222	24577	215	26141	5143	3770	237	2464	1204	13	2114	8794	156083
Total Outputs (m^3/yr)	33917	81400	20350	6108	22903	1527	140542	1369	32676	32676	17963	1506	4517	1506	86	10992	10992	421028
Difference (Inputs - Outputs)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Notes:

*Evaporation from impervious areas was assumed to be 20% of precipitation.

Asphalt has 0% infiltration capability

Low Density Single Lots: Assume rooftops cover about 60% of the lot. Driveways cover about 15% of the lot; Grass (lawns) cover about 25% of the lot.

Medium Density Townhouse Lots: Assume rooftops cover about 75% of the lot. Driveways cover about 5% of the lot; Grass (lawns) cover about 20% of the lot.

Medium Density 5-storey Residential lot: Assume rooftops cover about 60% of the lot. Asphalt covers about 20% of the lot; Grass (lawn) cover about 20% of the lot.

Road ROWs assumed to be 50% asphalt and 50% grass

Appendix F.5

Water Budget Summary

PARAMETER	SITE				
	Pre-Development	***Post-Development No Mitigation***	***Difference Pre- vs. Post-***	***Post-Development With Mitigation***	***Difference Pre- vs. Post-***
INPUTS (VOLUMES)					
Precipitation (m^3/yr)	421028	421028	0%	421028	0%
Run On (m^3/yr)	0	0	0%	0	0%
Other Inputs (m^3/yr)	0	0	0%	0	0%
Total Inputs (m^3/yr)	421028	421028	0%	421028	0%
OUTPUTS (VOLUMES)					
Precipitation Surplus (m^3/yr)	148335	226439	53%	226439	53%
Net Surplus (m^3/yr)	148335	226439	53%	226439	53%
Evapotranspiration (m^3/yr)	272693	194589	-29%	194589	-29%
Infiltration (m^3/yr)	70200	42674	-39%	42674	-39%
% Rooftop Runoff to balance infiltration	--	--	--	32%	--
Rooftop Infiltration (m^3/yr)	156	0	0%	27682	--
Total Infiltration (m^3/yr)	70356	42674	-39%	70356	0%
Runoff Pervious Areas (m^3/yr)	77512	43069	-44%	43069	-44%
Runoff Impervious Areas (m^3/yr)	467	140696	--	113015	--
Total Runoff (m^3/yr)	77979	183765	136%	156083	100%
Total Outputs (m^3/yr)	421028	421028	0%	421028	0%

To maintain pre-development infiltration values; 32% of post-development rooftop runoff needs to be infiltrated.

about GHD

GHD is one of the world's leading professional services companies operating in the global markets of water, energy and resources, environment, property and buildings, and transportation. We provide engineering, environmental, and construction services to private and public sector clients.

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