FUNCTIONAL SERVICING AND STORMWATER MANAGEMENT REPORT
IN SUPPORT OF RE-ZONING APPROVAL APPLICATIONS

One Heron's Hill Way
City of Toronto
North York District

counterpoint ENGINEERING

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File Number: 19049

Prepared For:

Paradise Developments Heron's Hill Inc.

1	Issued for OPA & Re-Zoning	April 3, 2020
No.	**Revision**	**Date**

EXECUTIVE SUMMARY

This Functional Servicing and Stormwater Management Report has been prepared on behalf of "Paradise Developments Heron's Hill Inc." in support of a Re-Zoning application, to provide for site specific regulations for the site. This Report presents a site servicing strategy for the proposed redevelopment that addresses the requirements of the applicable regulatory agencies and provides the basis for detailed servicing design. The servicing strategy for the proposed development is summarized as follows:

WATER SERVICING:

- The proposed development is to be serviced by two (2) connection to the existing 300mmø watermain located on Heron's Hill Way. The water demand requirement of the proposed development for Maximum Day Demand plus Fire Flow is **5,109 L/min**. The proposed development results in an increase in Maximum hour and Maximum Day demand.

FOUNDATION DRAINAGE:

- The short-term discharge rate is estimated to be **413 m^3/day**. This equates to lower than the proposed sanitary discharge from the site when the development is constructed. As such, there will be capacity in the downstream system subject to additional investigations currently being completed and discussed in Section 5.0 of this Report.
- The Long-term discharge rate is estimated to be **6 m^3/day**. This small amount of discharge has been included in the proposed sanitary discharge from the site. As such, there will be capacity in the downstream system for this flow. Refer to Hydrogeological assessment in Appendix 'C' of this Report.
- The quality limits for discharge to the sanitary sewer will satisfy the limits as listed in Table 1 – Limits for Sanitary and Combined Sewer Discharge.

SANITARY SERVICING:

- The proposed development is to be serviced by a new sanitary connection to the existing 300 mmø sanitary sewer located on Heron's Hill Way. The peak sanitary

design flow of the proposed development is **6.94 L/s** (including anticipated groundwater foundation drainage).

- A review of the existing and proposed sewer system using an InfoWorks CS model upstream and downstream of the proposed development was analyzed. For existing and proposed conditions, the downstream sanitary sewer system indicates no surcharging in the dry conditions.
- During the wet condition modeling significant surcharging was present. However, the HGL remains at acceptable levels well below the 1.8 m from the ground surface
- The increase in sanitary flows in post-development conditions is marginal however as discussed in Section 5.0, external downstream upgrades are not required for this development to proceed.

STORMWATER SERVICING:

- The entire development will be serviced by a new storm connection to the existing 750mmø storm sewer on Heron's Hill Way. The City of Toronto's *Wet Weather Flow Management Policy* identifies performance objectives for runoff from new development sites including water quantity, quality and water balance.

- Quantity - Quantity control will be provided on-site by approximately **151m^3** of underground storage tank in combination with an inlet control to ensure that the 100-year post development peak flows are attenuated to the 2-year predevelopment allowable release rate.

- Water Balance – A water balance volume of **10.8 m^3** will be provided within the underground storage tank below the outlet pipe. Details of internal reuse to be provided by the mechanical consultant.

- Quality – Roof and landscape (non-vehicle) coverage is approximately 95% of the total site area. Runoff from rooftop surfaces and landscape area are considered clean discharge and quality control is not required for this drainage. However, during SPA if quality control measures are required, they will be added to the design.

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	Site Plan, Prepared by by Graziani + Corazza Architects Inc.
Appendix B	Water Demand Calculations
Appendix C	Sanitary Design Flow Calculations
	Geohydrology Assessment, Prepared by Soil Engineer Inc.
	Basement flooding Area 30 Infoworks Model data
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1.0 INTRODUCTION

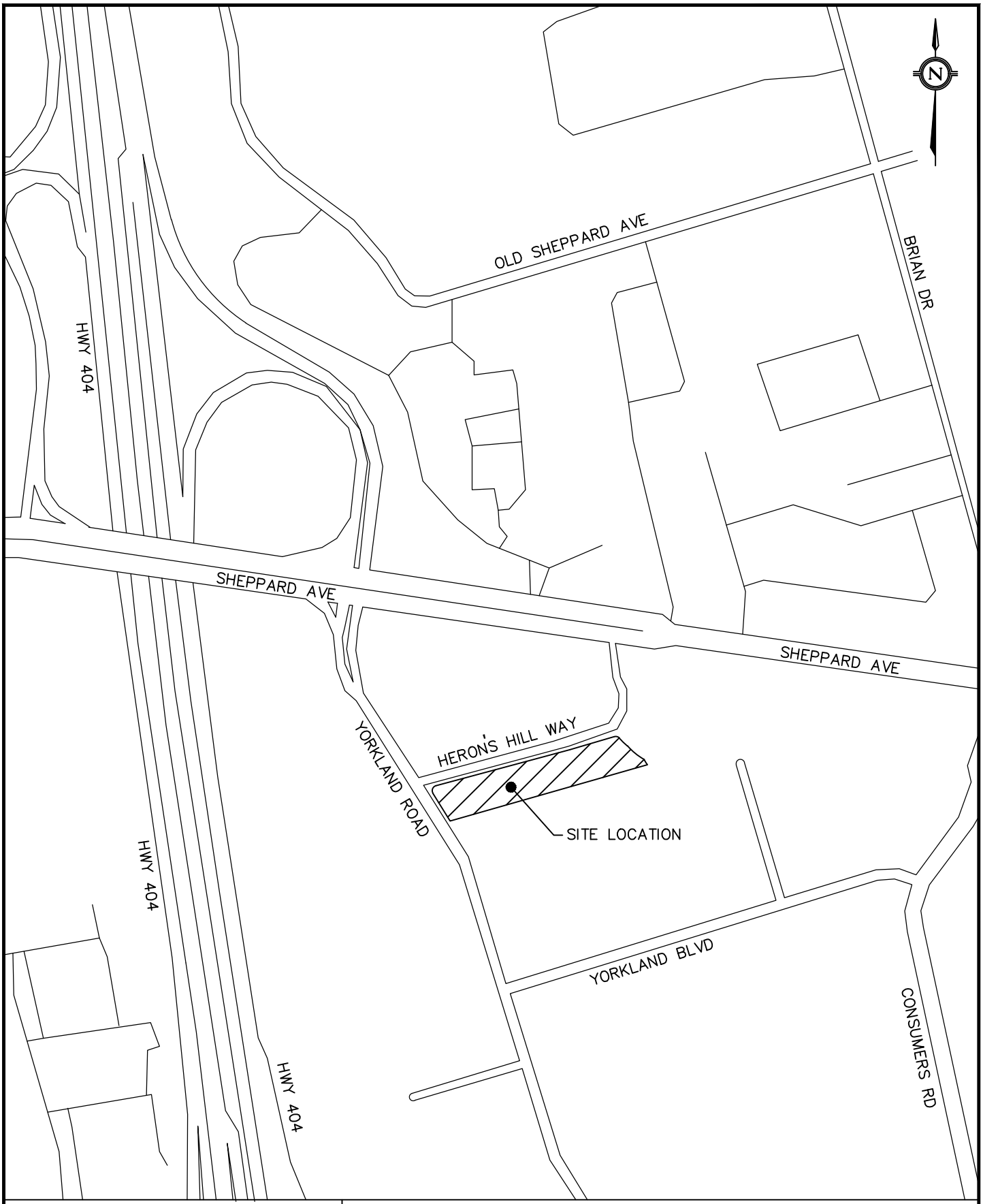
1.1 BACKGROUND

This Functional Servicing Report and Stormwater Management Report has been prepared on behalf of "Paradise Developments Heron's Hill Inc." in support of a Official Plan and Re-Zoning application for a 0.60 ha One Heron's Hill Way site. This application proposes to re-designate the former employment zoning of the subject site.

The subject site is located within ConsumersNext Secondary Plan redevelopment area in the North York District of the City of Toronto. The subject site is located at the south east corner of Yorkland Road and Heron's Hill Way. The site is bound by residential lands to the north and employment lands to the south, east and west. **Figure 1 – Site Location** illustrates the subject site within the context of its surroundings. The 0.6 ha site currently contains a two (2) storey office building with an associated surface parking area and a vacant parcel of land to the east of the parking. For the existing conditions a topographical survey of the site has also been included in **Appendix A**.

The proposed site development will maintain the existing two (2) storey office building well adding a new thirty-nine (39) storey residential building with a Four (4) storey podium, one underground level of parking and a pops space between the two buildings. The existing surface parking will be removed and supplied as part of the underground/podium parking structure. Refer to **Appendix A** for the Site Plan prepared by Graziani + Corazza Architects Inc.

This FSR has been prepared to address the site servicing strategy (stormwater, sanitary, and water) in support of a re-zoning application. The proposed servicing works (including stormwater conveyance) will be designed to meet City of Toronto Design Guidelines.



SITE LOCATION

counterpoint ENGINEERING
COUNTERPOINT ENGINEERING INC.
8395 Jane St., Suite 100, Vaughan, ON L4K 5Y2 Phone 905.326.1404 Fax 905.326.1405

ONE HERON'S HILL WAY
MIXED USE DEVELOPMENT
NORTH YORK, ON

DESIGNED BY: TO	DATE: NOVEMBER 2019
CHECKED BY: JF	PROJECT No. 19049
SCALE: NTS	FIGURE No. 1

2.0 STUDY PARAMETERS

This functional servicing and stormwater management report is based on the review of the following documents and drawings:

- **Architectural Plans,** prepared by Graziani + Corazza Architects Inc.
- **Geohydrology Report,** prepared by Soil Engineers Ltd.
- **Plan and Profile Drawings,** provided by City of Toronto
- **City of Toronto Wet Weather Flow Management Guidelines**, prepared by City of Toronto, Revised November 2006
- **City of Toronto Sewer Atlas Maps**, prepared by City of Toronto, Third Edition January 2010

3.0 WATER SUPPLY

3.1 EXISTING WATER SUPPLY

There is an existing 300mmø PVC watermain on the north side of Heron's Hill Way adjacent to the subject site. The existing Heron's Hill Way watermain is feed at one end from an existing 300mmø on Sheppard Avenue East and an existing 300mmø watermain on Yorkland Road at the other. There is an existing hydrant located on the North side of Heron's Hill Way Adjacent to the subject site. There is also an existing 100mmø domestic and 300mmø fire service to the existing building that will remain post redevelopment.

3.2 PROPOSED WATER SUPPLY

As the proposed Building will be greater than 84m in height, two (2) new connection to the existing 300mmø watermain located on Heron's Hill Way is proposed to service the subject site. Each connection will count as a source firefighting water as required under the building code section 3.2.9.7.(4). As per City standards the one of the proposed connect will be split prior to the property line to service both the fire and domestic needs of the proposed building. The other water connection will be a direct connection from the municipal watermain for fire water only.

The City of Toronto's design criteria states that the water demand used for watermain size selection should be sufficient to satisfy maximum day demand plus fire flow or the peak hour demand, whichever is greater. Fire flow for residential areas will not be less than 4,800 L/min for a 2-hour duration in addition to the maximum daily domestic demand, delivered with a residual pressure of not less than 140kPa. For commercial, institutional and industrial areas, the minimum fire flow available will not be less than 5,000 L/min for 4 hours, delivered with a residual pressure of not less than 140kPa. Fire demand was calculated as per the Fire Underwriter's Survey (FUS) guidelines (1999).

Refer to **Appendix B** for the supporting calculations of the following proposed flows:

- Maximum Hour Demand = 210.1 L/min
- Maximum Day Demand = 109.3 L/min
- Fire Flow Demand (2.0 hours) = 5,000 L/min
- Maximum Day Demand plus Fire Flow Demand = 5**,109 L/min** (governs)

The estimated fire flow demands for the proposed development is 5000 L/min as noted above.

A hydrant and Flow Test was conducted on the existing 300 mm watermain at a hydrant on the north side of Heron's Hill Way adjacent to the site. Based on the flow test results the existing watermain has a static pressure of 338 kPa (49 psi) and a residual pressure of 324 kPa (47 psi) at a flow of 6,942 L/min. Based on these results and utilizing the accepted calculation method of the National Fire Protection Agency (NFPA), the available flow from this main at the minimum residual pressure allowed by City of Toronto criteria of 140kPA would be **29,486 L/min**. Refer to **Appendix B** for the supporting calculations.

Based on the flow test results, the pressure and flow within the existing watermain meets the requirements to accommodate the proposed development. No external watermain upgrades are required. The flow test results for the existing watermain is included in **Appendix B**.

4.0 FOUNDATION DRAINAGE

Discharge of foundation drains to municipal sewers must be in accordance with Toronto Municipal Code, Chapter 681 Sewers. The quality limits for discharge in the sewers must satisfy the limits as listed in Table 1 – Limits for Sanitary and Combined Sewer Discharge and/or Table 2 – Limits for Storm Sewer Discharge of Chapter 681. A Permit To Take Water (PTTW) from the Ontario Ministry of the Environment and Climate Change (MOECC) through an online process is required for Short Term water taking between 50 m^3/day and 400 m^3/day. A PTTW is required for Long Term water taking from a permanent drainage system greater than 50 m^3/day. A permit is required from the City of Toronto for both short term and long term discharges to the municipal sewer system.

A Hydrogeological Assessment was prepared by Soil Engineers', dated April 2020 for the proposed development. Refer to **Appendix C** for the body of the Soil Engineering' Assessment.

<u>Short Term (Construction)</u> – Based on the current design there is no Groundwater expected during construction. However, a discharge permit will be required for Rainfall within the construction area, these rates are expected to conservatively be **413m^3/ day**. A PTTW from the MOECC will be required for construction dewatering. Most likely the discharge will be to

the 300mmø sanitary sewer located on Heron's Hill Way. Any Temporary discharge of water must meet the City of Toronto Table 1 Sanitary Sewer Discharge Limits or Table 2 Storm Sewer Discharge Limits prior to discharge to the municipal sewer. Details of the Construction (short-term) dewatering will be provided by a dewatering contractor prior to construction and will satisfy the Toronto Municipal Code, Chapter 681 Sewers in order to obtain a short-term discharge permit from the City.

Long Term Discharge – As discussed in the Soil Eng. report, the depth to ground water is +/- 5m below the proposed building. Based on the current underground design, a small amount of ground water is expected **6m^3/ day** or **0.07 l/s**. If during SPA or Working Drawings the design of the underground can not be modified to make it water tight, the proposed building will be required to enter into a long-term discharge agreement with Toronto Water.

5.0 SANITARY SERVICING

5.1 EXISTING SANITARY SERVICING

The subject site is serviced by a connection to the existing 300mmø sanitary sewer located on Heron's Hill Way that conveys flows easterly to a 375mmø sanitary sewer on Sheppard Avenue East. At Consumers Road the sanitary sewer increases to a 525mmø and flows south within an easement just east of the existing intersection. Ultimately, the local sewer connects to the Don River Trunk sewer just west of the end of the north/south leg of Consumers Road. Please note that the subject site is located within the ConsumersNext redevelopment area. Upon further review of the ConsumersNext existing and proposed InfoWorks models, the redeveloped area known as Heron Hill (location of the subject site) was not correctly included within the conditions. As such, we have remodeled the area in both the existing dry and existing extreme conditions and added any new developments that have come online since the original modeling was done.

5.2 PROPOSED SANITARY SERVICING

The subject site will be serviced by a new connection from the existing 300mmø sanitary sewer located on Heron's Hill Way and will maintain an existing connection draining the remaining office use.

Using the City of Toronto Sanitary Design criteria, the equivalent population for the proposed residential development is approximately **634 persons**. The peak sanitary flow for the proposed development has been calculated to be **6.94 L/s**. Refer to **Appendix C** for detailed calculations. The proposed development results in an increase of **6.94 L/s** in the peak sanitary flow to the existing 300mmø sanitary sewer on Heron's Hill Way. This represents a marginal increase in flow to the larger sanitary sewer.

Notwithstanding the above marginal increase in sanitary flow, a detailed analysis of the sanitary sewer system from immediately upstream of the proposed development to the downstream outlet to the Don Valley Wastewater Trunk under both dry and wet weather flow conditions was undertaken. The detailed analysis incorporated new developments/re-developments within the drainage boundary and utilized the InfoWorks Model for Basement Flooding Area 30.

The analysis determined that for the proposed development:

- Under existing and proposed conditions, the sanitary sewer system operates under normal conditions within with in all sewer legs during dry-weather conditions;
- For existing and proposed conditions, the sanitary sewer system does not have capacity to accommodate the dry weather flow and the May 12, 2000 event without surcharge. However, at no time does the HGL rise to within 1.8 m of the surface elevation for the downstream sewer legs.

Based on the downstream analysis there are no proposed upgrades required to the existing municipal system to accommodate the subject site. Refer to **Appendix C** for infoWorks Model output.

6.0 STORMWATER SERVICING

6.1 EXISTING STORMWATER SERVICING

There is an existing 750mmø concrete storm sewer located on Heron's Hill Way that currently drains the subject site. From Heron's Hill Way the storm discharge flows north-easterly to Sheppard Avenue East and then east to Consumers Road. The storm flows travel south to the end of the north/south leg of Consumers Road and from there the flow work their way

south west and ultimately discharge to a branch of the East Don River south of the 401 highway. Based on the existing site conditions, all storm runoff is directed to the adjacent road allowance.

6.2 EXISTING DRAINAGE

The subject site contains a two storey office building that comprises 0.168 ha of the 0.60 ha site. Based on the existing servicing plan, the entire block has been designed to meet the city of Toronto's wet weather flow design guidelines. As such, the subject site in the existing condition meets the Quality, Quantity and Water Balance criteria of the City of Toronto. Refer to the **Existing Site Servicing Plan** in **Appendix D** of the report.

6.3 ALLOWABLE RELEASE RATE

The sites imperviousness under existing conditions is higher than 50%. Under Wet Weather Guidelines the maximum value of C (Runoff Coefficient) used in calculating the pre-development peak runoff rate is limited to 0.50 for the 2-year storm event. As the existing property is greater than 50% impervious this rule applies.

The allowable minor system discharge from the subject site is calculated using the 0.60 ha at a runoff coefficient of 0.5 as follows:

$$\mathbf{Q_A = C \times A \times i \times N\ (l/s)}$$

Table 2 - Allowable Release Rate

Variables	Site
A - Site Area (ha)	0.55
Tc (min)	10
C - Runoff Coefficient	0.50
i - Intensity	88.19
N – Constant	2.778
Q - Release Rate (l/s)	**67.4**

The allowable release rate to the 750mmø concrete storm sewer on Heron's Hill Way is **67.4 l/s**. Refer to **Appendix D** for allowable release rate calculations.

6.4 PROPOSED STORMWATER SERVICING

This report has been prepared in accordance with the criteria set by the City of Toronto Weather Flow Management Guidelines (WWFMG). The entire site will be serviced by a new connection to the existing 750mmø concrete storm sewer on Heron's Hill Way.

6.5 QUANTITY CONTROL

The allowable site release rate for the proposed development was determined by calculating the 2-year peak flow with a maximum value of 50% impervious as per the City of Toronto Wet Weather Flow Management Guidelines. The allowable release rate to the 750mmø concrete storm sewer on Heron's Hill Way is **67.4 l/s**.

Quantity control will be provided on-site by an underground storage tank within the building on the P1 level in combination with an outlet control device to ensure that the 100-year post redevelopment peak flows from the site are attenuated to the 2 year allowable release rate of **67.4 L/s**. Please note that the outlet control and size will be provided at the time of site plan approval. A storage volume of approximately **151m^3** will be required to control the 100-year post development flows to the allowable release rate. Note that an additional **10.8 m^3** volume will be provided for the water reuse cistern portion of the tank. Refer to **Appendix D** for detailed calculations.

Table 3 – Peak Flow and Storage Summary - 100-Year Storm Event

Area ID	Area (ha)	Runoff Coefficient	Storage Available (m^3)	Storage Required (m^3)	Allowable Release Rate (L/s)	Description	Orifice Size (mm)	Actual Release Rate (L/s)
SITE	0.55	0.83	151	151	67.4			

1. On-site storage will be provided via an underground storage tank located within the building.
2. Refer to **Appendix D** for modified rational calculations.
3. Refer to **Appendix D** for orifice sizing.

Refer to **Appendix D** for storage volume calculations.

In situations where the Orifice Control is not sufficient (events greater than the 100yr or a broken watermian), the at grade access lid to the underground storage tank located in the p1 of the development will allow water to discharge overland to Heron's Hill Way. The access lid

is to be as per OPSD 401.010 – Type B – Open Cover. The required water reuse volume will be available below the outlet invert and is discussed in further detail later in this report in

There may be runoff from rainstorms that exceeds the capacity of the City's storm service connections. Therefore, the owner shall be responsible to provide flood protection or a safe overland flow route for the proposed development without causing damage to the proposed and adjacent public and private properties.
Existing drainage patterns on adjacent properties shall not be altered and stormwater runoff from the subject development shall not be directed to drain onto adjacent properties.

The design of all internal piping within the building must provide adequate capacity for full capture and conveyance of all flows generated by storms up to and including the 100-year rainfall event. All design and associated calculations for the internal storm system, including the design of the internal inlet structures, piping and mechanical appurtenances is to be completed by the Mechanical Engineer.

6.6 WATER BALANCE

The City of Toronto's Guidelines require that 5mm rainfall events must be retained on-site through infiltration, water reuse and/or evapotranspiration. To achieve the water balance objectives, the site was categorized by surface types: impervious asphalt/paved/roof and landscaped areas. The initial abstraction values for the impervious surfaces and pervious surfaces were 1 mm and 5 mm, respectively. The initial abstraction was determined based on percent of surface area and initial abstraction values of each surface type. On a preliminary basis the water balance target has been calculated based on the site area of 0.55 ha and a 5 mm storm event to be approximately **27.5 m^3** of required water balance volume. Without any specific on-site retention measures, the proposed development would achieve the following levels of water balance as seen in **Table 4**.

Table 4 – Achieved Water Balance

Site Description	Fraction of Site Area		Initial Abstraction (mm)	Overall Initial Abstraction (mm)
Impervious Roof Area	29%	0.158 ha	1.0	0.29
Green Roof Area	09%	0.047 ha	5.0	0.45
Asphalt	20%	0.110 ha	1.0	0.20
Pervious Area	39%	0.235 Ha	5.0	2.11
Total	**100%**	**0.55** ha		**3.05**

Based on **Table 4,** the site will have a shortfall of 2.12 mm (5 mm – 2.88 mm) of initial abstraction. This is equivalent to approximately **10.8 m^3** of storage. To achieve water balance requirements, a water re-use system will be employed to provide the additional storage indicated above.

The re-use storage tank will form part of the underground stormwater storage tank provided for quantity control. The underground storage tank will outlet at an elevation such that **10.8 m^3** will be available below the outlet invert for re-use.

6.7 QUALITY CONTROL

The proposed building covers the majority of the site resulting in the majority of site runoff being generated from rooftop or landscape surfaces. Runoff from rooftop and Landscape surfaces are generally considered to be clean and does not require water quality treatment. As such no quality control measures are proposed for the site to achieve 80% TSS removal. However, at the time of detailed design the need for a quality control device will be investigated, and if required a system will be designed to achieve the minimum 80% TSS removal.

7.0 CONCLUSIONS

This Functional Servicing Report presents a site servicing strategy for the proposed development that addresses the requirements of the applicable design guidelines and provides the basis for detailed servicing design.

We trust this report sufficiently addresses the site servicing requirements and allows for approval of the proposed re-zoning approval of the subject site for the proposed use described

herein. Should there be any questions or comments, please feel free to contact the undersigned.

Sincerely,
Counterpoint Engineering Inc.

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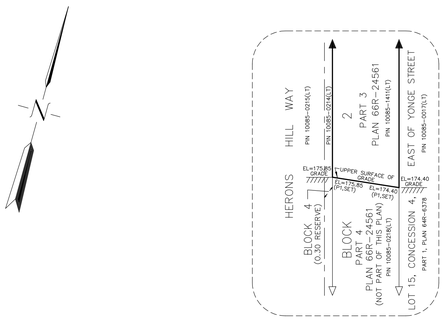
Appendix A



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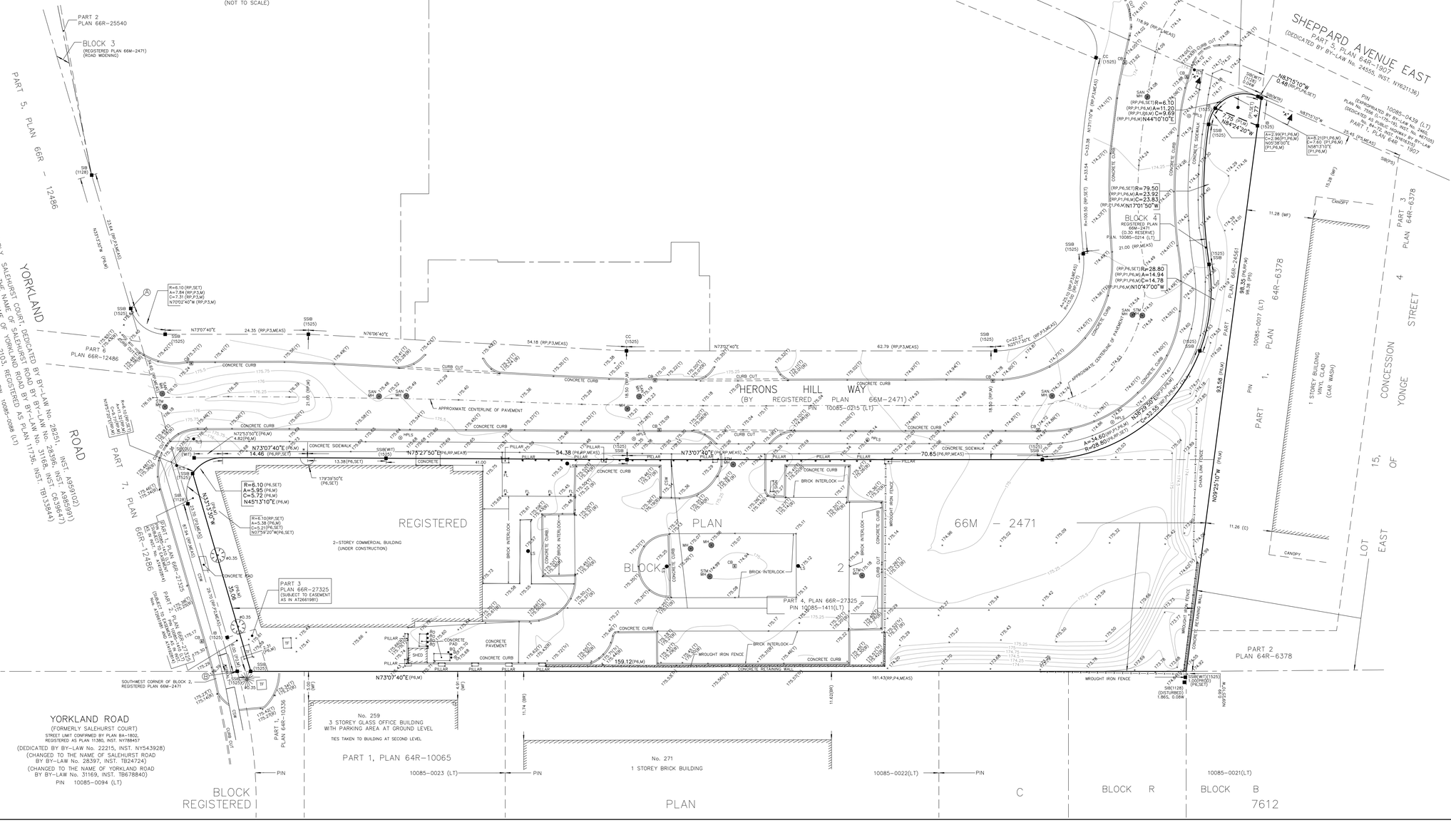

TOPOGRAPHIC AND BOUNDARY SURVEY OF

PART OF BLOCK 2
REGISTERED PLAN 66M – 2471

CITY OF TORONTO
(FORMERLY CITY OF NORTH YORK)

SCALE 1 : 300

5m 4 3 2 1 0 5 10 15 20m

R. AVIS SURVEYING INC.

METRIC : DISTANCES SHOWN ON THIS PLAN ARE IN METRES AND CAN BE CONVERTED TO FEET BY DIVIDING BY 0.3048.

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NOTES AND LEGEND :

BEARINGS SHOWN HEREON ARE GRID BEARINGS AND ARE DERIVED FROM HORIZONTAL CONTROL MONUMENTS No. 02019824011 AND No. 02019864011 AND ARE REFERRED TO THE 3° MODIFIED TRANSVERSE MERCATOR GRID PROJECTION, ZONE 10, CENTRAL MERIDIAN 79°30' WEST LONGITUDE, NAD 83(CSRS)(1997.0)

INTEGRATION DATA

OBSERVED REFERENCE POINTS (ORPL3s) DERIVED FROM HORIZONTAL CONTROL MONUMENTS No. 02019824011 AND No. 02019864011 AND ARE REFERRED TO MTM ZONE 10, NAD 83(CSRS)(1997.0).

COORDINATE VALUES ARE TO AN URBAN ACCURACY PER SEC. 14(2) OF O. REG. 216/10.

POINT ID	NORTHING	EASTING
HCM 02019824011	4848462.231	317848.860
HCM 02019864011	4848501.600	317571.171
ORP A	4848299.855	317916.914
ORP B	4848246.061	317952.138

COORDINATES CANNOT, IN THEMSELVES, BE USED TO RE-ESTABLISH CORNERS OR BOUNDARIES SHOWN ON THIS PLAN.

ELEVATIONS SHOWN HEREON ARE GEODETIC AND ARE REFERRED TO CITY OF TORONTO BENCH MARK No. NY29024, HAVING AN ELEVATION = 176.998 metres.

DISTANCES ARE GROUND AND CAN BE CONVERTED TO GRID BY MULTIPLYING BY THE COMBINED SCALE FACTOR OF 0.99987445

■	DENOTES	SURVEY MONUMENT FOUND
□	DENOTES	SURVEY MONUMENT PLANTED
SIB	DENOTES	STANDARD IRON BAR
SSIB	DENOTES	SHORT STANDARD IRON BAR
IB	DENOTES	IRON BAR
CC	DENOTES	CUT CROSS
WIT	DENOTES	WITNESS
OU	DENOTES	ORIGIN UNKNOWN
MEAS/M	DENOTES	MEASURED
N,S,E,W	DENOTES	NORTH, SOUTH, EAST, WEST
MTR	DENOTES	CITY OF TORONTO ROADS AND TRAFFIC DEPARTMENT
RP	DENOTES	REGISTERED PLAN 66M-2471
P1	DENOTES	PLAN 66R-24561
P2	DENOTES	PLAN 66R-25314
P3	DENOTES	PLAN 66R-25540
P4	DENOTES	PLAN 66R-12486
P5	DENOTES	PLAN 64R-6378
P6	DENOTES	PLAN 66R-27325
1128	DENOTES	DAVID HORWOOD LTD., O.L.S.
1525	DENOTES	R. AVIS SURVEYING INC., O.L.S.
*	DENOTES	UNSUITABLE FOR MONUMENTATION
BO	DENOTES	BOLLARD
(B)	DENOTES	BOTTOM OF CURB
CB	DENOTES	CATCH BASIN
CLF	DENOTES	CHAIN LINK FENCE
CONC	DENOTES	CONCRETE
CRW	DENOTES	CONCRETE RETAINING WALL
CSW	DENOTES	CONCRETE SIDEWALK
FL	DENOTES	FLOOD LIGHT
HPLS	DENOTES	HYDRO POLE LIGHT STANDARD
LS	DENOTES	LIGHT STANDARD
MH	DENOTES	MANHOLE
SAN MH	DENOTES	SANITARY MANHOLE
STM MH	DENOTES	STORM MANHOLE
TLS	DENOTES	TRAFFIC LIGHT STANDARD
TF	DENOTES	TRANSFORMER
(T)	DENOTES	TOP OF CURB
(TF)	DENOTES	TOP OF RETAINING WALL
WF	DENOTES	WROUGHT IRON FENCE
0.10Ø	DENOTES	CONIFEROUS TREE WITH TRUNK DIAMETER 0.10 metres
0.10Ø	DENOTES	DECIDUOUS TREE WITH TRUNK DIAMETER 0.10 metres
+ 000.00	DENOTES	SPOT ELEVATION
	DENOTES	EXTENT OF PART NOT LIMITED VERTICALLY

– THE SITE IS STILL UNDER CONSTRUCTION DURING THE FIELD SURVEY(DECEMBER 21, 2017)

AREA: 6491.0 sq. m.

SURVEYOR'S CERTIFICATE :

I CERTIFY THAT :

1. THIS SURVEY AND PLAN ARE CORRECT AND IN ACCORDANCE WITH THE SURVEYS ACT, THE SURVEYORS ACT AND THE REGULATIONS MADE UNDER THEM.
2. THE SURVEY WAS COMPLETED ON THE 21st DAY OF DECEMBER, 2017.

JANUARY 3, 2018
DATE

PIRATHEEPAN RAMACHANDRAN
Ontario Land Surveyor

R. AVIS SURVEYING INC.
SUITE 203
235 YORKLAND BOULEVARD
TORONTO, ONTARIO
M2J 4Y8
TEL.: (416) 490-8352 FAX: (416) 491-6206
www.ravissurveying.com

CHECKED BY : P.R., O.L.S.	
CALCULATED BY: SR/JB	PROJECT No. : 2301-20
DRAWN BY : SR/JB	DRAWING No. : 2301-20T-A.DWG

existing
podium B
3 storeys

existing
tower B
33 storeys

balcony

existing
podium C
5 Storeys

PARCEL 1
Existing

existing
recreation
3 Storeys

existing
tower C
25 Storeys

garage access

exhaust shaft at grade

proposed gas meter station

mech.

Siamese Connections at grade

exhaust shaft

intake shaft

intake shaft at grade

Siamese Connections at grade

Fire Hydrant

main entry

garage access

Phase 3

Phase 1

HERONS HILL WAY

LAY-BY / DROP OFF PARKING

Fire Route

Siamese Connections

Main Entry

pylon sign

secondary entry

exit

EXISTING OFFICE BUILDING
2 Storeys + Mech
23,980 ft2 (2,227 m2)

(Zoning=*2 Storeys)
(OBC=*2 Storeys)
(25 m max.height)

green roof

outdoor landscaped area

OPEN SPACE
"P.O.P.S."
550 m2

1 HERON'S HILL SERVICE WALKWAY

GREEN ROOF
88 m2
947 ft2

PROPOSED 39 ST. MIXED-USE BUILDING
(PROPOSED RESIDENTIAL & OFFICE)

TERRACES

BALC.

GREEN ROOF
139 m2
1,496 ft2

OUTDOOR AMENITY AT 5TH FLOOR

4 ST.

GREEN ROOF
241m2
2,594ft2

LINE OF UNDERGROUND BELOW

LINE OF 2ND FL. ABOVE

PROPOSED PUBLIC ROAD AS PER CONSUMERS NEXT SECONDARY PLAN MAP 38-3 PUBLIC STREETS PLAN

masonry screen wall

No. 259
3 STOREY GLASS OFFICE BUILDING
WITH PARKING AREA AT GROUND LEVEL
TIES TAKEN TO BUILDING AT SECOND LEVEL

No. 271
1 STOREY BRICK BUILDING

PARCEL 2

This drawing, as an instrument of service, is provided by and is the property of Graziani + Corazza Architects Inc. The contractor must verify and accept responsibility for all dimensions and conditions on site and must notify Graziani + Corazza Architects Inc. of any variations from the supplied information. Graziani + Corazza Architects Inc. is not responsible for the accuracy of survey, structural, mechanical, electrical, etc., engineering information shown on this drawing. Refer to the appropriate engineering drawings before proceeding with the work. Construction must conform to all applicable codes and requirements of the authorities having jurisdiction. Unless otherwise noted, no investigation has been undertaken or reported on by this office in regards to the environmental condition of this site.

This drawing is not to be scaled. All architectural symbols indicated on this drawing are graphic representations only.

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1. MAR.18.2020 ISSUED FOR REZONING J. CHI.

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GRAZIANI + CORAZZA ARCHITECTS INC.
ONTARIO ASSOCIATION OF ARCHITECTS
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1320 Shawson Drive, Suite 100 Mississauga Ontario L4W 1C3
Phone. 905.795.2601 Fax.905.795.2844 www.gc-architects.com

PROPOSED 39 ST. MIXED-USE BUILDING
(PROPOSED RESIDENTIAL & OFFICE)

PARADISE DEVELOPMENTS HERON'S HILL INC.

HERONS HILL WAY + SHEPPARD AVE. E
NORTH YORK ONTARIO

Project Architect:	E. Corazza
Assistant Designer:	J. Chimienti
Drawn By:	J. Chimienti
Checked By:	D. Biase
Plot Date:	MAR.17.2020
Job #	1684.19

SITE PLAN

1:250 A102

TITLEBLOCK SIZE: 610 x 900

Appendix B

Counterpoint Engineering Inc.

Water Demand Design Calculations

Project: **One Herons Hill Way**
Project No: **19049**
Location: **Toronto, Ontario**
Site Area: 0.550 ha

Population

1BR/1BR+Den	1.4	ppu
2BR/2BR+Den/	2.1	ppu
3BR/3BR+Den	3.1	ppu
Commercial / Retail	1.1	persons/100m^2
Offices	3.3	persons/100m^2

	Residential Units			
	1B / 1B+D	**2B / 2B + D**	**3B / 3B+D**	**Total Units**
Level 1-4	0	0	0	0
Level 5-39	210	105	35	350
TOTAL UNITS / AREA (m^2)	**210**	**105**	**35**	350

		Population 1BR / 1B + D	**Population 2BR / 2BR + D**	**Population 3BR / 3BR + D**	**TOTAL POPULATION**
Residential		294	221	109	624
Office					10
Total Equivalent Population					**634**

City of Toronto Watermain Guidelines

Per Capita Demand

Single Family	320	(l/capita/day)
Multi-Unit	191	(l/capita/day)

Peaking Factors

Land Use	Minimum Hour	Maximum Hour	Maximum Day
Residential	0.70	2.48	1.65
Commercial	0.84	1.20	1.10
Industrial	0.84	0.90	1.10
Institutional	0.84	0.90	1.10
Apartment	0.84	2.50	1.30

*Values used for Residential (Multi-Unit) Land Use

Proposed Site

	Residential Floor Area (m^2)	Total GFA (m^2)
Ground	**1296**	**2125**
Level 2	**0**	**2719**
Level 3	**0**	**2719**
Level 4	**0**	**2719**
Level 5	**750**	**2719**
Level 6 - 39	**25500**	**25500**
TOTAL AREA (m^2)	**27546**	**38501**

Water Demand based on Equivalent Population

Land Use	Population	Minimum Hour (l/min)	Maximum Hour (l/min)	Maximum Day (l/min)	Fire Flow Required (l/min)	Fire Flow Duration (hr)*	Max Day + Fire Flow (l/min)
Residential (Multi-Unit)	634	70.6	210.1	109.3	-	-	-
Totals	**634**	**70.6**	**210.1**	**109.3**	**5000**	**2.00**	**5109**

* See attached table in Appendix B for Fire Flow Duration

Counterpoint Engineering Inc.

REQUIRED FIRE FLOW WORKSHEET - PROPOSED DEVELOPMENT
Fire Underwriters Survey

Project : **One Herons Hill Way**
Project No: **19049**

Guide for Determination of Required Flow Copyright I.S.O

$$F = 220C\sqrt{A}$$ where

F = the required fire flow in litres per minute.
C = coefficient related to the type of construction.
= 1.5 for wood frame construction (structure essentially all combustible).
= 1.0 for ordinary construction (brick or other masonry walls, combustible floor and interior).
= 0.8 for non-combustible construction (unprotected metal structural components, masonry or metal walls).
= 0.6 for fire-resistive construction (fully protected frame, floors, roof).

A = The total floor area in square metres (including all storeys, but excluding basements at least 50 percent below grade) in the building being considered.

Type of Construction		Class Factor
210	105	35.0
NC	Non-Combustible	25
LC	Limited Combustible	15
C	Combustible	0
FB	Free Burning	15
RB	Rapid Burning	25

Area Notes for Fire Resistive Buildings (from FUS manual, 1999):

If Vertical Openings are inadequately protected (less than 1-hour fire rating): Area is the total of the two largest adjoining floors (above ground level) plus 50% of the area of each of the next 8 adjoining floors above that.

If Vertical Openings are adequately protected (at least 1-hour fire rating): Area is the total of the largest floor (above ground level) plus 25% of the area of each of the next 2 immediately adjoining floors above that.

1) Fire Flow

Type of Construction:	NC
C=	0.8
A*=	1125 m^2
F=	6,000 **L/min**

Note: Assuming fire restive building. Assuming Vertical Openings are adequately protected. Area is the total of the largest floor (Level 1) plus 25% of the next 2 adjoining floors above.

2) Occupancy Reduction/Surcharge

Contents Factor:		LC		
Reduction/Surcharge of		-15%	=	-900 L/min
F=	6000L/min +	-900 L/min	=	5,000 **L/min**

3) System Type Reduction

NFPA 13 Sprinkler:	YES	30%	
Standard Water Supply:	YES	10%	
Fully Supervised:	YES	10%	
Total		50%	
Reduction of	50%	L/min =	2,500 L/min
F=	5000L/min -	2,500 L/min =	2,500 **L/min**

4) Separation Charge

Building Face	Dist(m)	Charge			
North	26.17	10%			
East	32	5%			
South	12.5	15%			
West	20	15%			
Total		45%	**of**	5000 **L/min**	= 2,250 **L/min**

(max exposure charge can be 75%)

Separation	Charge	Separation	Charge
0 to 3m	25%	20.1 to 30 m	10%
3.1 to 10m	20%	30.1 to 45m	5%
10.1 to 20m	15%		

F= 2500L/min + 2250L/min = 4,750 **L/min** (2,000L/min<F<45,000L/min)

F=	5,000	**L/min**
F=	83	**L/s**
F=	1,321	**gpm**

(round to the nearest 1,000L/min)

Counterpoint engineering

NFPA Theoretical Flow Calculations

Project Name: **One Herons Hill Way**
Project Number: **19049**

Based on National Fire Protection Association Guidelines, the available flow at the minimum residual pressure of 20psi can be calculated based on the observed flow at the observed pressure readings, as follows:

$$\mathbf{Q_F = 29.83 \times c \times d^2 \times p^{0.5}}$$, where

Q_F = observed flow (US GPM)
c = hydrant nozzle coefficient (0.90 - 0.95)
d = nozzle diameter (in)
p = observed pitot pressure

$$\mathbf{Q_R = Q_F \times h_F^{0.54} / h_R^{0.54}}$$, where

Q_R = available flow
Q_F = observed flow (US GPM)
h_F = drop from measured static to desired baseline pressure
h_R = drop from measured static to measured residual pressure

Based on flow test results obtained by **lozzi Aqua Check*, November 4th, 2018***

c =	0.9	
d =	2.5	in
number of ports =	2	
p =	30	

Q_F = 1838 US GPM

Measured Static Pressure =	49	psi	
Measured Residual Pressure =	47	psi	
Desired Residual Pressure =	20	psi	, minimum per City of Toronto design criteria

Q_R = 7789 US GPM per fire conneciton
29,486 L/min

Lozzi Aqua Check

4820 18th Sideroad

Schomberg, Ontario

L0G-1T0

Massimo Lozzi Cell: 416 990-2131

E-mail: lozziaquacheck@gmail.com

Hydrant Flow Test Form

Job Location: 1 Heron Hills Way ,Toronto

Date: November 4,2019

Test Data

Time of Test: 11:00 am

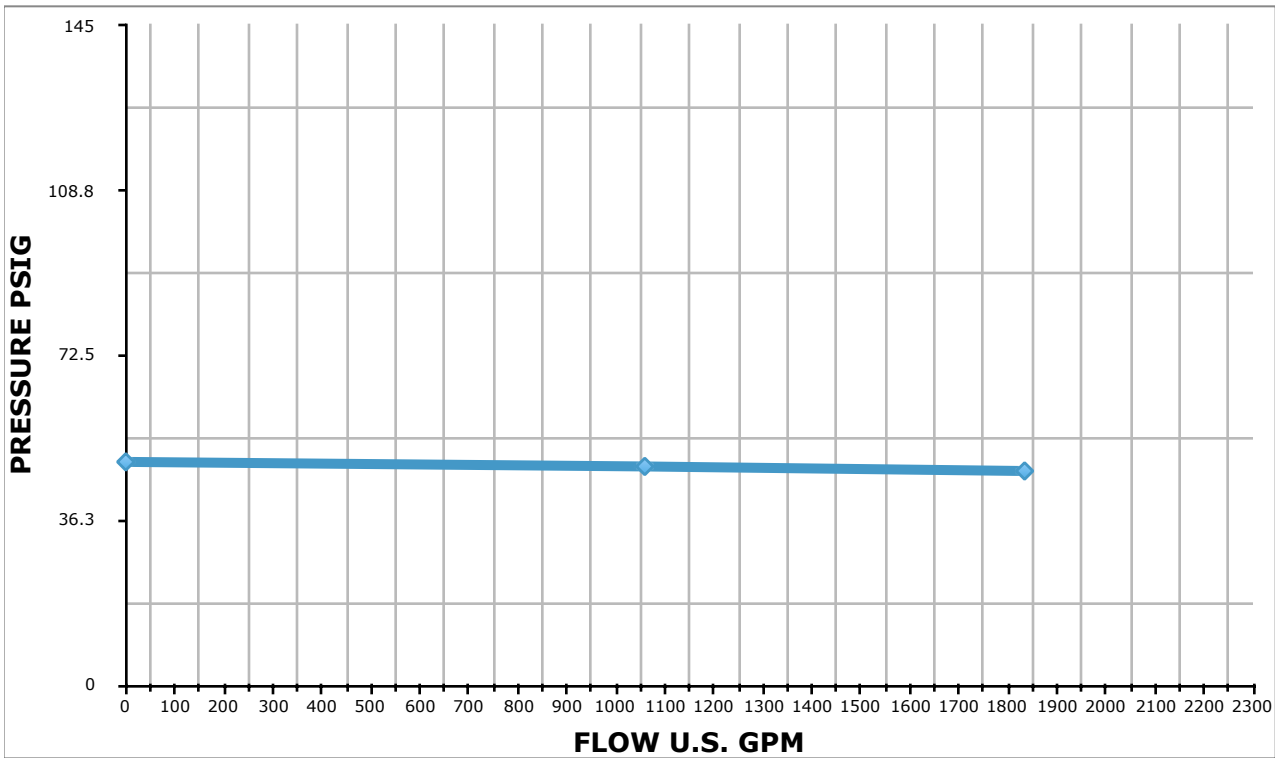
Location of Hydrant: Flow hydrant near Yorkland Rd, static the hydrant near Sheppard Ave.

Main Size:

Static Pressure: 49 psi

	Number of Outlets & Orifice Size	Pitot Pressure (psi)	Flow (U.S. G.P.M.)	Residual Pressure (psi)
1.	Static	0	0	49
2.	1 x 2 ½	40	1059	48
3.	2 x 2 ½	30	1834	47

Note :Flow test conducted in accordance with NFPA Std 291



Appendix C

Counterpoint Engineering Inc.

Project: one herons hill way
Project No: 19049
Location: Toronto
Site Area: 0.550 ha

Proposed Sanitary Flow Calculations

As per Design Criteria for Sewers and Watermains - First Edition November 2009 City of Toronto

Design flow = average daily dry weather flow x peaking factor + infiltration

Persons Per Unit and per Land Use

1BR/1BR+Den	1.4	ppu
2BR/2BR+Den/	2.1	ppu
3BR/3BR+Den	3.1	ppu
Commercial / Retail	1.1	persons/100m^2
Offices	3.3	persons/100m^2

	Residential Units			
	1B / 1B+D	**2B / 2B + D**	**3B / 3B+D**	**Total Units**
Level 1-4	0	0	0	0
Level 5 -39	210	105	35	350
TOTAL UNITS / AREA (m^2)	210	105	35	350

	Population 1BR / 1B + D	**Population 2BR / 2BR + D**	**Population 3BR / 3BR + D**	**TOTAL POPULATION**
Residential	294	221	109	624
Office				10
Total Equivalent Population				**634**

Office population based on a office area of 292 m2.

Peak flow Design Parameters

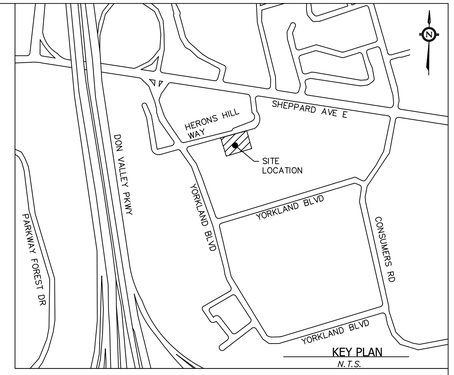
Residential Average flow	240	litres/person/day
Commercial Average flow	180,000	litres/ha/day
Infiltration	0.26	litres/second/ha

Harmon Peaking Factor

PF = 1 + (14/(4+(P/1000)$^{1/2}$))

Residential Population	**Harmon Peak Factor**
634	**3.92**

Peak Wastewater Flow	6.79	**l/s**	
Infiltration	0.14	**l/s**	
Groundwater Flows	0.00	**l/s**	*water-tight building
Flow	**6.94**	**l/s**	



LEGEND

1. MEASUREMENTS IN METRES AND/OR MILLIMETRES UNLESS OTHERWISE SHOWN.
2. CONTRACTOR TO BE RESPONSIBLE FOR LOCATION OF ALL EXISTING UNDERGROUND & OVERHEAD UTILITIES. VARIOUS UTILITIES CONCERNED TO BE GIVEN REQUIRED ADVANCE NOTICE PRIOR TO ANY DIGGING, FOR STAKE OUT. THE CONSULTANT ASSUMES NO RESPONSIBILITY FOR THE ACCURACY OF THE LOCATION OF EXISTING UTILITIES AS INDICATED ON THIS DRAWING.
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NO.	DATE	REVISION	INITIAL	SIGNED
1.			GP	MA

LEGAL & TOPOGRAPHY

BENCHMARK

counterpoint ENGINEERING
COUNTERPOINT ENGINEERING INC.
8395 Jane St., Suite 100, Vaughan, ON L4K 5Y2 Phone 905.326.1404 Fax 905.326.1405

TORONTO ENGINEERING & CONSTRUCTION SERVICES

ACCEPTED TO BE IN ACCORDANCE WITH THE CITY OF TORONTO STANDARDS. THIS ACCEPTANCE IS NOT TO BE CONSTRUED AS VERIFICATION OF ENGINEERING CONTENT.

MANAGER, ENGINEERING REVIEW

DATE:

1 HERONS HILL WAY
TORONTO, ONTARIO
SANITARY DRAINAGE PLAN

DESIGN: TO	DRAWN: TO	CHECKED: GP	CONTRACT No: 19049
SCALE: 1:3000	CITY DRAWING NUMBER:		DRAWING NUMBER: SAN-1
DATE: JANUARY 2019			

SANITARY DESIGN CALCULATIONS
InfoWorks Model Results (Scenario1 Pre-development Condition_Dry Weather)

Project Name: One herons hill
Municipality: City ofToronto
Project No.: 19049
Date: 25-Nov-19

Prepared by: R.K.
Checked by:
Last Revised: 30

Pipe ID	Condheight	CondLen	US Inv	DS Inv	Grad	Capacity	Max._Total Head	Max._DS_FLOW	DS_ Ground El.	DS_Freeboard
	(mm)	(m)	(m)	(m)	(m/m)	(m^3/s)	(m)	(m^3/s)	(m)	(m)
A30-1_SA-MH9A.1	300	8	171.809	171.729	0.010	0.097	171.749	0	175.6	3.851
A30-1_SA-MH8A.1	300	15	171.679	171.529	0.010	0.097	171.56	0.00016	175.497	3.937
A30-1_SA-MH7A.1	300	33	171.479	171.149	0.010	0.097	171.18	0.00016	175.52	4.34
A30-1_SA-MH6A.1	300	33	171.109	170.779	0.010	0.097	170.81	0.00016	175.338	4.528
A30-1_SA-MH5A.1	300	81	170.74	169.9	0.010	0.101	169.931	0.00016	174.858	4.927
A30-1_SA-MH4A.1	300	19.5	169.879	169.684	0.010	0.097	169.706	0.00016	174.649	4.943
A30-1_SA-MH3A.1	300	40	169.634	169.234	0.010	0.097	169.256	0.00016	174.187	4.931
A30-1_SA-MH2A.1	300	14.5	169.184	168.908	0.019	0.134	169.096	0.00016	174.236	5.14
4817618070.1	300	45.7	168.9	168.71	0.004	0.062	168.949	0.0469	173.721	4.772
4817018116.1	375	91.5	168.69	168.49	0.002	0.082	168.708	0.04689	173.312	4.604
4815618206.1	375	99.2	168.46	168.24	0.002	0.083	168.455	0.04688	173.238	4.783
4814118304.1	375	97.8	168.2	167.95	0.003	0.089	168.169	0.04821	173.643	5.474
4812718401.1	525	81.7	167.62	167.21	0.005	0.305	167.496	0.09782	173.622	6.126
4804718418.1	525	105.3	167.21	166.8	0.004	0.269	167.102	0.09782	173.365	6.263
4794418441.1	525	59.1	166.8	166.58	0.004	0.263	166.909	0.12752	173.268	6.359
4788618453.1	525	36.7	166.55	166.23	0.009	0.402	166.587	0.14742	173.213	6.626
4785118461.1	525	80.5	166.23	165.755	0.006	0.331	166.112	0.14742	173.701	7.589
4777218478.1	525	15	165.755	165.65	0.007	0.36	166.046	0.17443	173.786	7.74
4775818483.1	525	115.1	164.94	164.29	0.006	0.324	164.683	0.17442	175.738	11.055

Counterpoint Engineering Inc.
8395 Jane Street, Suite 100 Vaughan, Ontario L4K 5Y2
TEL: (905) 326-1404 FAX: (905) 326-1405
www.counterpointeng.com

SANITARY DESIGN CALCULATIONS
InfoWorks Model Results (Scenario 4 Post-development Condition_Extreme Condition; May 12, 2000 Storm Event)

Project Name: One herons hill
Municipality: City ofToronto
Project No.: 19049
Date: 25-Nov-19

Prepared by: R.K.
Checked by:
Model Area # 30

Pipe ID	Condheight	CondLen	US Inv	DS Inv	Grad	Capacity	Max._Total Head	Max._DS_FLOW	DS_ Ground El.	DS_Freeboard
	(mm)	(m)	(m)	(m)	(m/m)	(m^3/s)	(m)	(m^3/s)	(m)	(m)
A30-1_SA-MH9A.1	300	8	171.809	171.729	0.010	0.097	171.749	0	175.6	3.851
A30-1_SA-MH8A.1	300	15	171.679	171.529	0.010	0.097	171.625	0.00891	175.497	3.872
A30-1_SA-MH7A.1	300	33	171.479	171.149	0.010	0.097	171.245	0.00891	175.52	4.275
A30-1_SA-MH6A.1	300	33	171.109	170.779	0.010	0.097	170.875	0.00891	175.338	4.463
A30-1_SA-MH5A.1	300	81	170.74	169.9	0.010	0.101	170.441	0.00884	174.858	4.417
A30-1_SA-MH4A.1	300	19.5	169.879	169.684	0.010	0.097	170.437	0.01814	174.649	4.212
A30-1_SA-MH3A.1	300	40	169.634	169.234	0.010	0.097	170.427	0.01746	174.187	3.76
A30-1_SA-MH2A.1	300	14.5	169.184	168.908	0.019	0.134	170.422	0.0197	174.236	3.814
4817618070.1	300	45.7	168.9	168.71	0.004	0.062	170.239	0.08347	173.721	3.482
4817018116.1	375	91.5	168.69	168.49	0.002	0.082	170.093	0.08678	173.312	3.219
4815618206.1	375	99.2	168.46	168.24	0.002	0.083	169.958	0.09116	173.238	3.28
4814118304.1	375	97.8	168.2	167.95	0.003	0.089	169.817	0.10054	173.643	3.826
4812718401.1	525	81.7	167.62	167.21	0.005	0.305	169.412	0.3371	173.622	4.21
4804718418.1	525	105.3	167.21	166.8	0.004	0.269	168.794	0.33537	173.365	4.571
4794418441.1	525	59.1	166.8	166.58	0.004	0.263	168.392	0.36364	173.268	4.876
4788618453.1	525	36.7	166.55	166.23	0.009	0.402	168.065	0.43091	173.213	5.148
4785118461.1	525	80.5	166.23	165.755	0.006	0.331	167.287	0.4301	173.701	6.414
4777218478.1	525	15	165.755	165.65	0.007	0.36	167.12	0.46776	173.786	6.666
4775818483.1	525	115.1	164.94	164.29	0.006	0.324	165.826	0.4775	175.738	9.912

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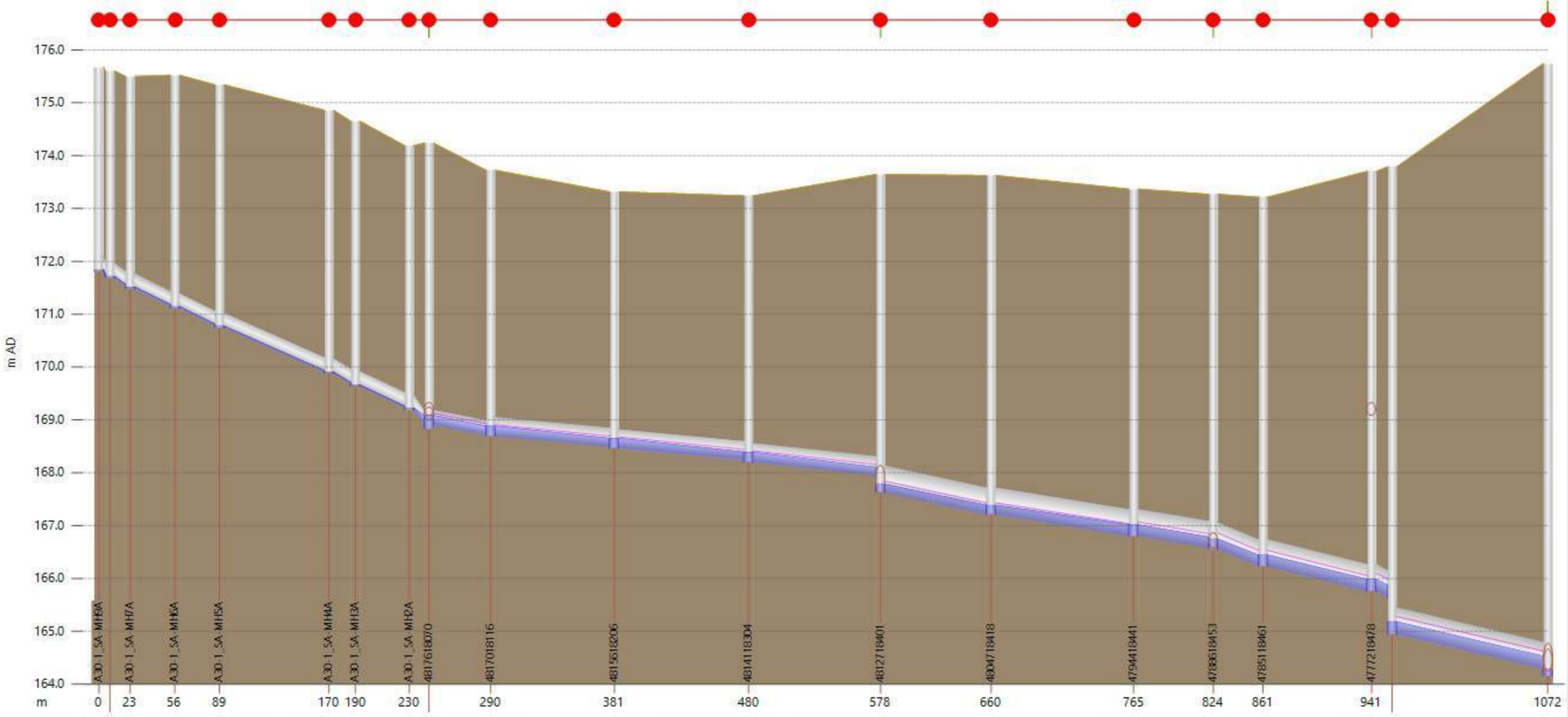

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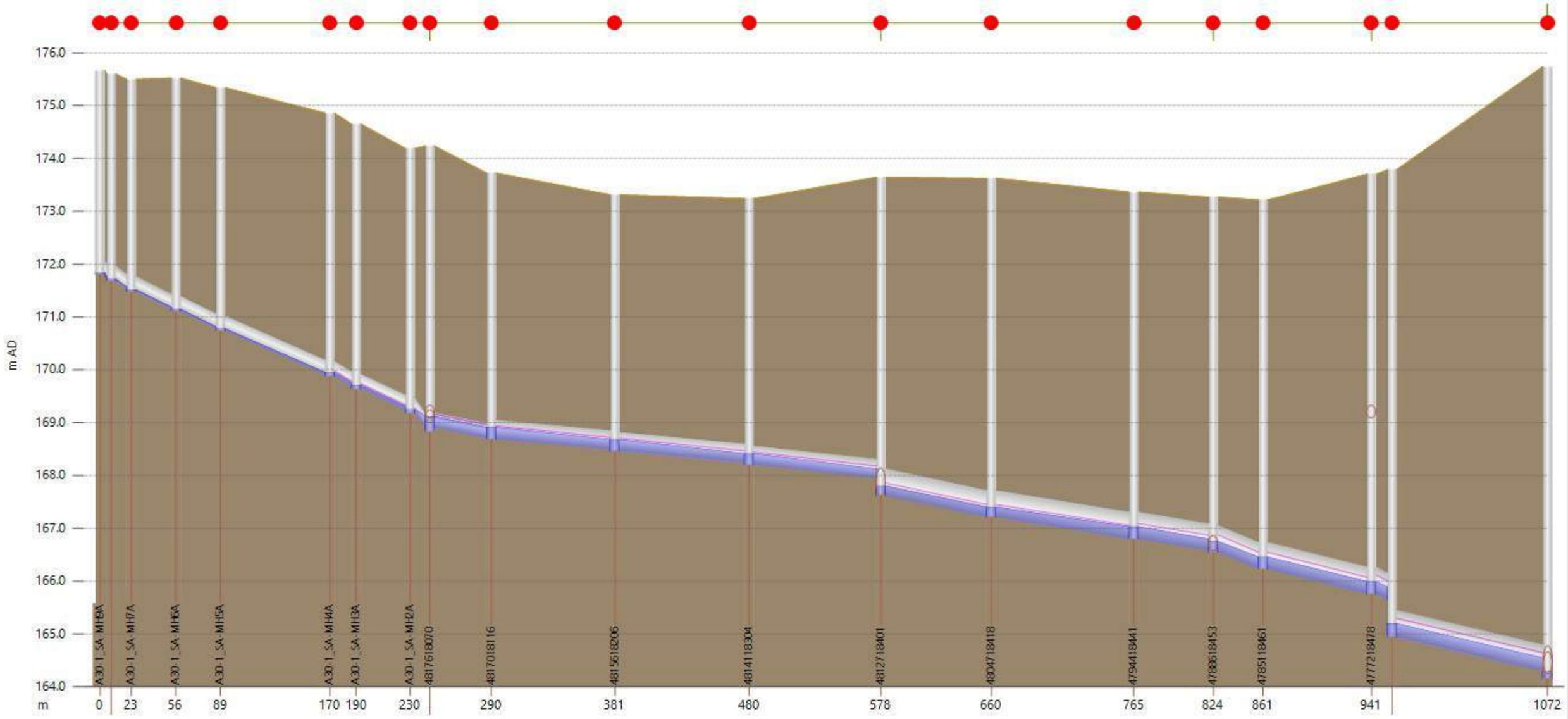
height (mm)			-	300	300	300	300	300	-	300	375	375	375	525	525	525	525	525	-	525					
US total head (m AD)			-	-	-	170.771	-	169.656	-	169.142	168.924	168.693	168.431	167.905	167.496	167.132	166.918	166.587	-	165.333					
DS depth (m)			-	0.031	0.031	0.031	-	0.021	-	0.185	0.174	0.157	0.159	0.222	0.260	0.239	0.249	0.260	-	0.275					
DS total head (m AD)			-	-	-	169.931	-	169.256	-	168.949	168.708	168.455	168.169	167.496	167.102	166.909	166.587	166.112	-	164.683					
Node			-	-	-	-	-	-	-	4817018116	4815618206	4814118304	4812718401	4804718418	4794418441	-	-	-	4775818483	-					
ground (m AD)			-	-	175.338	174.858	-	-	-	173.721	173.312	173.238	173.643	173.622	173.365	173.268	173.213	173.701	173.786	175.738					
level (m AD)			-	-	170.771	169.900	-	-	-	168.895	168.664	168.397	167.827	167.432	167.060	166.773	166.479	166.015	165.215	164.294					
flood dep (m)			-	-	-4.567	-4.958	-	-	-	-4.826	-4.648	-4.841	-5.816	-6.190	-6.305	-6.495	-6.734	-7.686	-8.571	-11.444					



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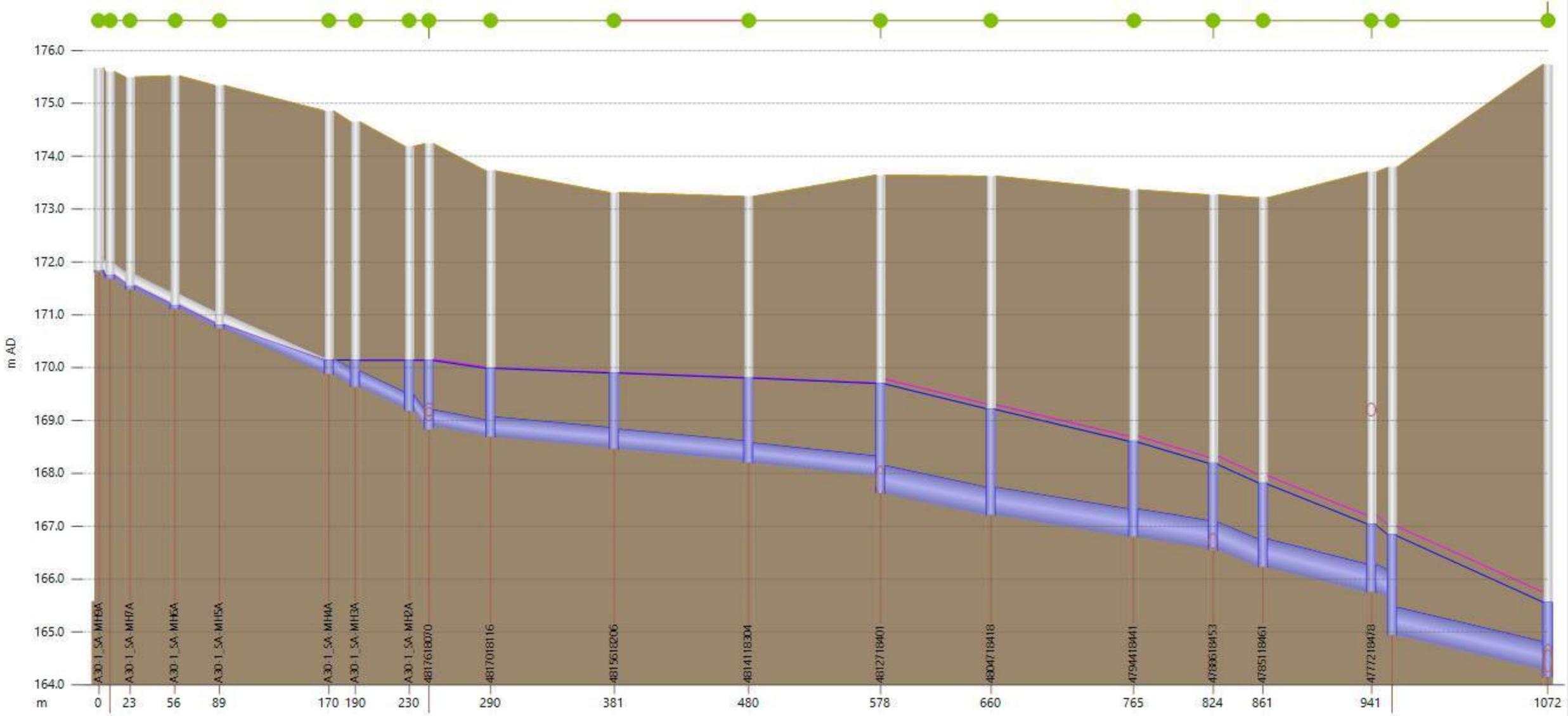
height (mm)		-	300	300	300	300	300	-	300	375	375	375	525	525	525	525	525	-	525				
US total head (m AD)		-	-	-	170.771	-	169.736	-	169.174	168.951	168.720	168.457	167.919	167.511	167.146	166.932	166.600	-	165.345				
DS depth (m)		-	0.031	0.031	0.046	-	0.067	-	0.210	0.198	0.180	0.175	0.231	0.268	0.248	0.258	0.266	-	0.287				
DS total head (m AD)		-	-	-	169.946	-	169.336	-	168.978	168.734	168.479	168.192	167.511	167.116	166.923	166.600	166.125	-	164.695				
Node		-	-	-	-	-	-	-	4817018116	4815618206	4814118304	4812718401	4804718418	4794418441	-	-	-	4775818483	-				
ground (m AD)		-	-	175.338	174.858	-	-	-	173.721	173.312	173.238	173.643	173.622	173.365	173.268	173.213	173.701	173.786	175.738				
level (m AD)		-	-	170.771	169.946	-	-	-	168.919	168.688	168.420	167.838	167.441	167.068	166.779	166.488	166.021	165.228	164.298				
flood dep (m)		-	-	-4.567	-4.912	-	-	-	-4.802	-4.624	-4.818	-5.805	-6.181	-6.297	-6.489	-6.725	-7.680	-8.558	-11.440				



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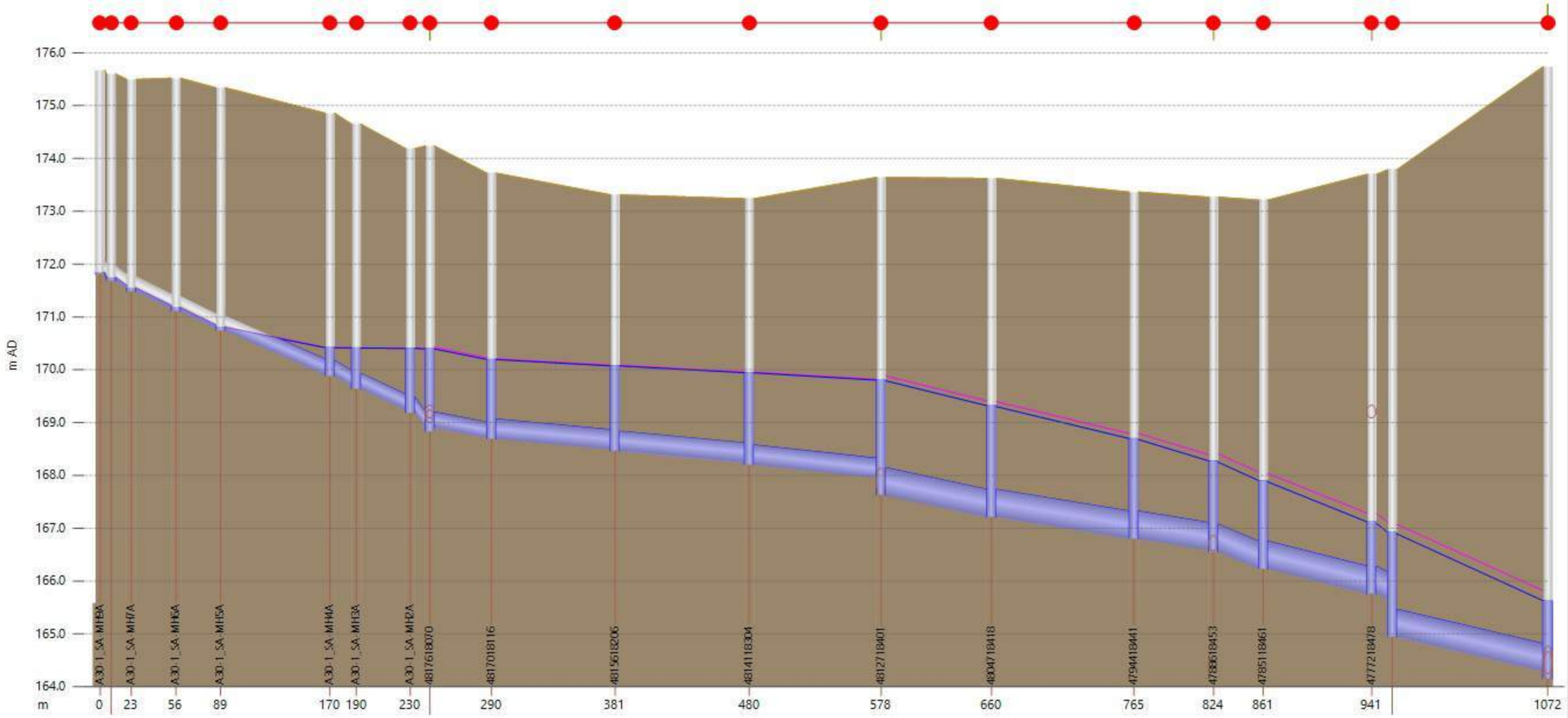
height (mm)		-	300	300	300	300	300	-	300	375	375	375	525	525	525	525	525	-	525	
US total head (m AD)		-	-	-	170.836	-	170.177	-	170.197	170.022	169.927	169.826	169.786	169.310	168.718	168.342	167.975	-	167.024	
DS depth (m)		-	0.068	0.068	0.278	-	0.941	-	1.304	1.428	1.577	1.758	2.023	1.825	1.630	1.613	1.314	-	1.304	
DS total head (m AD)		-	-	-	170.178	-	170.176	-	170.039	169.929	169.827	169.719	169.325	168.718	168.323	168.001	167.231	-	165.783	
Node		-	-	-	-	-	-	-	4817018116	4815618206	4814118304	4812718401	4804718418	4794418441	-	-	-	4775818483	-	
ground (m AD)		-	-	175.338	174.858	-	-	-	173.721	173.312	173.238	173.643	173.622	173.365	173.268	173.213	173.701	173.786	175.738	
level (m AD)		-	-	170.806	170.178	-	-	-	170.013	169.918	169.817	169.708	169.232	168.623	168.208	167.841	167.066	166.872	165.591	
flood dep (m)		-	-	-4.532	-4.680	-	-	-	-3.708	-3.394	-3.421	-3.935	-4.390	-4.742	-5.060	-5.372	-6.635	-6.914	-10.147	



Link		-	-	-	-	-	-	-	-	4817018116.1	4815618206.1	4814118304.1	4812718401.1	4804718418.1	-	-	4785118461.1	-	4775818483.1	
height (mm)		-	300	300	300	300	300	-	300	375	375	375	525	525	525	525	525	-	525	
US total head (m AD)		-	-	-	170.836	-	170.437	-	170.449	170.218	170.091	169.957	169.882	169.397	168.794	168.410	168.039	-	167.079	
DS depth (m)		-	0.068	0.068	0.540	-	1.191	-	1.496	1.589	1.705	1.853	2.109	1.900	1.697	1.677	1.369	-	1.345	
DS total head (m AD)		-	-	-	170.441	-	170.427	-	170.239	170.093	169.958	169.817	169.412	168.794	168.392	168.065	167.287	-	165.826	
Node		-	-	-	-	-	-	-	4817018116	4815618206	4814118304	4812718401	4804718418	4794418441	-	-	-	4775818483	-	
ground (m AD)		-	-	175.338	174.858	-	-	-	173.721	173.312	173.238	173.643	173.622	173.365	173.268	173.213	173.701	173.786	175.738	
level (m AD)		-	-	170.806	170.440	-	-	-	170.206	170.079	169.945	169.803	169.318	168.698	168.276	167.905	167.122	166.925	165.632	
flood dep (m)		-	-	-4.532	-4.418	-	-	-	-3.515	-3.233	-3.293	-3.840	-4.304	-4.667	-4.992	-5.308	-6.579	-6.861	-10.106	

SANITARY DESIGN CALCULATIONS
InfoWorks Model Results (Scenario2 Post-development Condition_Dry Weather)

Project Name: One herons hill
Municipality: City ofToronto
Project No.: 19049
Date: 25-Nov-19

Prepared by: R.K.
Checked by:
Last Revised: 30

Pipe ID	Condheight	CondLen	US Inv	DS Inv	Grad	Capacity	Max._Total Head	Max._DS_FLOW	DS_ Ground El.	DS_Freeboard
	(mm)	(m)	(m)	(m)	(m/m)	(m^3/s)	(m)	(m^3/s)	(m)	(m)
A30-1_SA-MH9A.1	300	8	171.809	171.729	0.010	0.097	171.749	0	175.6	3.851
A30-1_SA-MH8A.1	300	15	171.679	171.529	0.010	0.097	171.56	0.00016	175.497	3.937
A30-1_SA-MH7A.1	300	33	171.479	171.149	0.010	0.097	171.18	0.00016	175.52	4.34
A30-1_SA-MH6A.1	300	33	171.109	170.779	0.010	0.097	170.81	0.00016	175.338	4.528
A30-1_SA-MH5A.1	300	81	170.74	169.9	0.010	0.101	169.946	0.00016	174.858	4.912
A30-1_SA-MH4A.1	300	19.5	169.879	169.684	0.010	0.097	169.786	0.00974	174.649	4.863
A30-1_SA-MH3A.1	300	40	169.634	169.234	0.010	0.097	169.336	0.00974	174.187	4.851
A30-1_SA-MH2A.1	300	14.5	169.184	168.908	0.019	0.134	169.127	0.00974	174.236	5.109
4817618070.1	300	45.7	168.9	168.71	0.004	0.062	168.978	0.05647	173.721	4.743
4817018116.1	375	91.5	168.69	168.49	0.002	0.082	168.734	0.05646	173.312	4.578
4815618206.1	375	99.2	168.46	168.24	0.002	0.083	168.479	0.05646	173.238	4.759
4814118304.1	375	97.8	168.2	167.95	0.003	0.089	168.192	0.05778	173.643	5.451
4812718401.1	525	81.7	167.62	167.21	0.005	0.305	167.511	0.1074	173.622	6.111
4804718418.1	525	105.3	167.21	166.8	0.004	0.269	167.116	0.1074	173.365	6.249
4794418441.1	525	59.1	166.8	166.58	0.004	0.263	166.923	0.1371	173.268	6.345
4788618453.1	525	36.7	166.55	166.23	0.009	0.402	166.6	0.157	173.213	6.613
4785118461.1	525	80.5	166.23	165.755	0.006	0.331	166.125	0.157	173.701	7.576
4777218478.1	525	15	165.755	165.65	0.007	0.36	166.059	0.18401	173.786	7.727
4775818483.1	525	115.1	164.94	164.29	0.006	0.324	164.695	0.18401	175.738	11.043

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SANITARY DESIGN CALCULATIONS
InfoWorks Model Results (Scenario 3 Pre-development Condition_Extreme Condition; May 12, 2000 Storm Event)

Project Name: One herons hill
Municipality: City ofToronto
Project No.: 19049
Date: 25-Nov-19

Prepared by: R.K.
Checked by:
Last Revised: 30

Pipe ID	Condheight	CondLen	US Inv	DS Inv	Grad	Capacity	Max._Total Head	Max._DS_FLOW	DS_ Ground El.	DS_Freeboard
	(mm)	(m)	(m)	(m)	(m/m)	(m^3/s)	(m)	(m^3/s)	(m)	(m)
A30-1_SA-MH9A.1	300	8	171.809	171.729	0.010	0.097	171.749	0	175.6	3.851
A30-1_SA-MH8A.1	300	15	171.679	171.529	0.010	0.097	171.625	0.00624	175.497	3.872
A30-1_SA-MH7A.1	300	33	171.479	171.149	0.010	0.097	171.245	0.00632	175.52	4.275
A30-1_SA-MH6A.1	300	33	171.109	170.779	0.010	0.097	170.875	0.00639	175.338	4.463
A30-1_SA-MH5A.1	300	81	170.74	169.9	0.010	0.101	170.178	0.00631	174.858	4.68
A30-1_SA-MH4A.1	300	19.5	169.879	169.684	0.010	0.097	170.177	0.00553	174.649	4.472
A30-1_SA-MH3A.1	300	40	169.634	169.234	0.010	0.097	170.176	0.00477	174.187	4.011
A30-1_SA-MH2A.1	300	14.5	169.184	168.908	0.019	0.134	170.175	0.00403	174.236	4.061
4817618070.1	300	45.7	168.9	168.71	0.004	0.062	170.039	0.05454	173.721	3.682
4817018116.1	375	91.5	168.69	168.49	0.002	0.082	169.929	0.05384	173.312	3.383
4815618206.1	375	99.2	168.46	168.24	0.002	0.083	169.827	0.05322	173.238	3.411
4814118304.1	375	97.8	168.2	167.95	0.003	0.089	169.719	0.05602	173.643	3.924
4812718401.1	525	81.7	167.62	167.21	0.005	0.305	169.325	0.32375	173.622	4.297
4804718418.1	525	105.3	167.21	166.8	0.004	0.269	168.718	0.32323	173.365	4.647
4794418441.1	525	59.1	166.8	166.58	0.004	0.263	168.323	0.35232	173.268	4.945
4788618453.1	525	36.7	166.55	166.23	0.009	0.402	168.001	0.41507	173.213	5.212
4785118461.1	525	80.5	166.23	165.755	0.006	0.331	167.231	0.41435	173.701	6.47
4777218478.1	525	15	165.755	165.65	0.007	0.36	167.065	0.44903	173.786	6.721
4775818483.1	525	115.1	164.94	164.29	0.006	0.324	165.783	0.44823	175.738	9.955

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A REPORT TO
PARADISE DEVELOPMENTS HERON'S HILL INC.

HYDROGEOLOGICAL ASSESSMENT

PROPOSED MIXED USE DEVELOPMENT

1 HERON'S HILL WAY

CITY OF TORONTO

REFERENCE NO. 1908-W037

APRIL 2020
(REVISION OF REPORT DATED DECEMBER 2019)

DISTRIBUTION

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1 Copy - Soil Engineers Ltd. (Richmond Hill)

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1.0 EXECUTIVE SUMMARY

Soil Engineers Ltd. conducted a preliminary hydrogeological assessment for a proposed residential development site, located at 1 Heron's Hill Way, in the City of Toronto. Surrounding land use includes; Yorkland Road and commercial building to the west, Heron's Hill Way and residential properties to the north, along with commercial properties to the south and east of the subject site. The site is currently occupied by a by an office building within its western portion, and an above grade parking area is located within the mid portion of the subject site. It is proposed to construct a thirty-nine (39), storey mixed use building, with a one (1) - level underground parking structure within the eastern portion of the property.

The subject site lies within the physiographic region of Southern Ontario known as the Peel Plain which is underlain by the Halton Till unit native soil deposits, consisting predominantly of silt to silty clay matrix, high in matrix calcium carbonate content, considered as being clast-poor.

The subject site is located within Lower East Don River subwatershed of the Don River Watershed.

A review of the local topography shows that the site is relatively flat, having a minor decline in elevation relief towards its eastern limits.

The study has disclosed that beneath the existing layer of pavers, granular fill, and earth fill, the native soils underlying the subject site consist of silt, silty sand till, sandy silt till, silty clay, sand, silty clay till, and sand and gravel.

The study confirms that the groundwater level elevations beneath the site, ranges from 165.60 to 157.80 masl (i.e. 9.60 to 18.0 m below ground surface).

A review of the average of the groundwater elevations suggests that shallow groundwater flows in southerly, easterly, and south-easterly directions.

The single well response test results provided an estimated hydraulic conductivity (K) estimate of 1.1×10^{-8} m/sec for the silty clay unit, a K estimate for the silty sand till and silty clay till units is 9.7×10^{-9} m/sec, a K estimate for the sandy silt till, and silty clay unit, is at 1.2×10^{-7} m/sec., and a K estimate for the sandy silt till unit is 7.8×10^{-7} m/sec., at the depths of the well screens. This result suggests that low shallow groundwater seepage rates can be anticipated into open excavations below the water table.

The Hazen Equation calculated permeability results indicates that the hydraulic conductivity (K) estimates for the silty sand till, ranges from 6.4 x 10^{-6} to 7.29 x 10^{-8} m/sec; the K estimate for the sandy silty till, is about 1.94 x 10^{-7} m/sec., and for the sand and gravel unit, it is about 1.69 x 10^{-5} m/sec. The K estimates determined from the Hazen method suggests low to moderate hydraulic conductivities for the shallow subsoil units beneath the site.

The groundwater beneath the site is approximately 5.0 m below the proposed elevation for the base of the proposed underground parking foundation footings, and is 4.08 m below the proposed elevator pit structure. It is therefore not anticipated that construction dewatering will be required for groundwater control earthworks and for construction of the proposed development, including installation of any associated underground services.

Accumulated stormwater runoff within earthworks excavation following storm event precipitation associated with this development is estimated to be approximately 412,760 L/day. The runoff from the proposed development area could be directed for discharge into the adjacent building's foundation drainage/sump network, which, in turn could be directed for disposal discharge building the municipal storm sewer. However, given that the existing site is included as part of the proposed development application, the city may require a discharge permit for the existing structure even for short-term stormwater related drainage.

There is no anticipated long-term permanent foundation drainage from groundwater seepage for the proposed underground parking structure, or to elevator pit structures. However, potential drainage associated with shallow runoff related seepage from storm event precipitation runoff associated with this development is estimated to be approximately 2,036 litres/day; by applying a safety factor of three, the runoff could reach a maximum of 6,108 litres/day. The runoff from the proposed development area can be directed for discharge into the existing building foundation drainage/sump network, for disposal discharge into the municipal storm sewer.

Dewatering effluent from any short-term construction dewatering or from any long-term foundation drainage is acceptable for disposal to the City of Toronto sanitary sewer. For disposal to the storm sewer, the effluent will require pre-treatment to lower levels of total suspended solids and chloroform to meet the City's disposal standards. Any short-term dewatering may be associated with seepage of any perched groundwater encountered within excavations, or from the removal of the accumulated runoff from within the excavation following storm events. It is anticipated that there may be limited construction dewatering following storm events during excavation works. However, any groundwater seepage within excavations will likely dissipate relatively quickly after the earthworks commence.

The option exists to pump any accumulated runoff from excavations to a temporary building tank, for later removal off site, using licensed carriers and not direct any of the runoff effluent to the city sewer system.

2.0 INTRODUCTION

2.1 Project Description

In accordance with authorization from the Paradise Developments Heron's Hill Inc., Soil Engineers Ltd., (SEL) has conducted a hydrogeological assessment for a proposed mixed-use building development site located at 1 Heron's Hill Way, in the City of Toronto. The location of the site is shown on Drawing No. 1.

The subject site is located within an existing urban developed area; where the surrounding land use includes; Yorkland Road and commercial building to the west, Heron's Hill Way and residential properties to the north, along with commercial properties to the south and to the east of the site. The site is currently occupied by a paved, above-grade parking lot within its mid portion, and an existing office building within its western portion. It is anticipated that this existing building will remain after the proposed development is completed. The remainder of the development site will be comprised of the construction of a 39-storey mixed use development building having a 1-level underground parking structure. It is anticipated that the first 4 storeys will be used for above ground parking facility and for office purposes, and the upper floors will be used for residential occupancy purposes.

This report summarizes findings of the field study and associated groundwater monitoring and hydraulic testing. The current study provides preliminary recommendations for any construction dewatering needs, including any long-term foundation drainage needs prior to detailed design. In addition, comments are provided regarding the groundwater quality for any proposed discharge for disposal to the City of Toronto Sewer Systems. A description and characterization of the hydrogeostratigraphy for the site and surrounding area, is provided, together with an assessment of the site's groundwater function relative to the maintenance for any on-site or nearby groundwater receptors.

2.2 Project Objectives

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

1. Establish the hydrogeological setting for the subject site and surrounding local area;
2. Interpret shallow groundwater flow and runoff patterns;

3. Identify zones of higher groundwater yield as potential sources for ongoing shallow groundwater seepage;
4. Characterize the hydraulic conductivity (K) for the groundwater-bearing sub-soil soil strata;
5. Prepare an interpreted hydrostratigraphic cross-section across the subject site and the proposed development footprint;
6. Estimate the anticipated dewatering flows that may be required to lower the groundwater table to facilitate construction, or for any permanent, long-term foundation drainage needs, following construction;
7. Evaluate potential impacts to any nearby groundwater receptors within the anticipated zone of influence for construction dewatering; and to develop preliminary estimates for any temporary dewatering flow rates that may be required to facilitate excavations for construction, or from any long-term foundation drainage needs, following construction.

2.3 **Scope of Work**

The scope of work for the hydrogeological assessment is summarized below:

1. Clearance of underground services, drilling of six (6) boreholes, and installation of monitoring wells, one within each of the boreholes advance beneath the site within the site's development footprint;
2. Monitoring well development and performance of Single Well Response Tests (SWRTs) at six (6) monitoring wells to estimate the hydraulic conductivity (K) for groundwater-bearing subsoil at the depths of the well screens;
3. Describing the geological and hydrogeological setting for the subject site and local surrounding areas;
4. Estimating the hydraulic conductivity (K) for the groundwater bearing subsoil strata, based on the SWRT results and from a review of soils grain size analyses.
5. Review of the findings of the previous geotechnical study; review of available engineering development plans and profiles for the proposed multi-storey mixed-use development; assessing the preliminary construction dewatering needs and estimation of any anticipated dewatering flows to lower the groundwater levels for construction, or for any anticipated long-term foundation drainage needs following construction.
6. Groundwater sampling and analysis from one (1) monitoring well to assess shallow groundwater quality for comparison and evaluation against the City of Toronto Sanitary and Storm Sewer Use By-Law limits to assess any disposal management options for any dewatering or drainage effluent generated during construction or for any long-term foundation drainage.

3.0 METHODOLOGY

3.1 Borehole Advancement and Monitoring Well Installation

Borehole drilling and monitoring well construction were performed on August 14, 15, 16, 19, 20 and 21, 2019. The program consisted of the drilling of six (6) boreholes (BH) and the installation of six (6) monitoring wells (MW), one in each of the six (6) boreholes advance beneath the site. The locations of the boreholes/monitoring wells are shown on Drawing No. 2.

The borehole drilling and monitoring well construction were completed by a licensed water well contractor, DBW Drilling Ltd., under the full-time supervision of a geotechnical technician from SEL, who also logged the soil sub-strata encountered during borehole advancement, and collected representative subsoil samples for textural classification. The boreholes were drilled using continuous flight power augers. Detailed descriptions of the encountered subsoil and groundwater conditions are presented on the borehole and monitoring well logs, on the enclosed Figures 1 to 6, inclusive.

The monitoring wells were constructed, using 50-mm diameter PVC riser pipes and screens, which were installed in each of the boreholes in accordance with Ontario Regulation (O. Reg.) 903. All of the monitoring wells were provided with flush mount protective steel casings at the ground surface. The details of the monitoring well construction are provided on the enclosed Borehole Logs (Figures 1 to 6).

The UTM coordinates and ground surface elevations at the borehole/monitoring well locations, together with the monitoring well construction details, are provided on Table 3-1.

Table 3-1 - Monitoring Well Installation Details

Well ID	Installation Date	UTM Coordinates		Ground El. (masl)	Borehole Depth (mbgs)	Screen Interval (mbgs)	Casing Dia. (mm)
		East	North				
BH/MW 1	14 - Aug-19	633927	4848153	175.2	24.5	21.4-24.4	50
BH/MW 2	20-2 1- Aug-19	633945	4848184	175.2	21.8	17.9-20.9	50
BH/MW 3	20-21 - Aug-19	633966	4848190	175.2	21.8	18.3-21.3	50
BH/MW 4	14-16 - Aug-19	633974	4848167	175.3	30.6	27.5-30.5	50
BH/MW 5	20 -Aug-19	634001	4848200	175.2	21.6	18.3-21.3	50
BH/MW 6	16, 19 - Aug-19	634006	4848177	175.8	21.4	18.3-21.3	50

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

3.2 Groundwater Monitoring

The groundwater levels in the monitoring wells were measured, manually on August 28, September 12, 25, October 9, 24, and November 4, 2019.

3.3 Mapping of Ontario Water Well Records

SEL received the Ministry of the Environment, Conservation and Park (MECP) Water Well Records (WWRs) for the registered wells located on the subject site and within 500 m of the site boundaries (study area). The well records indicate that sixty-four (64) registered well records are located within the 500 m zone of influence study area relative to the subject site boundaries. The WWR well locations are shown on Drawing No. 3, and a summary of the WWRs reviewed for this study are listed in Appendix 'A', with a discussion of the findings provided in Section 6.2.

3.4 Monitoring Well Development and Single Well Response Tests

All of the monitoring wells, except BH/MWs 2 and 4, underwent development in preparation for single well response testing (SWRT) to estimate the hydraulic conductivity (K) for saturated subsoil strata at the depths of the monitoring well screens. Well development involved the purging and removal of several casing volumes of groundwater from each monitoring well to remove remnants of clay, silt and other debris introduced into the monitoring wells during construction, and to induce the flow of formation groundwater through the well screens, thereby improving the transmissivity of the subsoil strata formation at the monitoring well screen depths.

The K values derived from the SWRT's provide an indication of the yield capacity for the groundwater-bearing subsoil strata, at the well screen depths, and can be used to estimate the flow of groundwater through the groundwater-bearing subsoil strata.

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

The SWRT could not be performed on BH/MWs 2 and 4, due to the fact that these wells were heavily laden with silt, throughout the monitoring period. The K test estimate results are provided in Appendix 'B', with a summary of the results provided in Table 6-2.

3.5 **Groundwater Quality Assessment**

The monitoring well at BH/MW 4 underwent sampling for groundwater quality analysis to characterize its quality for evaluation against the City of Toronto Storm and Sanitary Sewer Use By-Law parameters. This was performed to assess whether any anticipated dewatering effluent from construction can be disposed of into the City of Toronto sewer systems, or following site development, from any anticipated long-term foundation drainage. Based on the results, recommendations for any pre-treatment of any dewatering or drainage effluent can be developed, if required.

BH/MW 4 was developed and purged of at least 3 well casing volumes of groundwater prior to sample collection. In accordance with City of Toronto Storm and Sanitary Sewer use by-law sampling protocols, one entire set of groundwater samples was not field filtered prior to placement in the laboratory sample bottles, while a second set of samples that were collected underwent filtration in the laboratory for metals and phosphorus parameter analysis. This was performed to provide a basis of comparison between the unfiltered and filtered groundwater sample for metals and total phosphorous (TP) analysis to assess potential sources for any elevated metals and phosphorous from the analysis of unfiltered groundwater. Upon sampling, all of the bottles were placed in ice and packed in a cooler at about 4^0 C for shipment to the analytical laboratory. Sample analysis was performed by SGS Environmental Services, which is accredited by the Canadian Association for Laboratory Accreditation Inc. (CALA).

Results of the water quality analysis are provided in Appendix 'C', with a discussion of the findings and evaluation provided in Section 7.5.

3.6 **Review Summary of Concurrent Report**

The following reports prepared by SEL were reviewed in preparation of this hydrogeological study:

"A Report to Paradise Developments Heron's Hill Inc., a Geotechnical Investigation for Proposed Mixed Use Building, 1 Heron's Hill Way City of Toronto" Reference No., 1908-S037, dated November 2019.

4.0 REGIONAL AND LOCAL SETTING

4.1 Regional Geology

The subject site lies within the physiographic region of Southern Ontario known as the Peel Plain where bevelled till is the dominant shallow physiographic feature. The Peel Plain is a level-to-undulating tract of silt and clay rich native soil covering an area of about 780 km^2 across the central portions of the Regional Municipalities of York, Peel, and Halton. In general, the ground surface elevation ranges from 150 to 230 masl. The area exhibits a gradual and fairly uniform downward slope towards Lake Ontario. The underlying native geological material for the Peel Plain is a till unit, containing significant amounts of shale and limestone. For most parts of the Peel Plain, the native mineral soil has been modified by a veneer of clay. The deeper clay deposits are clearly seen to be varved on occasion. There are widespread beds of stone less clay, overlying the till, while in some areas, the clay beds are deep and thick enough to preserve some of the un-weathered stratified clay (Chapman and Putnam, 1984).

The surface geological map of Ontario shows that the subject site is located on Halton Till, consisting predominantly of silt to silty clay matrix, high in calcium carbonate content being clast-poor. Drawing No. 4, reproduced from Ontario Geological Survey (OGS) mapping, illustrates the quaternary surface soil geology for the site and surrounding area.

The bedrock underlying the site is comprised mainly of Upper Ordovician aged shale, limestone, dolostone and siltstone of the Georgian Bay Formation, the Blue Mountain Formation, the Billings Formation, the Collingwood Member and the Eastview Member (Ontario Ministry of Northern Department and Mines, 1991). The approximate elevation for the top of the bedrock is at approximately 106.38 masl, which is about 68.82 to 69.42 m below the existing grades on site.

4.2 Physical Topography

A review of the topography shows that the subject site is relatively flat exhibiting a minor decline in elevation relief towards to the east perimeter of the site. Runoff from the site is expected to drain towards the east. Based on the topographic map, and from the review of the ground surface elevations at borehole and monitoring well locations, the elevation relief across the subject site is about 2.80 m. Drawing No. 5 shows the mapped topographical contours for the site and surrounding area.

4.3 **Watershed Setting**

The subject site is located within the Lower East Don sub-watershed portion of the Don River watershed. The Don River watershed occupies an area of approximately 358 square kilometers, which is large compare to the other watersheds within the Greater Toronto Area. The headwaters of the Don River watershed begin within the areas defined as Oak Ridges Moraine and South Slope. The Don River watershed flows through the municipalities of Toronto, York, Markham, Richmond Hill and Vaughan. It consists of three principal tributaries which are known as the Main Don, West Don and East Don.

Urban development has changed the watershed drastically, with approximately 96% of the watershed area having been urbanized. These changes have caused serious degradation to the watershed. While development within the watershed continues, regulations enforced by the Toronto Region Conservation Authority (TRCA) have been put in place to ensure a more sustainable approach to watershed development with considerations for improving the water quality and natural habitat conditions within the watershed.

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

4.4 **Local Surface Water and Natural Features**

There are no records for any natural heritage features, or Areas of Natural and Scientific Interest (ANSI) on site or within close proximity of the subject site. Two wooded areas are located approximately 165 m to the north of, and 275 m west of the subject site. The locations of the site and the noted natural features are shown on Drawing No. 7.

5.0 **SOIL LITHOLOGY**

This study has disclosed that beneath a layer of pavers, granular fill, and earth fill, in places the native soils underlying the subject site consist of silt, silty sand till, sandy silt till, silty clay, sand, silty clay till, and sand and gravel. A Key Plan and the interpreted geological cross-sections along the delineated north to south, and east to west transects are presented on Drawing Nos. 8-1 and 8-2.

5.1 **Pavement** (BH/MWs 1 and 2)

The existing parking lot consists of pavement material comprised of interlocking stone pavers. The thickness of the pavement materials ranges from 0.2 to 1.0 m.

5.2 **Topsoil** (BH/MWs 3, 4, 5 and 6)

Topsoil, approximately 10 cm and 20 cm thick, was observed at the ground surface at all of the BH/MWs, except at BH/MWs 1 and 2.

5.3 **Earth Fill** (All BH/MWs)

Earth fill, approximately 0.9 to 3.1 m thick, was encountered at all of the borehole locations. It consists of sandy silt with occasional sand and gravel layers. Asphalt and brick construction debris were encountered in some boreholes at depths of 1.5 to 1.8 m.

5.4 **Silt** (BH/MWs 1 and 4)

Silt was encountered beneath the earth fill, at depths of 2.0 mbgs and 2.9 mbgs at BH/MWs 1 and 4, respectively. The silt is brown in colour, and loose to compact in consistency, having traces of clay, and occasional sand seams. The thickness of the silt at the BH/MW 1, location is about 2.0 m, and it is 2.6 m at the BH/MW ,4 location. The moisture content for the unit ranges from 14% to 24%, indicating moist conditions.

5.5 **Silty Clay** (BH/MWs 2, 3, 5 and 6)

Silty clay was encountered below the earth fill horizon, at depths ranging between 2.1 mbgs and 3.2 mbgs. The unit is brown in colour, being stiff to very stiff in consistency, and having occasional silt and sand seams and layers. The thickness of this unit ranges from 1.5 to 2.5 m.

The soil moisture content for this unit ranges from 12% to 25%, indicating moist conditions.

5.6 **Silty Sand Till** (All BH/MWs)

Silty sand till, was encountered at depths, ranging from 4.0 to 5.6 mbgs at all of the BH/MW locations. It is brown to grey in colour, is loose to very dense in consistency, having traces of clay and gravel, with occasional silt seams, and layers, and cobbles and boulders. The silty sand till changes from brown to grey at about 7.2 mbgs at BH/MW 1, and at 6.0 mbgs at the BH/MW 2, location. The thickness of the unit ranges from 5.0 to 14.0 m. Its soil moisture content ranged from 8-18%, indicating damp to moist conditions.

The estimated permeability for the silty sand till layer encountered at BH/MW 2, at a depth of 9.4 mbgs is about 10^{-6} m/sec, the estimated permeability for the silty sand till layer

encountered at BH/MW 4, at a depth of 9.4 mbgs is about 10^{-7} m/sec, estimated permeability for the silty sand till layer at BH/MW 5, at a depth of 15.5 mbgs is about 10^{-6} m/sec. Grain size analyses were performed on three (3) soil samples, and the soil gradation curves are plotted on Figure Nos. 7, 8 and 9.

5.7 **Sandy Silt Till** (BH/MWs 4, 5 and 6)

Sandy silt till, was encountered at depths, ranging from 16.2 to 29.1 mbgs at the BH/MWs 4, 5 and 6, locations. It is grey in colour, is compact to very dense in consistency, having traces of clay and gravel, with occasional sand seams, cobbles and boulders. The thickness of the unit ranges from 1.5 to 4.2 m, at the BH/MWs 4 and 5, locations, where it extends from a depth of 17.1 m to the maximum investigated depth of 21.4 m at the BH/MW 6 location. Its soil moisture contents ranged from 9-14%, indicating damp to moist conditions.

The estimated permeability for the sandy silt till layer at BH/MW 1, at a depth of 12.4 mbgs is about 10^{-7} m/sec. Grain size analysis was performed on one (1) soil sample, and the gradation curve is plotted on Figure No. 10.

5.8 **Silty Clay Till** (BH/MWs 1, 2, 3, 4 and 5)

Silty clay till, was encountered at depths ranging from between 12.8 to 20.4 mbgs at the BH/MWs 1, 2, 3, 4 and 5, locations. It is grey in colour, hard in consistency, having traces of gravel and occasional sand layers cobbles and boulders. It is approximately 15.1 m thick at the BH/MW 4 location, where it extends from depths ranging from 12.8 to 20.4 mbgs to the maximum investigated depths of 21.6 to 24.5 m at the BH/MWs 1, 2, 3 and 5, locations.

Its moisture content ranges from 8-23%, indicating damp to moist conditions.

5.9 **Sand** (BH/MWs 2 and 6)

Sand, approximately 3.6 to 13.1 m thick, was encountered at the BH/MWs 2 and 6, locations. The sand was encountered beneath the silty sand unit, at depths of 11.0 mbgs and 14.0 mbgs, at BH/MWs 2 and 5, respectively. The sand is grey in colour, being compact to very dense in consistency, with fine sand and some silt, clay, and gravel. The moisture content for the sand ranges from 9% to 18%, indicating damp to moist conditions.

The estimated permeability for the sand layer, encountered at BH/MW 6, at a depth of 14.0 mbgs is about 10^{-5} m/sec. A grain size analysis was performed on one (1) soil sample, and the gradation curve is plotted on Figure No. 11.

5.10 **Sand and Gravel** (BH/MW 4)

Sand and gravel, were encountered at the BH/MW 4, location, at a depth of 10 mbgs. It is grey, being dense to very dense in consistency, with some silt, and having a trace of clay. This unit is approximately 4 m thick.

The moisture content for the sand and gravel unit ranges from 12% to 14%, indicating damp conditions.

The estimated permeability for the sand and gravel layer encountered at BH/MW 4, at a depth of 12.4 mbgs is about 10^{-6} m/sec. A grain size analysis was performed on one (1) soil sample, and the gradation curve is plotted on Figure No. 12.

6.0 **GROUNDWATER STUDY**

6.1 **Review Summary of Concurrent Report**

A review of the findings from the previous geotechnical soil investigation report (SEL, Reference No. 1908-S037) has disclosed that beneath a topsoil veneer or pavement structure with granular fill and a layer of earth fill in places, the site is predominantly underlain by loose to dense sandy silt till and silty sand till, overlying hard silty clay till, with compact sand and silt layers extending to 30.6 m below existing grade.

6.2 **Review of Ontario Water Well Records**

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

The records indicate that sixty-four (64) wells are located within the study area. The locations of these wells, based on the UTM coordinates provided by the records, are shown on Drawing No. 3. Details of the MECP water well records that were reviewed are provided in Appendix ‘A’.

A review of the final status of the well records within the study area reveals that eight (8) are registered as observation wells, twenty-seven (27) are registered as monitoring and test hole wells, six (6) are registered as dewatering wells, two (2) are registered as water supply wells, eight (8) are registered as abandoned-other wells, and thirteen (13) wells are registered as having unknown statuses.

A review of the first use of the well records within the study area reveals that thirty-four (34) are registered as monitoring and test hole wells, twenty-one (21) are registered as having unknown statuses, five (5) were registered as dewatering wells, one (1) is registered as a domestic well, one (1) is registered as a commercial well, and two (2) wells are registered as not being used.

6.3 **Groundwater Monitoring**

The groundwater levels in the monitoring wells were measured on six occasions over the study period, on the following dates; August 28, September 12, 25, October 9, 24, and

November 4, 2019, to record the fluctuation of the shallow groundwater table beneath the site. The groundwater levels and their corresponding elevations are given in Table 6-1.

Table 6-1 - Groundwater Level Measurements

Well ID		Aug-28-19	Sept-12-19	Sept-25-19	Oct-9-19	Oct-24-19	Nov- 4-19	Average Elevation	Fluctuation (m)
	mbgs	9.95	14.17	13.47	14.05	14.05	15.64	13.56	
BH/MW 1	masl	165.25	161.03	161.73	161.15	161.15	159.56	161.65	5.69
	mbgs	11.73	15.74	15.67	15.64	15.67	13.94	14.73	
BH/MW 2	masl	163.47	159.46	159.53	159.56	159.53	161.26	160.47	4.01
	mbgs	9.60	14.09	14.05	13.90	13.75	13.37	13.13	
BH/MW 3	masl	165.60	161.11	161.15	161.30	161.45	161.83	162.07	4.49
	mbgs	17.50	17.67	17.65	17.65	17.70	17.65	17.64	
BH/MW 4	masl	157.80	157.63	157.65	157.65	157.60	157.65	157.66	0.20
	mbgs	15.38	15.94	15.88	15.88	15.88	15.78	15.79	
BH/MW 5	masl	159.82	159.26	159.32	159.32	159.32	159.42	159.41	0.56
	mbgs	16.47	17.87	17.87	17.96	17.99	18.00	17.69	
BH/MW 6	masl	159.33	157.93	157.93	157.84	157.81	157.80	158.11	1.53

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

As shown above, in Table 6-1, the groundwater levels at BH/MW 1 fluctuated, where they decreased between August 28, and September 12, 2019, they increased again between September 12, and 25, 2019, they decreased between September 25, and October 9, 2019, it stabilized between October 9, to October 24, 2019, and again decreased between October 24, and November 4, 2019.

The groundwater levels at BH/MW 2 fluctuated, where they decreased between August 28, and September 12, 2019, increased again between September 12, and October 9, 2019, decreased again between October 9, and October 24, 2019, and again increased between October 24, and November 4, 2019.

The groundwater levels at BH/MW 3 fluctuated, where they decreased between August 28, and September 12, 2019, and exhibiting an increasing trend throughout the remainder of the monitoring period.

The groundwater levels at BH/MW 4 fluctuated, where they decreased between August 28, and September 12, 2019, it increased between September 12, and 25, 2019, and stabilized between September 12, and October 24, 2019, it again increased between October 24, and November 4, 2019.

The groundwater levels at BH/MW 5 fluctuated, where they decreased between August 28, and September 12, 2019, increased again between September 12, and 25, 2019, stabilized between September 25, and October 24, 2019, and again increased between October 24, and November 4, 2019.

The groundwater levels at BH/MW 6 fluctuated, where they decreased between August 28, and September 12, 2019, stabilized, between September 12, and September 25, 2019, and afterwards, exhibited a decreasing trend throughout the remainder of the monitoring period.

The greatest fluctuation was observed at BH/MW 1, where the groundwater level increased by 5.69 m during the monitoring period.

6.4 **Shallow Groundwater Flow Pattern**

The shallow groundwater flow pattern beneath the site was interpreted from the average of groundwater level measurements recorded at all of the BH/MWs locations. The recorded measured groundwater levels indicate that shallow groundwater flows in southerly, southeasterly, and easterly directions from an interpreted localized groundwater high area within the northeastern portion of the site. The interpreted shallow groundwater flow pattern for the subject site is illustrated on Drawing No. 9.

6.5 **Single Well Response Test Analysis**

All of the BH/MWs except BH/MWs 1 and 4, underwent single well response testing (SWRT), to estimate the hydraulic conductivity (K) for saturated shallow aquifer sub-soils at

the depths of the well screens. BH/MWs 2 and 4, were unable to undergo the SWRT K testing due to the high levels of silt encountered within the well screen intervals within these monitoring wells. The results of the SWRTs are presented in Appendix 'B', with a summary of the findings shown in Table 6-2.

Table 6-2 - Summary of SWRTs Results

Well ID	Ground El. (masl)	Monitoring Well Depth (mbgs)	Borehole Depth (mbgs)	Well Screen Interval (mbgs)	Screened Subsoil Strata	Hydraulic Conductivity (K) (m/sec)
BH/MW 1	175.2	24.4	24.5	21.4 – 24.4	Silty Clay Till	1.1×10^{-8}
BH/MW 3	175.2	21.8	21.8	18.3 – 21.3	Silty Sand Till, Silty Clay Till	9.7×10^{-9}
BH/MW 5	175.2	21.6	21.6	18.3 – 21.3	Sandy Silt Till, Silty Clay Till	1.2×10^{-7}
BH/MW 6	175.8	21.4	21.4	18.3 – 21.3	Sandy Silt Till	7.8×10^{-7}

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

As shown in Table 6-2, the K estimate for the silty clay unit is at 1.1×10^{-8} m/sec, the K estimates for the silty sand till and silty clay till units is 9.7×10^{-9} m/sec, the K estimate for the sandy silt till, and silty clay unit, is 1.2×10^{-7} m/sec., and the K estimates for the sandy silt till unit is 7.8×10^{-7} m/sec. The above results suggest that a low hydraulic conductivity for the groundwater-bearing subsoils at the depths of the well screen is low, with corresponding low anticipated groundwater seepage rates into open excavations, below the water table.

6.6 Assessment of Hydraulic Conductivity Based on the Hazen Equation

The Hazen Equation method was also adopted to estimate the hydraulic conductivity (K) for different subsoil layers which may contain groundwater during the high-water table spring season. These layers are primarily above the well screen depths.

The Hazen equation relies on the interrelationship between hydraulic conductivity and effective grain size, d_{10}, in the soil media. This empirical relation predicts a power-law relation with K, as follows:

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

where;

- d_{10}: Value of the soil grain size gradation curve as determined by sieve analysis whereby 10% by weight of the soil particles are finer and 90% by weight of the soil particles are coarser.
- A: Coefficient; it is equal to 1 when K in cm/sec and d_{10} is in mm

The Hazen Equation estimation method provides an indication of the yield capacity for groundwater-bearing sub-soil strata at the depths where the soil samples that underwent grain size analyses were collected. The calculated results indicate that the K estimate for the silty sand till, ranges from 6.4 x 10^{-6} to 7.29 x 10^{-8} m/sec; the K estimate for the sandy silty till, retrieved from a depth of 12.4 mbgs at BH/MW 1 is 1.94 x 10^{-7} m/sec., and for the sand and gravel unit, retrieved from a depth of 12.4 mbgs at BH/MW 4 it is 1.69 x 10^{-5} m/sec. The K estimate determined from the Hazen method suggests low to moderate hydraulic conductivities (K) for the shallow sub-soil and for any encountered shallow perched groundwater found beneath the subject site.

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

Well ID	Sample Depth (mbgs)	Sample El. (masl)	Description of Soil Strata	$D_{10\ (mm)}$	Hydraulic Conductivity (K) Estimates (m/sec)
BH/MW 1	12.4	162.8	Sandy Silt Till, some gravel, a trace of clay	0.0044	1.94×10^{-7}
BH/MW 2	9.4	165.8	Silty Sand Till, traces of clay and gravel	0.014	1.96×10^{-6}
BH/MW 4	9.4	165.9	Silty Sand Till, traces of clay and gravel	0.0027	7.29×10^{-8}
BH/MW 4	12.4	162.9	Sand and Gravel, some silt, a trace of clay	0.013	1.69×10^{-6}
BH/MW 5	15.5	159.7	Silty Sand Till, some gravel, a trace of clay	0.008	6.4×10^{-7}

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

7.0 GROUNDWATER CONTROL

The hydraulic conductivity (K) estimates for the sand, silty clay, sandy silt, silty clay, silty clay till, and shale bedrock, suggest that groundwater seepage rates into open excavations below the groundwater table will low. To provide safe, dry and stable conditions for earthworks excavations for construction of the proposed 1-level underground parking structures, the groundwater table should be lowered in advance of, or, during construction. The preliminary estimates for construction dewatering flows required to locally lower the water table, based on the K test estimates, are discussed in the following sections.

7.1 Groundwater Construction Dewatering Rates

The proposed development plans, provided by Graziani and Corazza Architects Inc., dated March 17, 2020, indicate that it is planned to construct a thirty-nine (39) storey, mixed-use building, having 4-levels of above ground parking facilities, and a 1-level underground parking structure. The proposed development footprint encompasses an area of approximately 3,318 square meters.

Thirty-Nine (39) Storey Mixed Use Building Construction – 1-Level Underground Parking Structure (95.51 m x 34.74 m) with an Estimated Finished Floor Elevation of approximately 171.2 masl:

For the proposed thirty-nine (39) storey mixed-use building, for the preliminary construction dewatering flow calculations, the estimated area of excavation for the 1-level underground parking structure is approximately 3,318 square meters which is approximately 95.51 m long by 34.74 m wide, having a perimeter of approximately 260.50 m, with a site grade elevation of approximately 175.2 masl.

An excavation depth of approximately 4.0 m beneath the finished floor elevation, was indicated for the proposed depth of the underground parking structure. The approximate underground structure floor elevation was therefore considered at 171.2 masl. An additional excavation depth of 0.6 m (El. 170.6 masl) was considered to accommodate the proposed underground parking level structure and footings which were considered for this dewatering need assessment.

To facilitate excavation and construction in dry and stable subsoil conditions, it is proposed that the shallow groundwater table be lowered to an elevation of 169.6 masl, which is about 1 m below the lowest considered excavation depth. The subsoil comprises topsoil, earth fill, silty and silty clay, extending to the maximum proposed depths for excavation. Comparison of the lowest proposed excavation depths with the highest measured shallow groundwater level indicates that the lowest proposed excavation depth is about 5.0 m below the highest measured shallow groundwater level elevation of 165.60 masl, as recorded at the BH/MW 3 location. As such, it is not anticipated that construction dewatering will be required for groundwater control to lower the groundwater table to facilitate earthworks and construction of the proposed underground parking structures at the proposed development, including installation of associated underground services, other than the need for potential removal of any accumulated runoff within the excavation, footprint following heavy rainfall events.

Installation of Elevator Pit:

An excavation depth of approximately 1.525 m (El. 169.68 masl) beneath the proposed elevation of the underground parking structure was considered for the proposed elevator pit construction. The lowest proposed excavation depth elevation of 169.68 masl was considered for the dewatering assessment estimation to accommodate the elevator pit structure. The subsoil at this depth is comprised of granular fill, earth fill, silty sand till, silty clay, and silt extending to the proposed excavation depths. Comparison of the lowest proposed excavation depth with the anticipated highest measured water level of 165.60 masl, as measured at the BH/MW 3 location, indicates that the proposed elevation for the elevator pit footing is about 4.08 m above the highest shallow groundwater level. As such, it is not anticipated that construction dewatering will be required for groundwater control for the installation of the proposed elevator pit footings, other than the potential need to remove any accumulated runoff within the excavation footprints for the elevator pit following heavy rainfall events.

7.2 Management of Runoff Accumulation During Construction

The anticipated runoff volume that could accumulate in the excavation (s) was calculated by using the Intensity-Duration-Frequency (IDF) curve for the year 2010 with a 100-yr return period for Station ID 43.770833-79.337500 which is adjacent to the site. The data was taken from the Ministry of Transportation (MTO) website. A maximum rainfall depth of 124.4 mm was used for a rainfall storm event having a duration of 24 hours. The accumulated runoff within the excavation for the proposed underground parking structure, having an estimated area of 3,318 square meters, was calculated using the maximum storm event rainfall depth from above, multiplied by the estimated area for the construction excavation i.e.

Maximum rainfall depth; 124.4 mm (0.1244 m)
Surface area for proposed excavation; 3,318 m^2
Accumulated rainfall runoff for a 100-year return period = (0.1244 m *3,318 square meters) = 412.76 m^3/day (412,760 litres/day).

The anticipated runoff volume was calculated at 412,760 liters per day. Any temporary dewatering system should be designed for the removal of the maximum expected runoff accumulation rate.

During construction, the runoff from this proposed development area could be discharged into the municipal storm sewer, or alternatively managed on site at an infiltration gallery or

holding tank. It is recommended that any retained runoff undergo filtration such that it meets the City of Toronto Storm Sewer Use By-law disposal standards for Total Suspended Solids (TSS) prior to its disposal discharge to the same.

7.3 Permanent Drainage for Proposed Underground Structures

Based on review of the proposed development plans for the construction of the proposed building, the shallow groundwater level is approximately 5.0 m below the proposed elevation for the underground parking level foundation footings and 4.08 m below the proposed elevator pit structure. As such there will be no anticipated permanent foundation drainage from groundwater seepage to the proposed underground parking and elevator pit structures.

7.4 Management of Potential Foundation Drainage Runoff

The anticipated runoff volume that could accumulate in the excavation (s) was calculated by using the Intensity-Duration-Frequency (IDF) curve for the year 2010 with a 100-yr return period for Station ID 43.770833 -79.337500 which is adjacent to the site. The data was taken from the Ministry of Transportation (MTO) website. A maximum rainfall depth of 124.4 mm was used for a rainfall storm event having a duration of 24 hours. The accumulated runoff within the drainage network for the proposed underground parking structure foundation drainage weeper network, having an estimated area of 81.84 square meters, was calculated using the maximum storm event rainfall depth multiplied by the estimated drainage weeper area, multiplied by the porosity of the soil i.e.

Maximum rainfall depth; 124.4 mm (0.1244 m)
Surface area for footing drainage weeper tiles; 81.84 m^2
Porosity of Soil (Silty clay /Silt)-0.20
Accumulated rainfall runoff for a 100-year return period = (0.1244 m *81.84 square meters * 0.20) = 2.036 m^3/day (2,036 litres/day).

The anticipated drainage volume was calculated at 2,036 liters per day for a standard perimeter foundation weeper drainage system. With a safety factor of three (3) applied to the estimate, it could reach to a maximum of 6,108 litres per day. The pumping facility and sump systems connected to the foundation drainage system should be designed for the maximum expected drainage flow rate. The drainage piping should be properly constructed, using weepers surrounded by filter cloth, in turn surrounded by bedding stone or concrete sand to minimize loss of fines and to prevent silt clogging of weeper tiles.

The runoff from this proposed development area can be discharged into the municipal storm sewer, or alternatively managed on site at an infiltration gallery or holding tank. It should be noted that should any foundation drainage system be connected to the municipal sewer system, a city issued permit will be required in accordance with City of Toronto By-Laws. It is recommended that any retained runoff undergo filtration such that it meets the City of Toronto Storm Sewer Use By-law disposal standards for Total Suspended Solids (TSS) prior to its disposal discharge to the same.

7.5 **Groundwater Quality**

One (1) groundwater sample was collected for analysis from the monitoring well at BH/MW 4, on November 4, 2019, using a dedicated sampling bailer. The monitoring well was purged of three well casing volumes of groundwater prior to sample collection. Upon sampling, all of the sample bottles were placed in ice and packed in a cooler, at about 4^{o} C for shipment to the analytical laboratory. The groundwater sample was submitted for analysis and evaluation against the City of Toronto storm and sanitary sewer use by-law parameters. Sample analysis was performed by SGS Environmental Services, which is accredited by the Canadian Association for Laboratory Accreditation Inc. (CALA). Results of the analysis are provided in Appendix 'C', with a discussion of the findings provided below.

As per the protocol for City of Toronto storm and sanitary sewer use, a full set of collected samples consisted of unfiltered groundwater which were submitted for analysis, with results presented as totals for various parameters analyzed. A second set of select samples underwent field filtration during collection, prior to analyses for Metals and Total Phosphorous. This was performed in order to evaluate the sources of any potentially elevated Metals and Phosphorous in a dissolved form, indicated from the results of the total analysis (unfiltered samples). The chain of custody number for the submitted samples that underwent analysis is 011792 (SGS Group). The analytical results for the unfiltered groundwater, show several exceedances of the City of Toronto Storm and Sanitary Sewer Use By-Law parameters.

The exceedances, together with the storm and sanitary sewer use standards, are presented in Table 7-2.

Table 7-2 - Groundwater Quality Exceedances Results (Unfiltered-Groundwater)

Parameter	Groundwater Quality Results (Unfiltered Groundwater) (mg/L) BH/MW 4	City of Toronto Storm Sewer Use Limits (mg/L)	City of Toronto Sanitary Sewer Use Limits (mg/L)	Comments
Total Suspended Solids (TSS)	57	15	350	Exceeds Storm; meets Sanitary Sewer Use
Chloroform	0.0041	0.002	0.04	Exceeds Storm; meets Sanitary Sewer Use

As shown above, the results of analysis for the unfiltered groundwater obtained from BH/MW 4 indicates that the concentrations for all of the measured parameters are within the City of Toronto sanitary sewer use limits, and the concentrations for Total Suspended Solids and Chloroform, exceed the City of Toronto storm sewer use limits. The results suggest that short-term construction dewatering effluent and effluent from any long-term foundation drainage should be acceptable for disposal to the City of Toronto Storm Sewer with minimal pre-treatment being implemented to lower TSS and Chloroform to acceptable disposal standards. The results suggest that short-term construction dewatering effluent and any long-term foundation drainage effluent should be acceptable for disposal to the City of Toronto Sanitary Sewer use limits, with no anticipated pretreatment being required.

A review of the results for the filtered groundwater sample indicates that all of the tested parameters for dissolved metals and phosphorus, also meet the Storm Sewer Use limits.

The results suggest that if there is any short-term construction dewatering effluent and/or any long-term foundation drainage effluent, the effluent should be acceptable for disposal to the City of Toronto sanitary sewer. The anticipated drainage effluent from both sources would not be acceptable for disposal to the City of Toronto Storm Sewer System; however, implementing minor pre-treatment to lower TSS and Chloroform to meet City of Toronto Storm Sewer Use limits should permit disposal of the effluent to the City's Storm Sewer.

A foundation drainage system designed to minimize TSS and Chloroform should result in the effluent being acceptable for disposal to the City's storm sewer system.

The final design for any construction dewatering effluent pre-treatment system will be the responsibility of the contractors responsible for construction. The final design for any long-term foundation drainage system effluent pre-treatment, will be the responsibility of the mechanical engineer, or the associated water treatment specialists responsible for the design for the long-term foundation drainage pretreatment system.

It should be noted that the above groundwater quality from above would not be representative of runoff quality generated onsite following a storm event, as groundwater control during construction and for any long-term foundation drainage is not anticipated.

7.6 Groundwater Function of the Subject Site

The subject site is located within an existing developed residential and commercial area. Two wooded areas are located approximately 165 m to the north and 275 m west of the subject site. There are no natural features, such as watercourses, bodies of water, wetlands or any other groundwater receptors, including water supply wells on site or within close proximity of the subject site.

Since the shallow groundwater elevation is lower than the proposed 1-level underground parking foundation structures, there will be no anticipated construction dewatering need, and no associated potential impacts on shallow groundwater or associated nearby groundwater receptors from the proposed development.

7.7 Low Impact Development

The subsoil beneath the site consists, predominantly of earth fill, underlain by silt, silty sand till, silty clay, silty clay till, silt, sand, and sand and gravel. Opportunities may exist to infiltrate collected runoff to the subsurface at the developed site, using appropriate Low Impact Development Infrastructure, such as infiltration galleries or underground storage/exfiltration tanks.

The groundwater lies at depths, ranging between 9.60 to 18.0 m below the ground surface. Potential LID infrastructure could be implemented in areas where the shallow groundwater is deeper than 1 m below the ground surface, and where it is possible to maintain a minimum of a 1 m separation between the base of any proposed LID stormwater management infiltration infrastructure and the high groundwater table. Any proposed LID infrastructure should be designed by the stormwater engineer for the project.

8.0 CONCLUSIONS

1. The subject site lies within the physiographic region of Southern Ontario known as the Peel Plain which is underlain by the Halton Till native soil deposits, consisting predominantly of silt to silty clay, high in matrix calcium carbonate content, considered as being clast-poor.

2. The subject site is located within Lower East Don River subwatershed of the Don River Watershed.
3. A review of the local topography shows that the site is relatively flat, exhibiting a minor decline in elevation relief towards its eastern limits.
4. The study has disclosed that beneath the existing layer of pavers, granular fill, and earth fill, the native soils underlying the subject site consists of silt, silty sand till, sandy silt till, silty clay, sand, silty clay till, and sand and gravel.
5. The findings of this study confirm that the groundwater level elevations beneath the site, ranges from 165.60 to 157.80 masl (i.e. 9.60 to 18.0 m below ground surface).
6. A review of the average of the groundwater elevations suggests that shallow groundwater flows in southerly, easterly, and south-easterly directions.
7. The single well response test results provided an estimated hydraulic conductivity (K) estimate of 1.1×10^{-8} m/sec for the silty clay unit, the K estimate for the silty sand till and silty clay till units is 9.7×10^{-9} m/sec, the K estimate for the sandy silt till, and silty clay unit, is at 1.2×10^{-7} m/sec, and the K estimate for the sandy silt till unit is 7.8×10^{-7} m/sec., at the depths of the well screens. This result suggests that low shallow groundwater seepage rates can be anticipated into open excavations below the water table.
8. The Hazen Equation calculated permeability results indicates that the hydraulic conductivity (K) estimates for the silty sand till, ranges from 6.4×10^{-6} to 7.29×10^{-8} m/sec; the K estimate for the sandy silty till, is at about 1.94×10^{-7} m/sec., and for the sand and gravel unit, it is about 1.69×10^{-5} m/sec. The K estimates determined from the Hazen method suggests low to moderate hydraulic conductivities for the shallow subsoil units beneath the site.
9. The groundwater at the site is approximately 5.0 m below the proposed elevation for the base of the underground parking foundation footings, and is 4.08 m below the proposed elevator pit structure. It is therefore not anticipated that construction dewatering will be required for groundwater control for earthworks and construction of the proposed development, including installation of any associated underground services.
10. Accumulated storm runoff within earthworks excavation from storm event precipitation associated with this development is estimated to be approximately 412,760 L/day. The runoff from the proposed development area can be directed for discharge into the adjacent building's foundation drainage/sump network, which, in turn could be directed for disposal discharge building the municipal storm sewer. However, given that the existing site is included as part of the development application, the city may require a discharge permit for the existing structure even for short-term storm related drainage.

11. There is no anticipated long-term permanent foundation drainage from groundwater seepage for the proposed underground parking structure or elevator pit structures. However, potential drainage associated with shallow runoff related seepage from storm event precipitation associated with this development is estimated to be approximately 2,036 litres/day; by applying a safety factor of three, the runoff could reach a maximum of 6,108 litres/day. The runoff from the proposed development area can be directed for discharge into the building foundation drainage/sump network, for disposal discharge into the municipal storm sewer.
12. Dewatering effluent from any short-term construction dewatering or from any long-term foundation drainage is acceptable for disposal to the City of Toronto sanitary sewer. For disposal to the storm sewer, the effluent will require pre-treatment to lower levels of total suspended solids and chloroform. Any short-term dewatering may be associated with seepage of any perched groundwater encountered within excavations, or from the removal of the accumulated runoff from within the excavation following storm events. It is anticipated that there may be limited construction dewatering needs following storm events during excavation works. However, any groundwater seepage within excavations will likely dissipate relatively quickly after the earthworks commence. The option also exists to pump any accumulated runoff from excavations to a temporary holding tank, for later removal off site using licensed carriers and to not direct any of the runoff effluent to the city sewer system.

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March 25, 2020

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4. Don River, 2018, Toronto Region Conservation Authority.

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FIGURES 1 to 6

MONITORING WELL LOGS

REFERENCE NO. 1908-W037

LIST OF ABBREVIATIONS AND DESCRIPTION OF TERMS

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

SAMPLE TYPES

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

PENETRATION RESISTANCE

Dynamic Cone Penetration Resistance:

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

Plotted as '—●—'

Standard Penetration Resistance or 'N' Value:

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

Plotted as '○'

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

SOIL DESCRIPTION

Cohesionless Soils:

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

Cohesive Soils:

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

Method of Determination of Undrained Shear Strength of Cohesive Soils:

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

△ Laboratory vane test

□ Compression test in laboratory

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

METRIC CONVERSION FACTORS

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

JOB NO.: 1908-W037

LOG OF BOREHOLE NO.: BH/MW 1

FIGURE NO.: 1

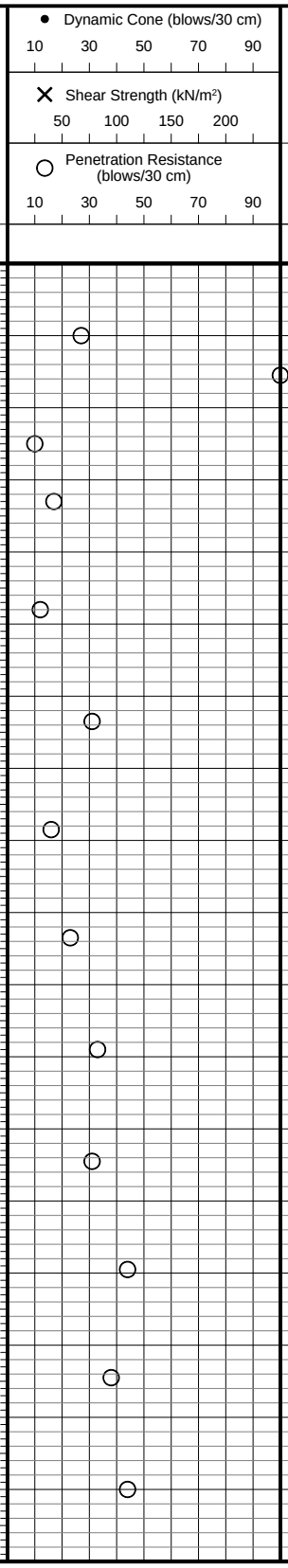
PROJECT DESCRIPTION: Proposed Residential Development

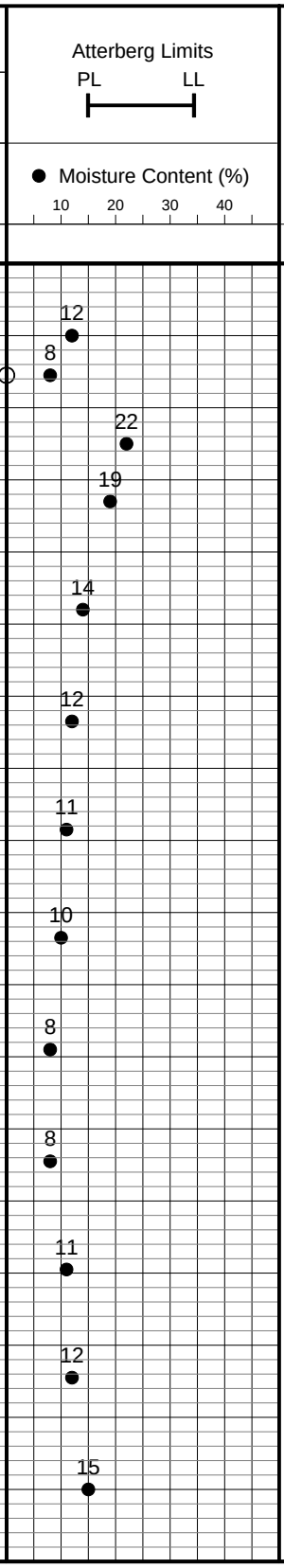
METHOD OF BORING: Hollow Stem Auger with Wash Boring

PROJECT LOCATION: 1 Herons Hill Way, City of Toronto

DRILLING DATE: August 14, 2019

El. (m) / Depth (m)	SOIL DESCRIPTION	SAMPLES Number	Type	N-Value	Depth Scale (m)
175.2	Ground Surface				
0.0	**INTERLOCKING STONE OVER**	1	DO	-	0
0.1	**GRANULAR FILL**				
0.3	**EARTH FILL** grey sandy silt with occ. sand and gravel layers	2	DO	27	1
		3	DO	50/8	
173.2	asphalt debris at 1.5 m				2
2.0	Brown, compact **SILT** a trace of clay occ. sand seams	4	DO	10	
		5	DO	17	3
171.2					4
4.0	Comapct to dense **SILTY SAND TILL** traces of clay and gravel occ. silt seams and layers	6	DO	12	5
		7	DO	31	6
	brown / grey				7
		8	DO	16	8
		9	DO	23	9
					10
		10	DO	33	11
					12
162.4		11	DO	31	
12.8	Grey, hard **SILTY CLAY TILL** low plasticity a trace of gravel occ. sand layers below 18 m				13
		12	DO	44	14
					15
		13	DO	38	
					16
		14	DO	44	17
157.2					18





WATER LEVEL

JOB NO.: 1908-W037

LOG OF BOREHOLE NO.: BH/MW 1

FIGURE NO.: 1

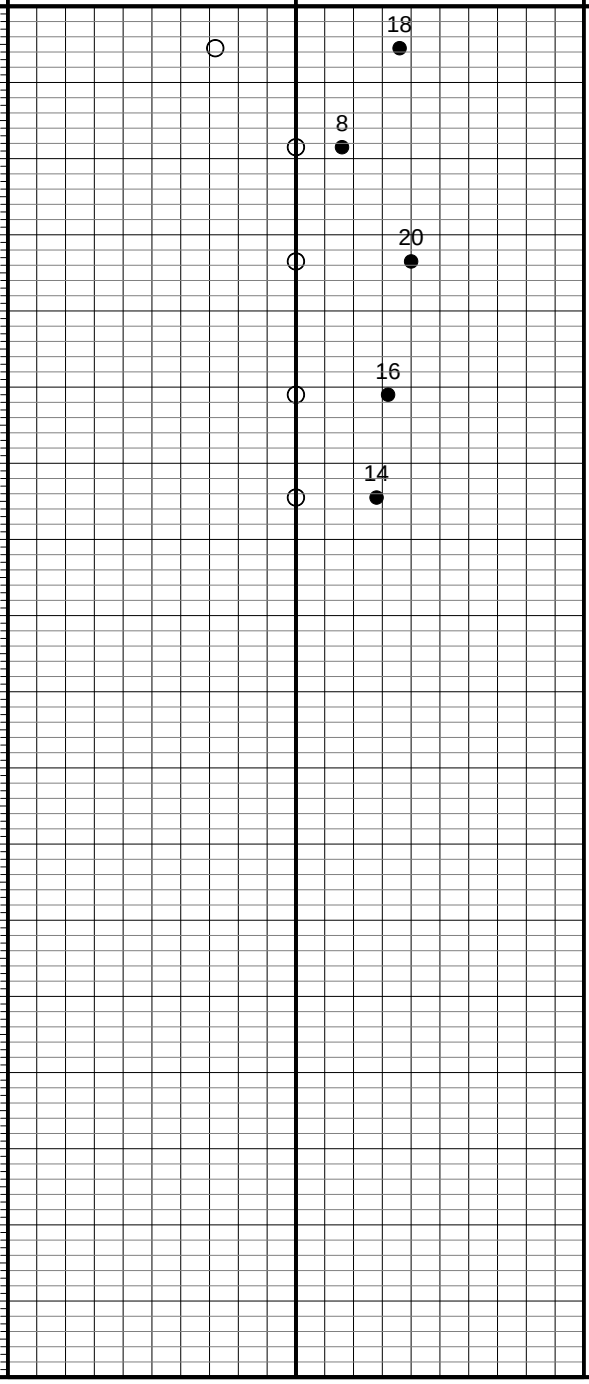
PROJECT DESCRIPTION: Proposed Residential Development

METHOD OF BORING: Hollow Stem Auger with Wash Boring

PROJECT LOCATION: 1 Herons Hill Way, City of Toronto

DRILLING DATE: August 14, 2019

El. (m) / Depth (m)	SOIL DESCRIPTION	SAMPLES Number	Type	N-Value	Depth Scale (m)
18.0	Grey, hard				18
	SILTY CLAY TILL	15	DO	72	19
	low plasticity a trace of gravel occ. sand layers below 18 m	~~16~~	~~DO~~	~~50/8~~	20
		~~17~~	~~DO~~	~~50/3~~	21
		18	DO	86/23	22
150.7		~~19~~	~~DO~~	~~50/10~~	23
24.5	**END OF BOREHOLE**				24
	Installed 50 mm Ø monitoring well to 24.4 m completed with 3.1 m screen Sand backfill from 20.7 to 24.4 m Bentonite seal from 0.0 to 20.7 m Provided with a monument steel casing				25
					26
					27
					28
					29
					30
					31
					32
					33
	Ground Water Elevations: W.L. @ El. 165.25 m on August 28, 2019 W.L. @ El. 161.03 m on September 12, 2019 W.L. @ El. 161.73 m on September 25, 2019 W.L. @ El. 161.15 m on October 9, 2019 W.L. @ El. 161.15 m on October 24, 2019 W.L. @ El. 159.56 m on November 4, 2019				34
					35
					36



WATER LEVEL

JOB NO.: 1908-W037

LOG OF BOREHOLE NO.: BH/MW 2

FIGURE NO.: 2

PROJECT DESCRIPTION: Proposed Residential Development

METHOD OF BORING: Hollow Stem Auger with Wash Boring

PROJECT LOCATION: 1 Herons Hill Way, City of Toronto

DRILLING DATE: August 20-21, 2019

El. (m) / Depth (m)	SOIL DESCRIPTION	SAMPLES Number	Type	N-Value	Depth Scale (m)
175.2	Ground Surface				
0.0 / 0.1	**INTERLOCKING STONE OVER GRANULAR FILL**	1	DO	36	0
		2	DO	23	1
1.2	**EARTH FILL** brown sandy silt occ. sand and gravel pockets	3	DO	50/5	
173.1 / 2.1	Brown, stiff	4	DO	9	2
	SILTY CLAY occ. silt and sand seams and layers	5	DO	9	3
		6	DO	11	4
170.6 / 4.6	Compact to dense	7	DO	13	5
	SILTY SAND TILL traces of clay and gravel — — brown / grey occ. silt seams, cobbles and boulders	8	DO	23	6
		9	DO	34	8
		10	DO	25	9
164.2 / 11.0	Grey, compact to very dense	11	DO	63/25	11
	SAND fine grained silty a trace of clay occ. silt seams and layers	12	DO	26	12
		13	DO	81/25	14
160.6 / 14.6	Grey, hard				
	SILTY CLAY TILL some sand and gravel occ. cobbles and boulders	14	DO	60	15
		15	DO	48	17
157.2					18

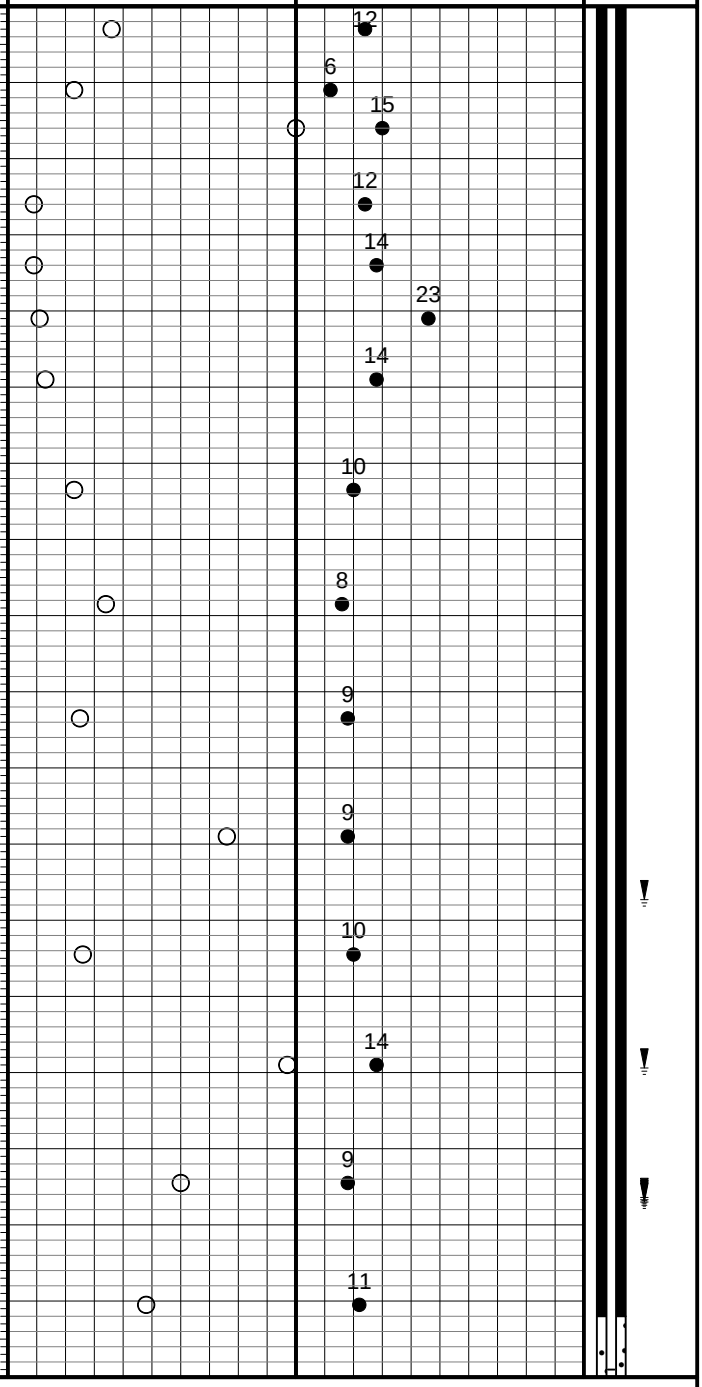
Dynamic Cone (blows/30 cm) 10 30 50 70 90

Shear Strength (kN/m²) 50 100 150 200

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

Atterberg Limits PL LL

Moisture Content (%) 10 20 30 40



WATER LEVEL

JOB NO.: 1908-W037

LOG OF BOREHOLE NO.: BH/MW 2

FIGURE NO.: 2

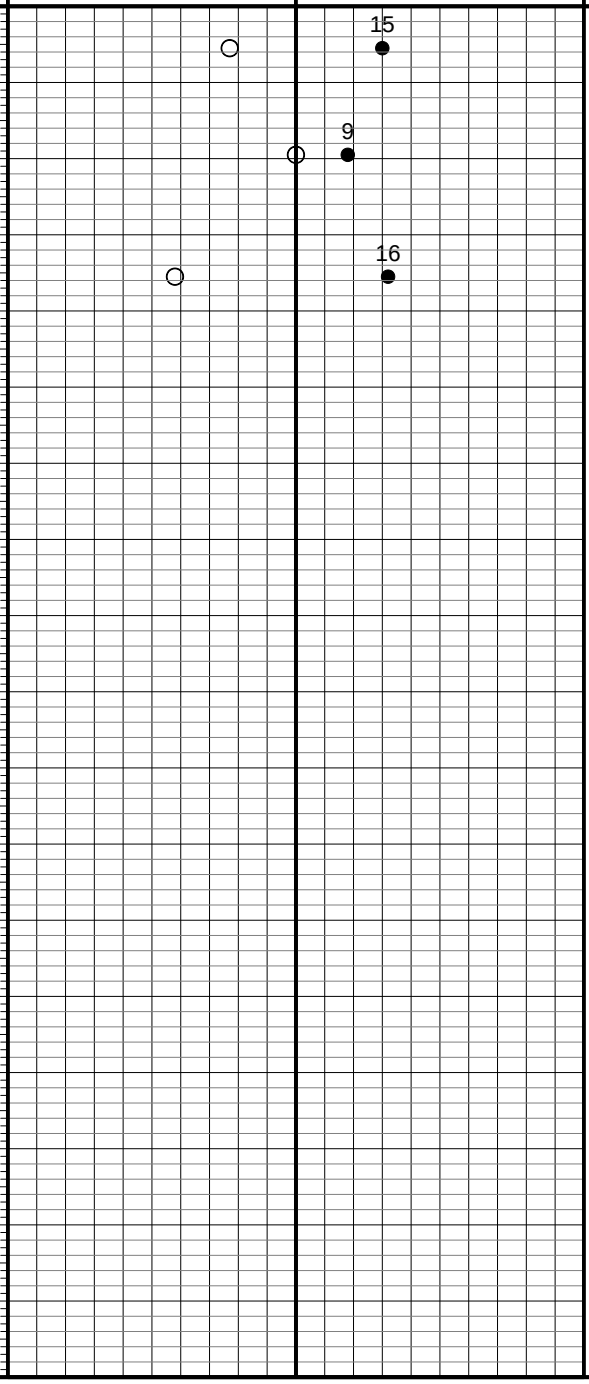
PROJECT DESCRIPTION: Proposed Residential Development

METHOD OF BORING: Hollow Stem Auger with Wash Boring

PROJECT LOCATION: 1 Herons Hill Way, City of Toronto

DRILLING DATE: August 20-21, 2019

El. (m) / Depth (m)	SOIL DESCRIPTION	SAMPLES Number	Type	N-Value	Depth Scale (m)
18.0	Grey, hard				18
	SILTY CLAY TILL	16	DO	77	19
	some sand and gravel occ. cobbles and boulders				
		17	DO	50/13	20
					21
153.4		18	DO	58	
21.8	**END OF BOREHOLE**				22
	Installed 50 mm Ø monitoring well to 20.9 m completed with 3.1 m screen Sand backfill from 17.2 to 20.9 m Bentonite seal from 0.0 to 17.2 m Provided with a monument steel casing				23
					24
					25
					26
					27
					28
					29
					30
					31
					32
					33
	Ground Water Elevations: W.L. @ El. 163.47 m on August 28, 2019 W.L. @ El. 159.46 m on September 12, 2019 W.L. @ El. 159.53 m on September 25, 2019 W.L. @ El. 159.56 m on October 9, 2019 W.L. @ El. 159.53 m on October 24, 2019 W.L. @ El. 161.26 m on November 4, 2019				34
					35
					36



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JOB NO.: 1908-W037

LOG OF BOREHOLE NO.: BH/MW 3

FIGURE NO.: 3

PROJECT DESCRIPTION: Proposed Residential Development

METHOD OF BORING: Hollow Stem Auger with Wash Boring

PROJECT LOCATION: 1 Herons Hill Way, City of Toronto

DRILLING DATE: August 20-21, 2019

El. (m) / Depth (m)	SOIL DESCRIPTION	SAMPLES Number	Type	N-Value	Depth Scale (m)	Dynamic Cone (blows/30 cm) 10 30 50 70 90 / Shear Strength (kN/m²) 50 100 150 200 / Penetration Resistance (blows/30 cm) 10 30 50 70 90	Atterberg Limits PL LL / Moisture Content (%) 10 20 30 40	WATER LEVEL
175.2	Ground Surface							
0.0	**10 cm TOPSOIL**							
0.1	**EARTH FILL** dark brown to grey sandy silt with some clay occ. topsoil and rootlet inclusions	1	DO	15	0		8	
		2	DO	9	1		11	
		3	DO	7	2		11	
172.5		4	DO	9	3		21	
2.7	Brown, stiff to very stiff **SILTY CLAY** occ. silt seams and layers	5	DO	13	4		19	
		6	DO	20	5		17	
170.0								
5.2	Grey, compact to very dense **SILTY SAND TILL** traces of clay and gravel occ. silt seams, cobbles and boulders	7	DO	27	6		11	
		8	DO	29	7		11	
		9	DO	17	8		10	
		10	DO	10	9		13	
		11	DO	18	10		11	
		12	DO	11	11		8	
		13	DO	32	12		8	
		14	DO	50/15	13		11	
157.2					14			
					15			
					16			
					17			
					18			

Soil Engineers Ltd.

JOB NO.: 1908-W037

LOG OF BOREHOLE NO.: BH/MW 3

FIGURE NO.: 3

PROJECT DESCRIPTION: Proposed Residential Development

METHOD OF BORING: Hollow Stem Auger with Wash Boring

PROJECT LOCATION: 1 Herons Hill Way, City of Toronto

DRILLING DATE: August 20-21, 2019

El. (m) / Depth (m)	SOIL DESCRIPTION	SAMPLES Number	Type	N-Value	Depth Scale (m)	Dynamic Cone (blows/30 cm) 10 30 50 70 90 / Shear Strength (kN/m²) 50 100 150 200 / Penetration Resistance (blows/30 cm) 10 30 50 70 90	Atterberg Limits PL LL / Moisture Content (%) 10 20 30 40	WATER LEVEL
18.0	Grey, very dense				18			
	SILTY SAND TILL	15	DO	50/15			12	
	traces of clay and gravel				19			
156.0	occ. silt seams, cobbles and boulders							
19.2	Grey, hard							
	SILTY CLAY TILL	16	DO	76	20		14	
	a trace of gravel							
	occ. sand seams, cobbles and boulders				21			
153.4		17	DO	61			16	
21.8	**END OF BOREHOLE**				22			
	Installed 50 mm Ø monitoring well to 21.3 m completed with 3.1 m screen Sand backfill from 17.7 to 21.3 m Bentonite seal from 0.0 to 17.7 m Provided with a monument steel casing				23			
					24			
					25			
					26			
					27			
					28			
					29			
					30			
					31			
					32			
					33			
	Ground Water Elevations: W.L. @ El. 170.24 m on August 28, 2019 W.L. @ El. 161.11 m on September 12, 2019 W.L. @ El. 161.15 m on September 25, 2019 W.L. @ El. 161.30 m on October 9, 2019 W.L. @ El. 161.45 m on October 24, 2019 W.L. @ El. 161.83 m on November 4, 2019.				34			
					35			
					36			

JOB NO.: 1908-W037

LOG OF BOREHOLE NO.: BH/MW 4

FIGURE NO.: 4

PROJECT DESCRIPTION: Proposed Residential Development

METHOD OF BORING: Hollow Stem Auger with Wash Boring

PROJECT LOCATION: 1 Herons Hill Way, City of Toronto

DRILLING DATE: August 14-16, 2019

El. (m) / Depth (m)	SOIL DESCRIPTION	SAMPLES Number	Type	N-Value	Depth Scale (m)
175.3	Ground Surface				
0.0	~~20 cm TOPSOIL~~				
0.2	**GRANULAR FILL**	1	DO	20	0
0.9	**EARTH FILL** brown sandy silt silty clay layers occ. topsoil inclusion and asphalt debris at 1.8 m	2	DO	11	1
		3	DO	43	2
172.4		4	DO	8	
2.9	Brown, loose to dense **SILT** a trace of clay occ. fine sand seams	5	DO	7	3
		6	DO	31	4
169.8					5
5.5	Grey, compact to dense **SILTY SAND TILL** a trace of gravel occ. sand seams, cobbles and boulders	7	DO	38	6
		8	DO	20	7
		9	DO	40	8
165.3					9
10.0	Grey, dense to very dense **SAND AND GRAVEL** some silt a trace of clay	10	DO	64	10
		11	DO	32	11
161.3					12
14.0	Grey, hard **SILTY CLAY TILL** low plasticity a trace to some gravel occ. sand seams and layers	12	DO	66	13
		13	DO	66	14
		14	DO	51	15
157.3					16
					17
					18

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

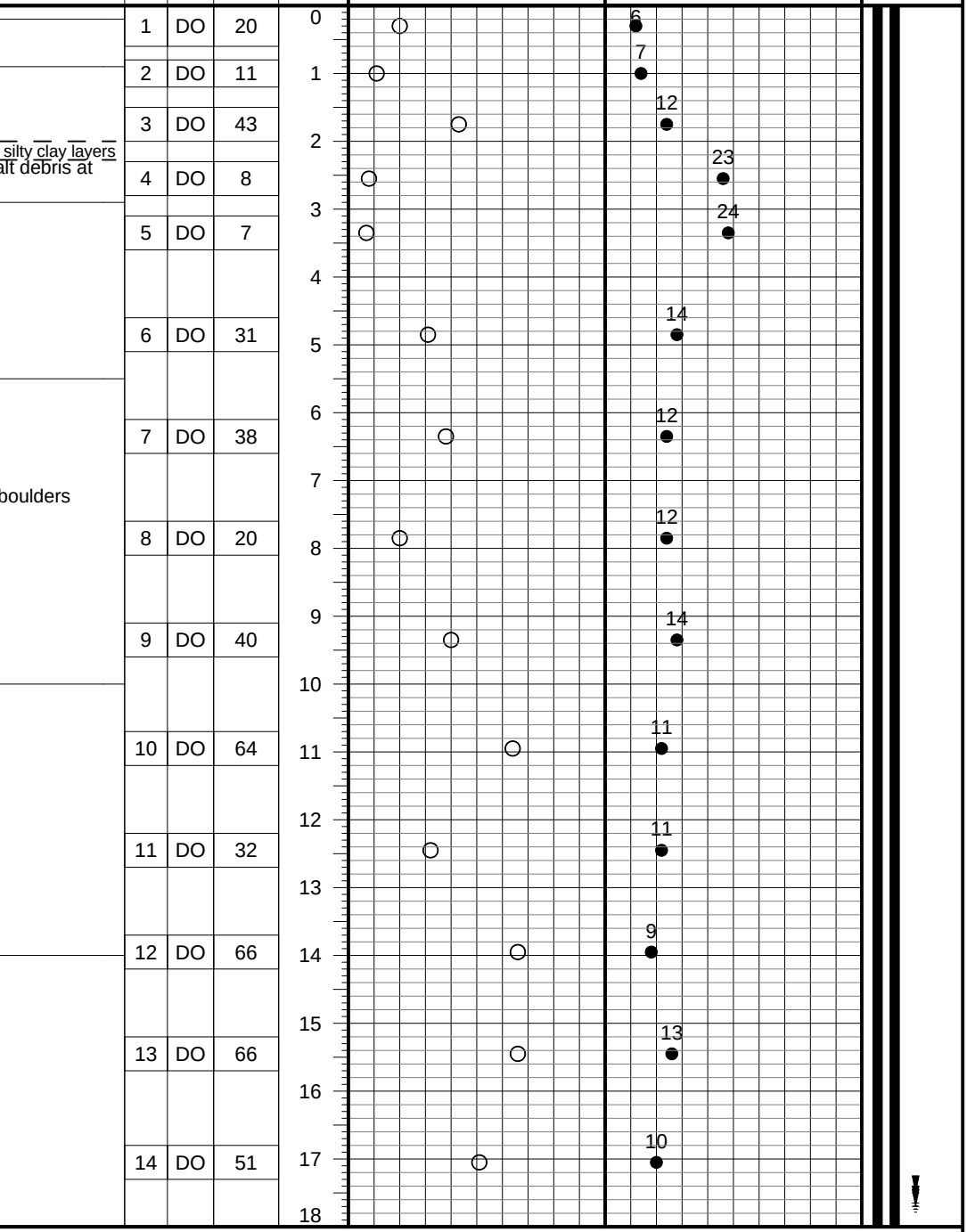
Shear Strength (kN/m²) 50 100 150 200

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

Atterberg Limits PL LL

Moisture Content (%) 10 20 30 40

WATER LEVEL



Soil Engineers Ltd.

JOB NO.: 1908-W037

LOG OF BOREHOLE NO.: BH/MW 4

FIGURE NO.: 4

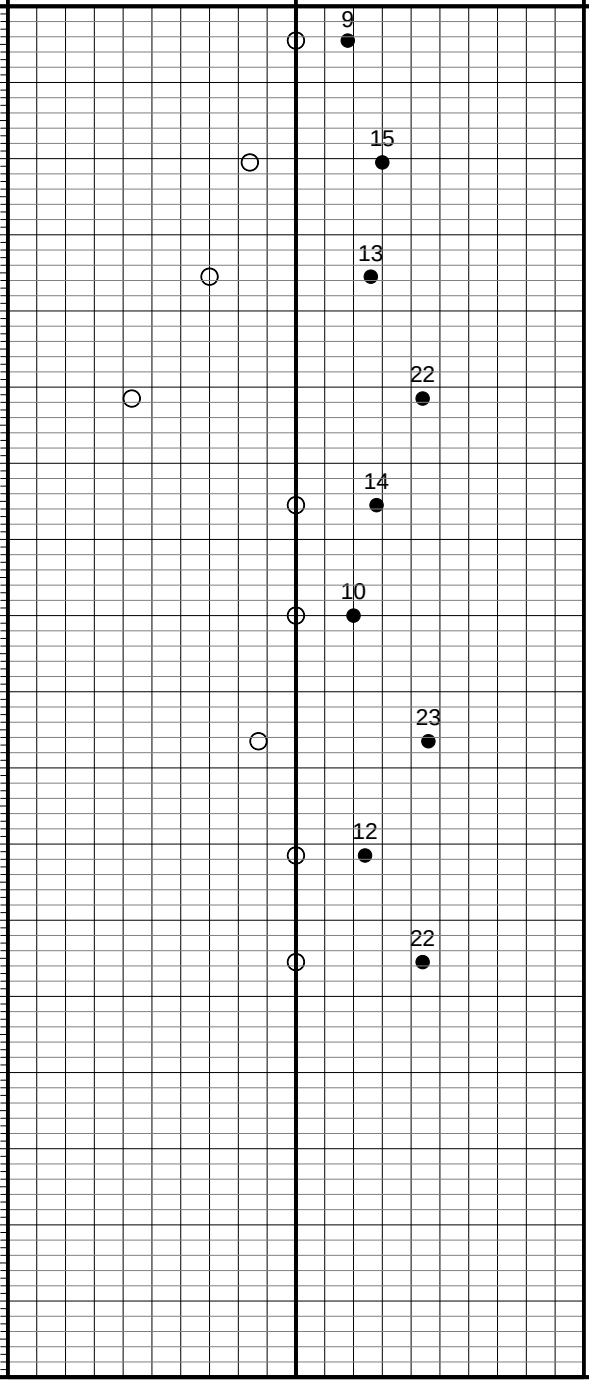
PROJECT DESCRIPTION: Proposed Residential Development

METHOD OF BORING: Hollow Stem Auger with Wash Boring

PROJECT LOCATION: 1 Herons Hill Way, City of Toronto

DRILLING DATE: August 14-16, 2019

El. (m) / Depth (m)	SOIL DESCRIPTION	SAMPLES Number	Type	N-Value	Depth Scale (m)
18.0	Grey, hard				18
	SILTY CLAY TILL	15	DO	50/15	19
	low plasticity a trace to some gravel occ. sand seams and layers	16	DO	84	20
		17	DO	70	21
		18	DO	43	22
		19	DO	78/18	23
		20	DO	54/15	24
		21	DO	87	25
146.2					26
29.1	Grey, very dense **SANDY SILT TILL** traces of clay and gravel occ. sand seams, cobbles and boulders	22	DO	50/13	27
144.7		23	DO	50/10	28
30.6	**END OF BOREHOLE**				29
	Installed 50 mm Ø monitoring well to 30.5 m completed with 3.1 m screen Sand backfill from 26.8 to 30.5 m Bentonite seal from 0.0 to 26.8 m Provided with a monument steel casing				30
	Ground Water Elevations: W.L. @ El. 157.80 m on August 28, 2019 W.L. @ El. 157.63 m on September 12, 2019 W.L. @ El. 157.65 m on September 25, 2019 W.L. @ El. 157.65 m on October 9, 2019 W.L. @ El. 157.60 m on October 24, 2019 W.L. @ El. 157.65 m on November 4, 2019				31
					32
					33
					34
					35
					36



WATER LEVEL

Soil Engineers Ltd.

JOB NO.: 1908-W037

LOG OF BOREHOLE NO.: BH/MW 5

FIGURE NO.: 5

PROJECT DESCRIPTION: Proposed Residential Development

METHOD OF BORING: Hollow Stem Auger with Wash Boring

PROJECT LOCATION: 1 Herons Hill Way, City of Toronto

DRILLING DATE: August 20, 2019

El. (m) / Depth (m)	SOIL DESCRIPTION	SAMPLES Number	Type	N-Value	Depth Scale (m)
175.2	Ground Surface				
0.0	**10 cm TOPSOIL**	1	DO	9	0
0.1	**EARTH FILL**				
	brown sandy silt with sand and gravel occ. topsoil and rootlet inclusions	2	DO	6	1
		3	DO	50/8	
					2
172.6		4	DO	6	
2.6	Brown, firm to stiff **SILTY CLAY** varved occ. silt layers				3
		5	DO	11	
171.1		6	DO		4
4.1	Grey, loose to compact				
	SILTY SAND TILL	7	DO	7	5
	traces of clay and gravel occ. silt layers and cobbles	8	DO		
					6
		9	DO	6	
					7
		10	DO	8	8
					9
		11	DO	6	
					10
		12	DO	15	11
					12
		13	DO	14	
					13
	clay layer	14	DO	22	14
					15
		15	DO	13	
159.0					16
16.2	Grey, very dense **SANDY SILT TILL** some gravel, a trace of clay occ. sand seams and layers, cobbles and boulders	16	DO	75	17
157.2					18

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

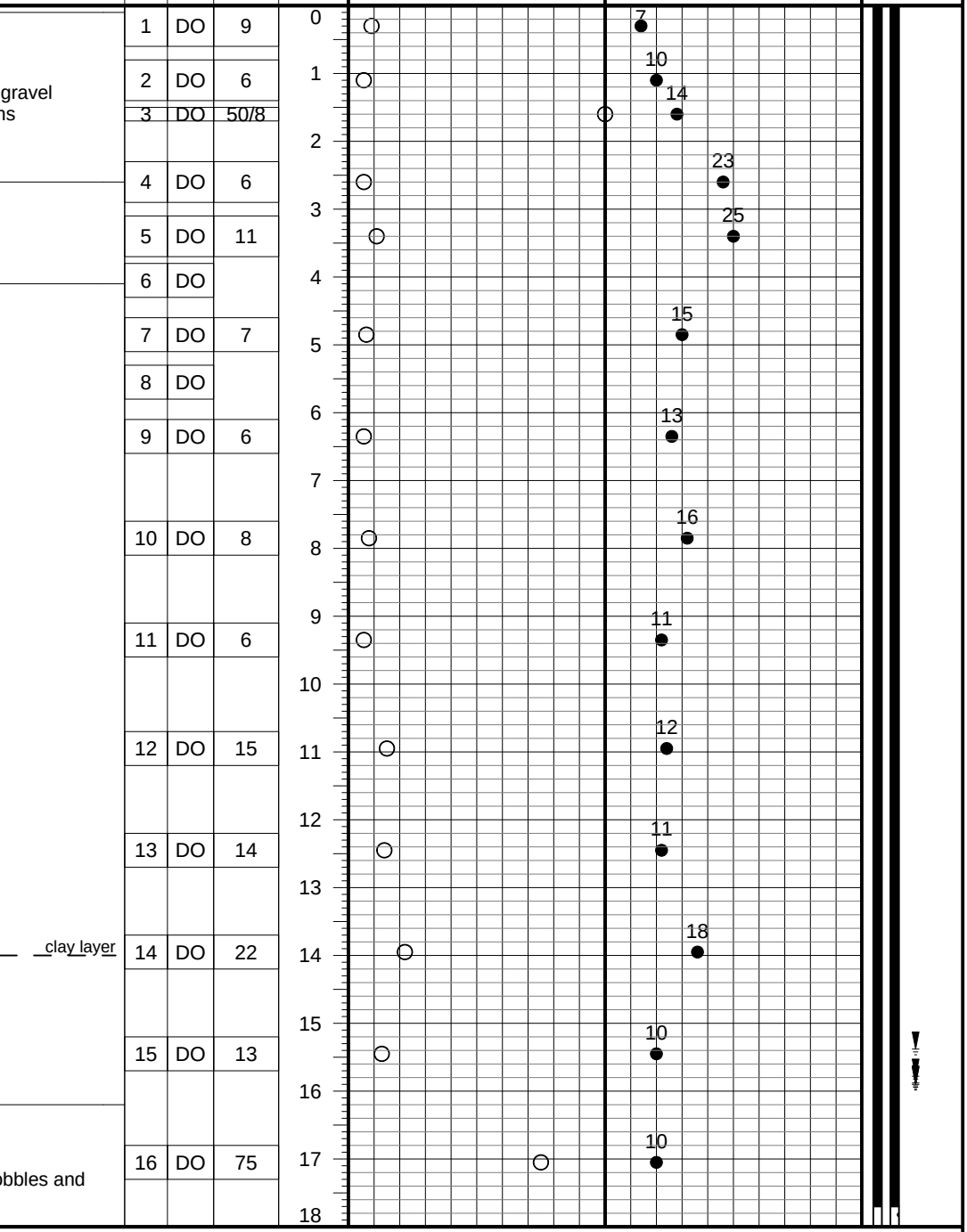
Shear Strength (kN/m²) 50 100 150 200

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

Atterberg Limits PL LL

Moisture Content (%) 10 20 30 40

WATER LEVEL



Soil Engineers Ltd.

JOB NO.: 1908-W037

LOG OF BOREHOLE NO.: BH/MW 5

FIGURE NO.: 5

PROJECT DESCRIPTION: Proposed Residential Development

METHOD OF BORING: Hollow Stem Auger with Wash Boring

PROJECT LOCATION: 1 Herons Hill Way, City of Toronto

DRILLING DATE: August 20, 2019

El. (m) / Depth (m)	SOIL DESCRIPTION	SAMPLES Number	Type	N-Value	Depth Scale (m)	Dynamic Cone (blows/30 cm) 10 30 50 70 90 / Shear Strength (kN/m²) 50 100 150 200 / Penetration Resistance (blows/30 cm) 10 30 50 70 90	Atterberg Limits PL LL / Moisture Content (%) 10 20 30 40	WATER LEVEL
18.0	Grey, very dense **SANDY SILT TILL** some gravel, a trace of clay occ. sand seams and layers, cobbles and boulders	~~17~~	~~DO~~	~~50/13~~	18		14	
		~~18~~	~~DO~~	~~50/13~~	19 20		14	
154.8 20.4	Grey, hard **SILTY CLAY TILL** occ. sand seams, cobbles and boulders				21			
153.6		19	DO	50/13			15	
21.6	**END OF BOREHOLE**				22			
	Installed 50 mm Ø monitoring well to 21.3 m completed with 3.1 m screen Sand backfill from 17.7 to 21.3 m Bentonite seal from 0.0 to 17.7 m Provided with a monument steel casing				23 24 25 26 27 28 29 30 31 32 33 34 35 36			

Ground Water Elevations:
W.L. @ El. 159.82 m on August 28, 2019
W.L. @ El. 159.26 m on September 12, 2019
W.L. @ El. 159.32 m on September 25, 2019
W.L. @ El. 159.32 m on October 9, 2019
W.L. @ El. 159.32 m on October 24, 2019
W.L. @ El. 159.42 m on November 4, 2019

JOB NO.: 1908-W037

LOG OF BOREHOLE NO.: BH/MW 6

FIGURE NO.: 6

PROJECT DESCRIPTION: Proposed Residential Development

METHOD OF BORING: Hollow Stem Auger with Wash Boring

PROJECT LOCATION: 1 Herons Hill Way, City of Toronto

DRILLING DATE: August 16 & 19, 2019

El. (m) / Depth (m)	SOIL DESCRIPTION	SAMPLES Number	Type	N-Value	Depth Scale (m)	Dynamic Cone (blows/30 cm) 10 30 50 70 90 / Shear Strength (kN/m²) 50 100 150 200 / Penetration Resistance (blows/30 cm) 10 30 50 70 90	Atterberg Limits PL LL / Moisture Content (%) 10 20 30 40	WATER LEVEL
175.8	Ground Surface							
0.0	**10 cm TOPSOIL**	1	DO	31	0		4	
0.1	**EARTH FILL** brown sandy silt with sand and gravel asphalt and brick debris below 1.8 m	2	DO	7			9	
		3	DO	9	1		16	
		4	DO	50/8			9	
		5	DO	20	2		12	
172.6								
3.2	Brown, stiff **SILTY CLAY** occ. sand seams and layers	6	DO	13	3		17	
		7	DO	12			25	
		8	DO	15	4		18	
					5			
170.2								
5.6	Grey, compact **SILTY SAND TILL** some clay a trace of gravel occ. silt layers, cobbles and boulders	9	DO	16	6		12	
		10	DO	15	7			
					8		11	
		11	DO	12	9		11	
		12	DO	15	10		12	
		13	DO	12	11		13	
					12			
161.8								
14.0	Grey, compact **SAND** well graded some silt and gravel	14	DO	14	13		14	
		15	DO	21	14		11	
					15			
158.7					16			
17.1	Grey, compact to very dense **SANDY SILT TILL**	16	DO	23	17		9	
157.8					18			

JOB NO.: 1908-W037

LOG OF BOREHOLE NO.: BH/MW 6

FIGURE NO.: 6

PROJECT DESCRIPTION: Proposed Residential Development

METHOD OF BORING: Hollow Stem Auger with Wash Boring

PROJECT LOCATION: 1 Herons Hill Way, City of Toronto

DRILLING DATE: August 16 & 19, 2019

El. (m) / Depth (m)	SOIL DESCRIPTION	SAMPLES Number	Type	N-Value	Depth Scale (m)	Dynamic Cone (blows/30 cm) 10 30 50 70 90 / Shear Strength (kN/m²) 50 100 150 200 / Penetration Resistance (blows/30 cm) 10 30 50 70 90	Atterberg Limits PL LL / Moisture Content (%) 10 20 30 40	WATER LEVEL
18.0	Grey, compact to very dense				18			
	SANDY SILT TILL	17	DO	10	19	○	12 ●	
	some clay a trace of gravel occ. sand seams and layers, cobbles and boulders	18	DO	46	20	○	9 ●	
154.4		19	DO	50/10	21	○	14 ●	
21.4	**END OF BOREHOLE**				22			
	Installed 50 mm Ø monitoring well to 21.3 m completed with 3.1 m screen Sand backfill from 17.7 to 21.3 m Bentonite seal from 0.0 to 17.7 m Provided with a monument steel casing				23			
					24			
					25			
					26			
					27			
					28			
					29			
					30			
					31			
					32			
					33			
	Ground Water Elevations: W.L. @ El. 159.33 m on August 28, 2019 W.L. @ El. 157.93 m on September 12, 2019 W.L. @ El. 157.93 m on September 25, 2019 W.L. @ El. 157.84 m on October 9, 2019 W.L. @ El. 157.81 m on October 24, 2019 W.L. @ El. 157.80 m on November 4, 2019				34			
					35			
					36			

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

FIGURES 7 to 12

GRAIN SIZE DISTRIBUTION GRAPHS

REFERENCE NO. 1908-W037

Soil Engineers Ltd.

GRAIN SIZE DISTRIBUTION

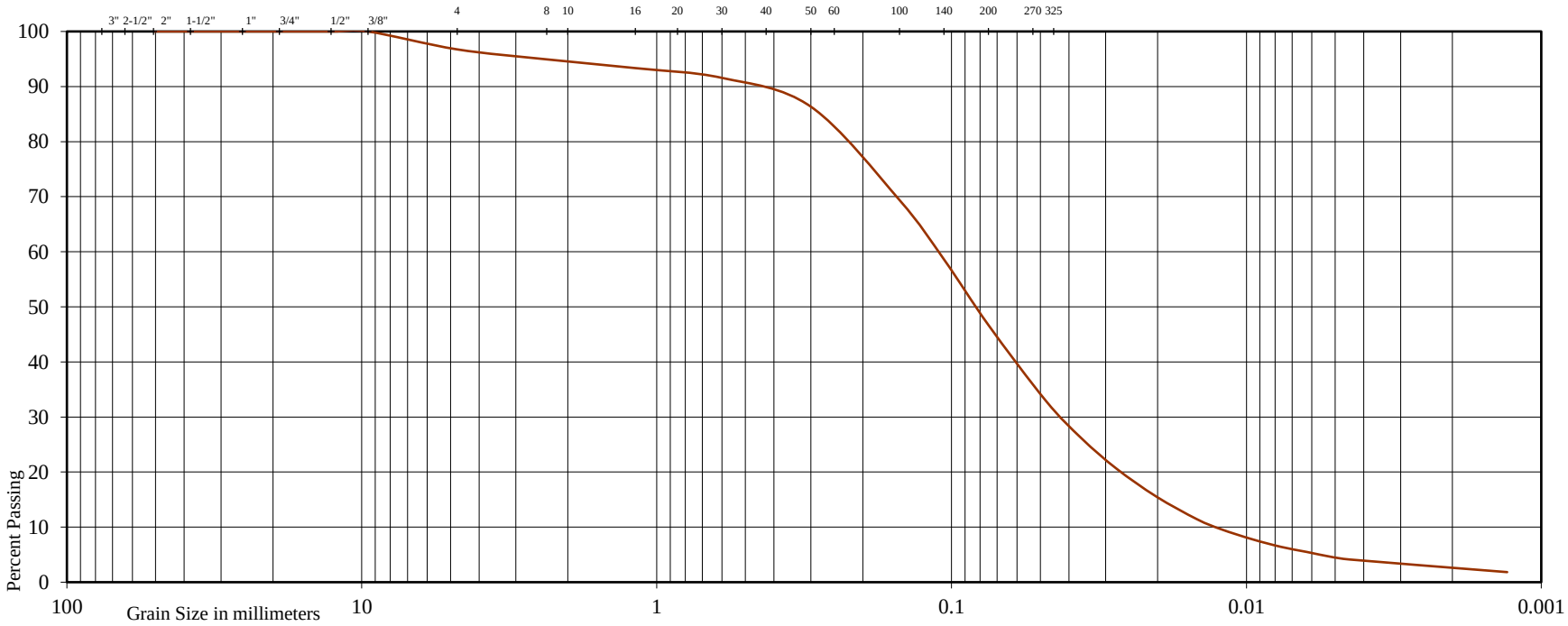
Reference No: 1908-W037

U.S. BUREAU OF SOILS CLASSIFICATION

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

UNIFIED SOIL CLASSIFICATION

GRAVEL		SAND			SILT & CLAY
COARSE	FINE	COARSE	MEDIUM	FINE	



Project: Proposed Mixed-Use Development

Location: 1 Herons Hill Way, City of Toronto

Borehole No: 2

Sample No: 10

Depth (m): 9.4

Elevation (m): 165.8

Estimated Permeability (m./sec.) = 10^{-6}

Classification of Sample [& Group Symbol]: SILTY SAND, TILL
traces of clay and gravel

Figure: 7

Soil Engineers Ltd.

GRAIN SIZE DISTRIBUTION

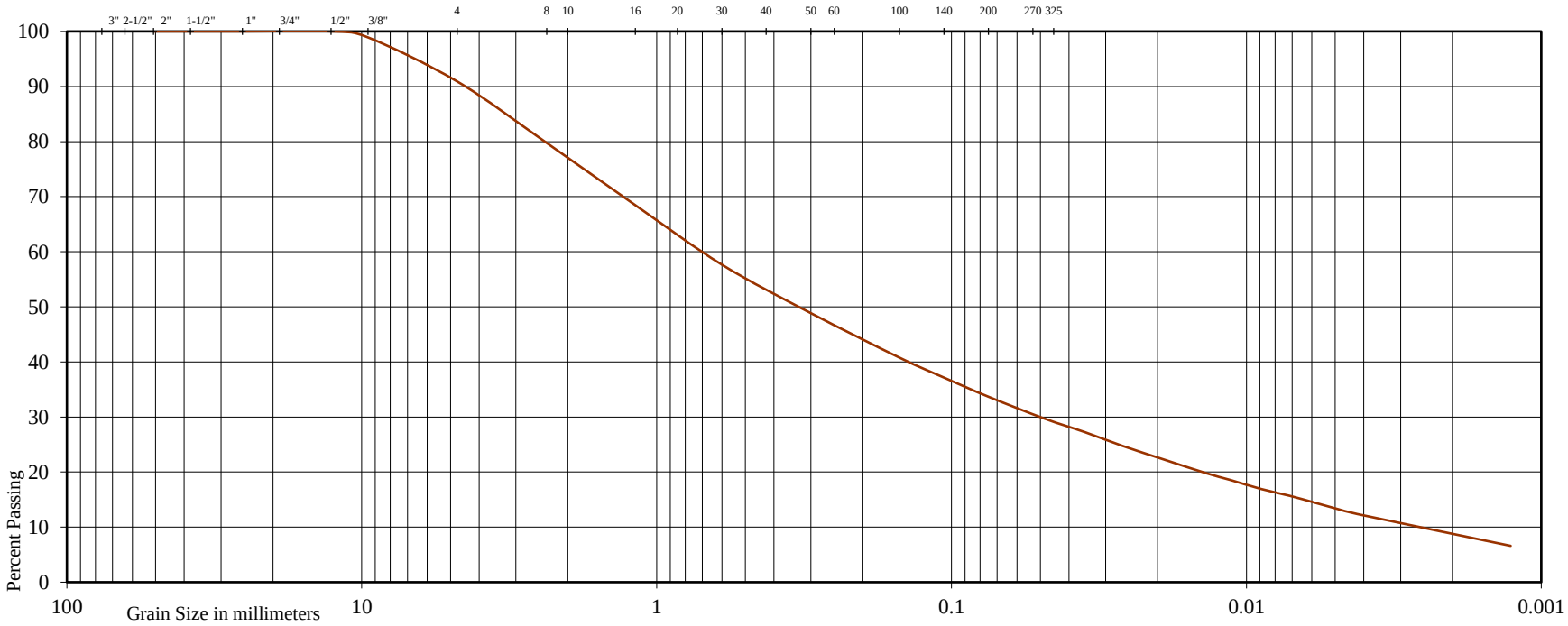
Reference No: 1908-W037

U.S. BUREAU OF SOILS CLASSIFICATION

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

UNIFIED SOIL CLASSIFICATION

GRAVEL		SAND			SILT & CLAY
COARSE	FINE	COARSE	MEDIUM	FINE	



Project: Proposed Mixed-Use Development

Location: 1 Herons Hill Way, City of Toronto

Borehole No: 4

Sample No: 9

Depth (m): 9.4

Elevation (m): 165.9

Estimated Permeability (m./sec.) = 10^{-7}

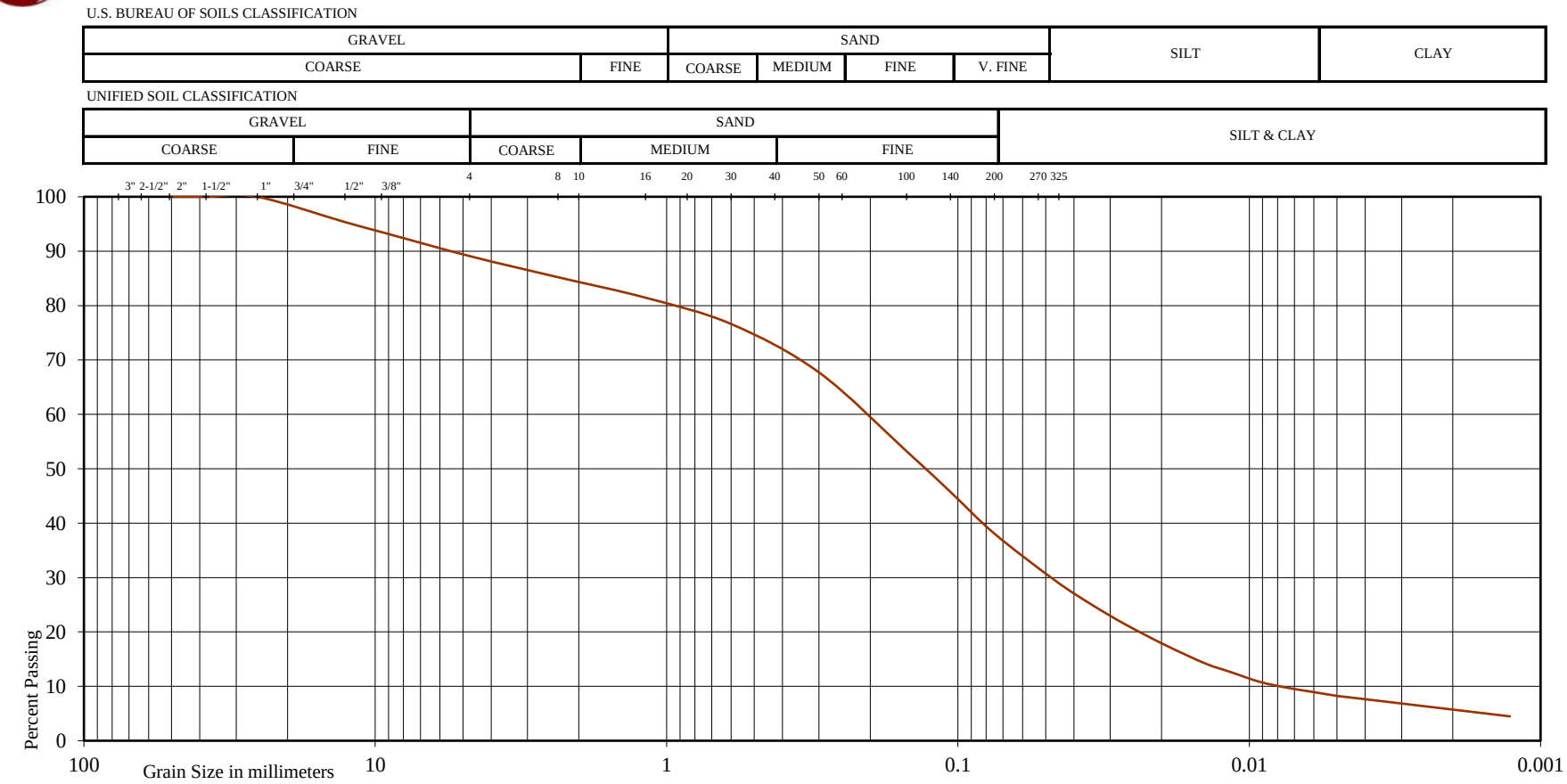
Classification of Sample [& Group Symbol]: SILTY SAND, TILL
traces of clay and gravel

Figure: 8

Soil Engineers Ltd.

GRAIN SIZE DISTRIBUTION

Reference No: 1908-W037



Project: Proposed Mixed-Use Development

Location: 1 Herons Hill Way, City of Toronto

Borehole No: 5

Sample No: 15

Depth (m): 15.5

Elevation (m): 159.7

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

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

some gravel, a trace of clay

Figure: 9

Soil Engineers Ltd.

GRAIN SIZE DISTRIBUTION

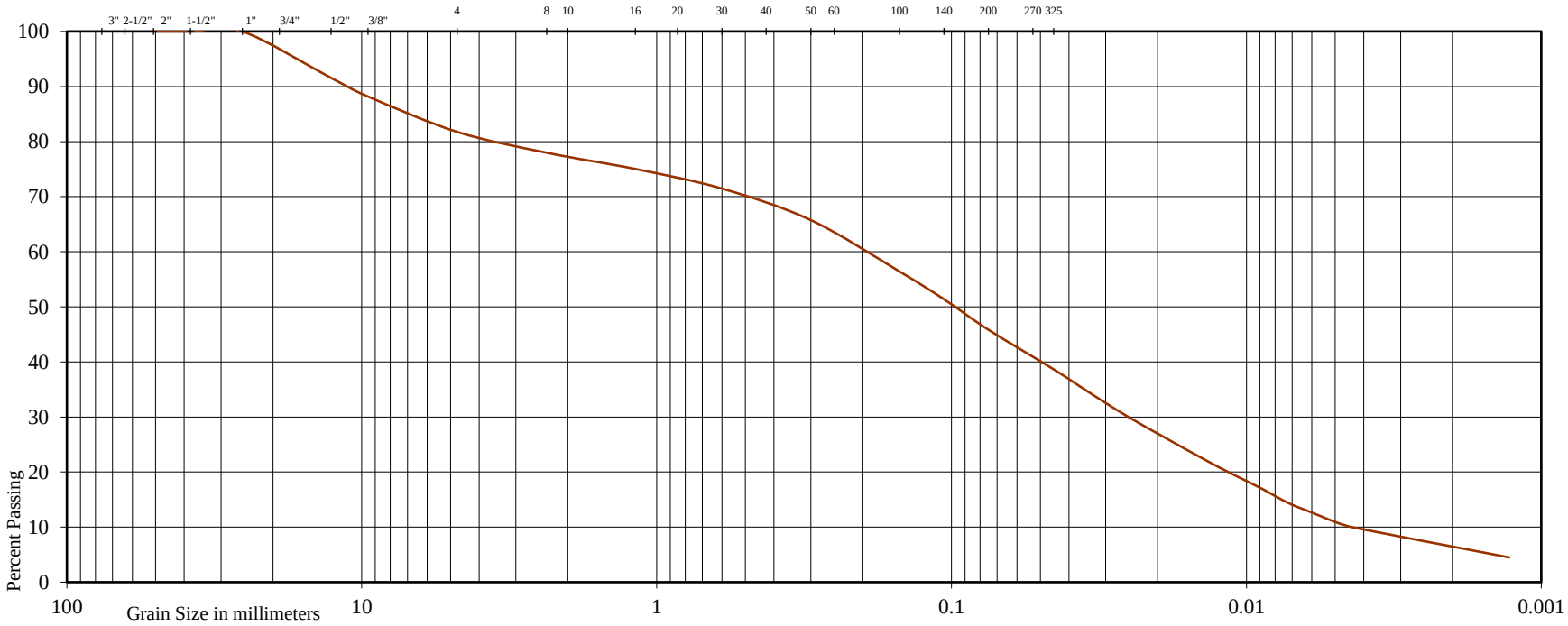
Reference No: 1908-W037

U.S. BUREAU OF SOILS CLASSIFICATION

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

UNIFIED SOIL CLASSIFICATION

GRAVEL		SAND			SILT & CLAY
COARSE	FINE	COARSE	MEDIUM	FINE	



Project: Proposed Mixed-Use Development

Location: 1 Herons Hill Way, City of Toronto

Borehole No: 1

Sample No: 11

Depth (m): 12.4

Elevation (m): 162.8

Estimated Permeability (m./sec.) = 10^{-7}

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

Figure: 10

Soil Engineers Ltd.

GRAIN SIZE DISTRIBUTION

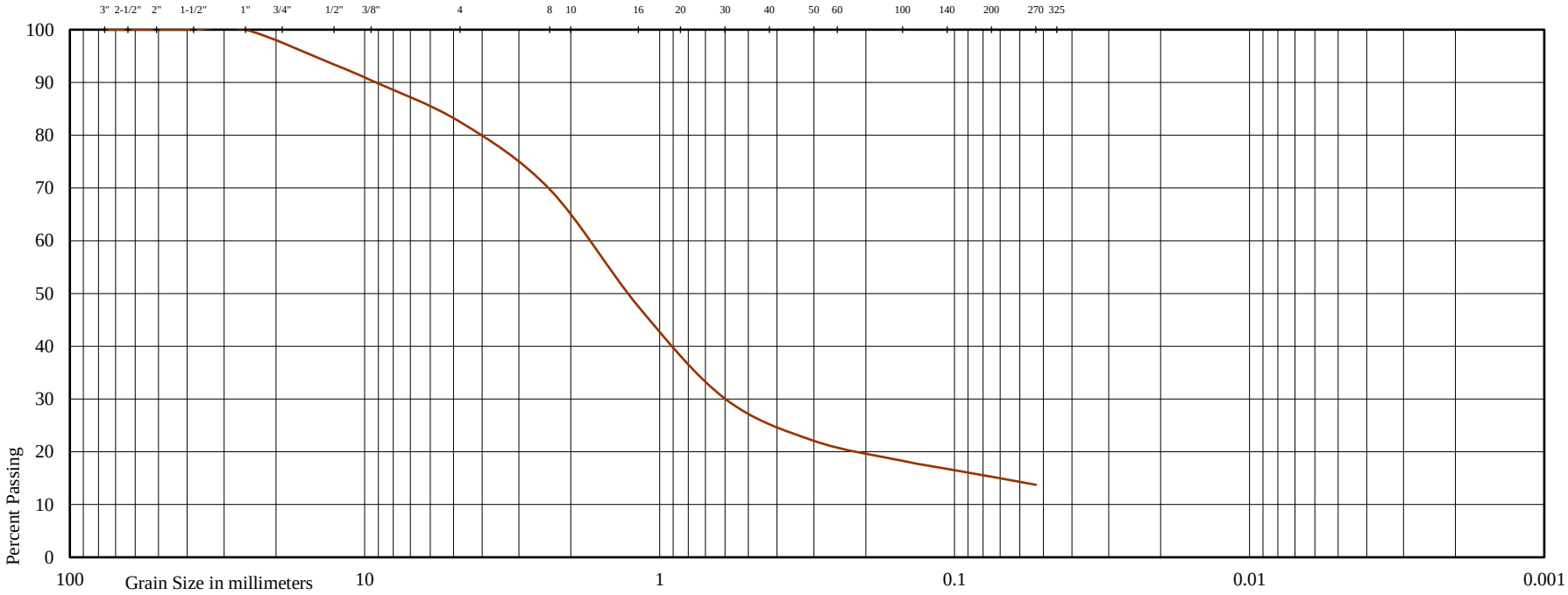
Reference No: 1908-W037

U.S. BUREAU OF SOILS CLASSIFICATION

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

UNIFIED SOIL CLASSIFICATION

GRAVEL		SAND			SILT & CLAY
COARSE	FINE	COARSE	MEDIUM	FINE	



Project: Proposed Mixed-Use Development

Location: 1 Herons Hill Way, City of Toronto

Borehole No: 6

Sample No: 14

Depth (m): 14

Elevation (m): 161.8

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

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

Figure: 11

Soil Engineers Ltd.

GRAIN SIZE DISTRIBUTION

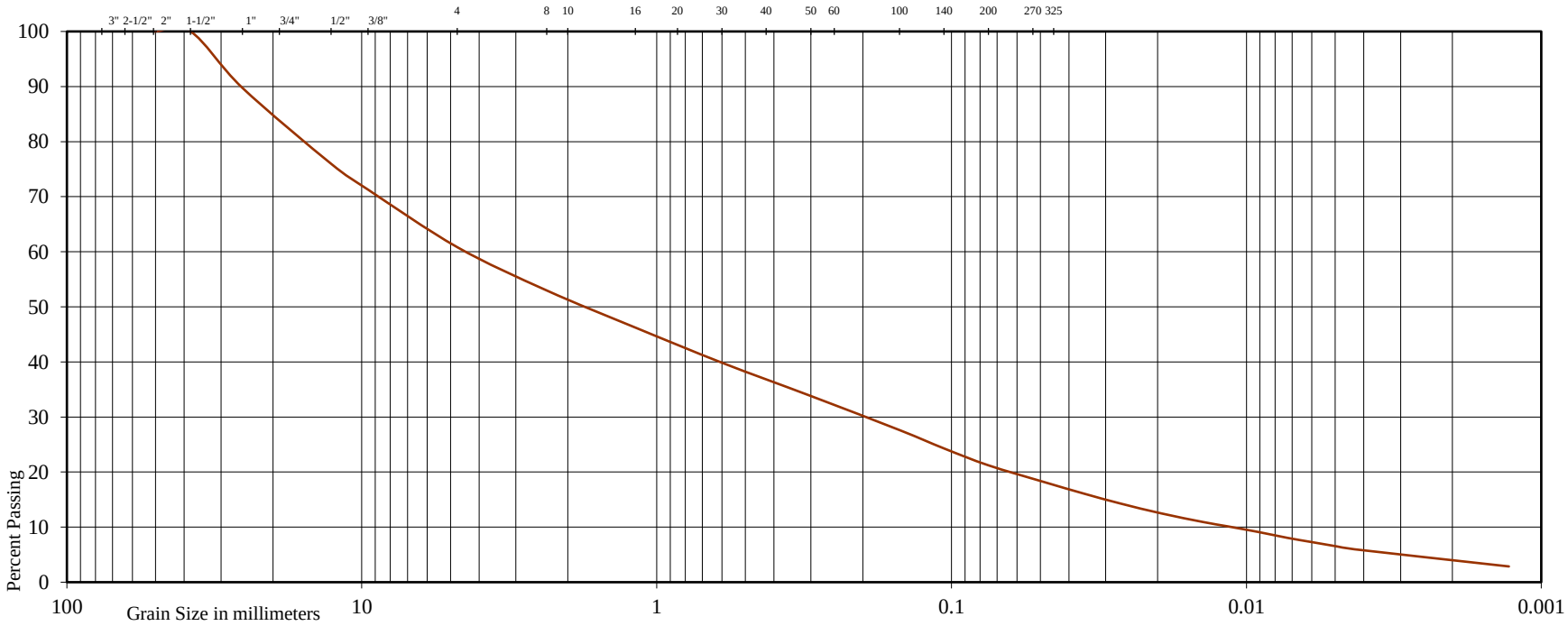
Reference No: 1903-W037

U.S. BUREAU OF SOILS CLASSIFICATION

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

UNIFIED SOIL CLASSIFICATION

GRAVEL		SAND			SILT & CLAY
COARSE	FINE	COARSE	MEDIUM	FINE	



Project: Proposed Mixed-Use Development

Location: 1 Herons Hill Way, City of Toronto

Borehole No: 4

Sample No: 11 & 12

Depth (m): 12.4

Elevation (m): 162.9

Estimated Permeability (m./sec.) = 10^{-6}

Classification of Sample [& Group Symbol]: SAND AND GRAVEL
some silt, a trace of clay

Figure: 12

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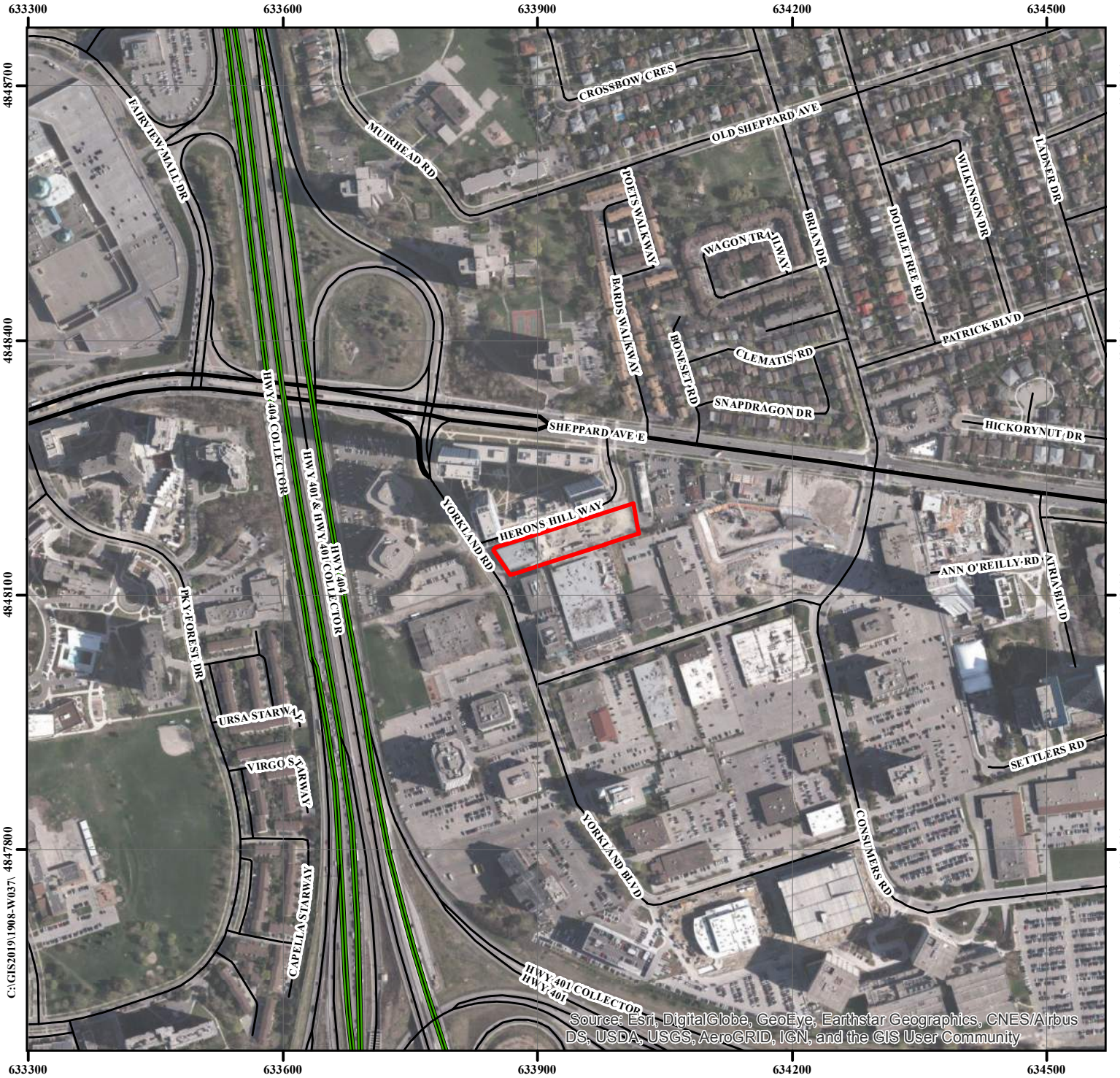
FAX: (705) 721-7864	FAX: (905) 542-2769	FAX: (905) 725-1315	FAX: (905) 881-8335	FAX: (705) 684-8522	FAX: (905) 725-1315	FAX: (905) 542-2769

DRAWINGS 1 to 9

REFERENCE NO. 1908-W037



C:\GIS2019\1908-W037\

Source: Ministry of Natural Resources and Forestry
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Approximate Boundary of Subject Site

Expressway/Freeway

Major Road

Local Road

Soil Engineers Ltd.

Title: Site Location Plan

Project:

Hydrogeological Assessment
Proposed Residential Development
1 Herons Hill Way
City of Toronto

Reference No. 1908-W037

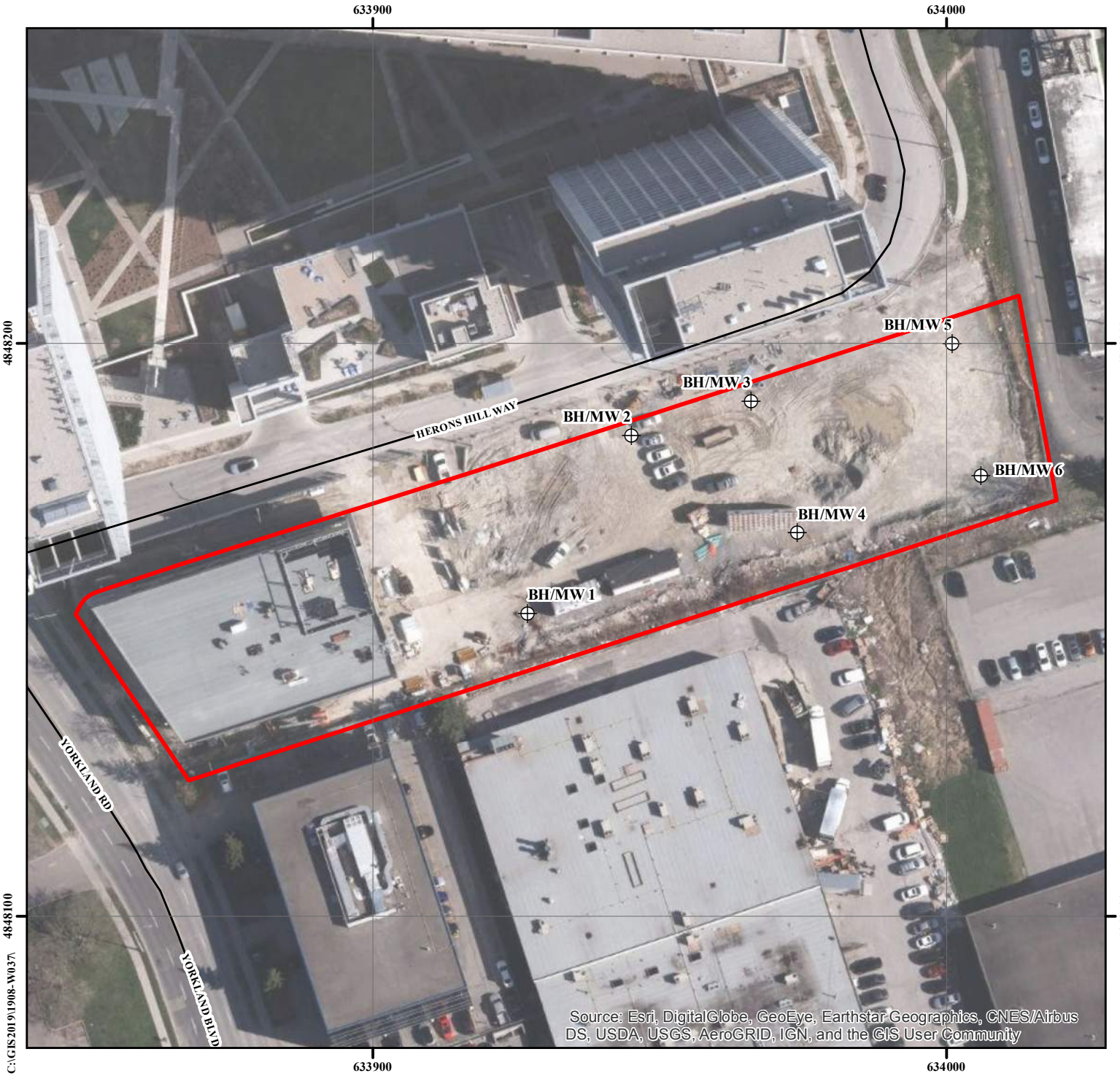
Date: September 20, 2019

Scale:

0 30 60 120 180 240 300

Metres

Drawing No. 1



C:\GIS\2019\1908-W037\

Source: Ministry of Natural Resources and Forestry
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Approximate Boundary of Subject Site

Borehole with Monitoring Well

Local Road

Soil Engineers Ltd.

Title: Borehole and Monitoring Well Location Plan

Project:

Hydrogeological Assessment
Proposed Residential Development
1 Herons Hill Way
City of Toronto

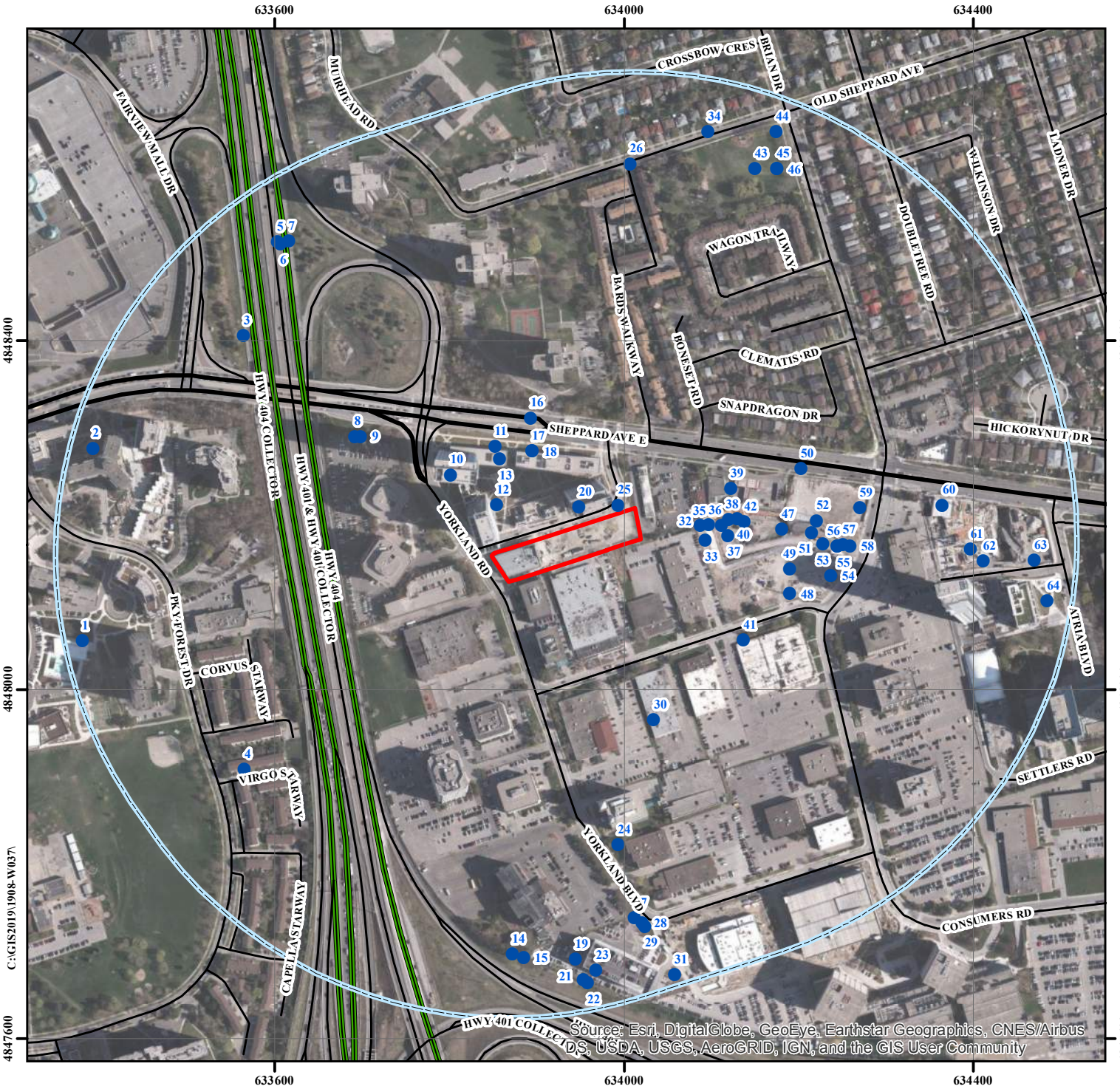
Reference No. 1908-W037

Date: September 20, 2019

Scale:

0 5 10 20 30 40 50
Metres

Drawing No. 2



Source: Ministry of Natural Resources and Forestry
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Approximate Boundary of Subject Site

500 metres from Subject Site Boundary

1 Well Location from MECP Well Records (see Appendix 'A')

Expressway/Freeway

Major Road

Local Road

Soil Engineers Ltd.

Title: MECP Well Location Plan

Project:

Hydrogeological Assessment
Proposed Residential Development
1 Herons Hill Way
City of Toronto

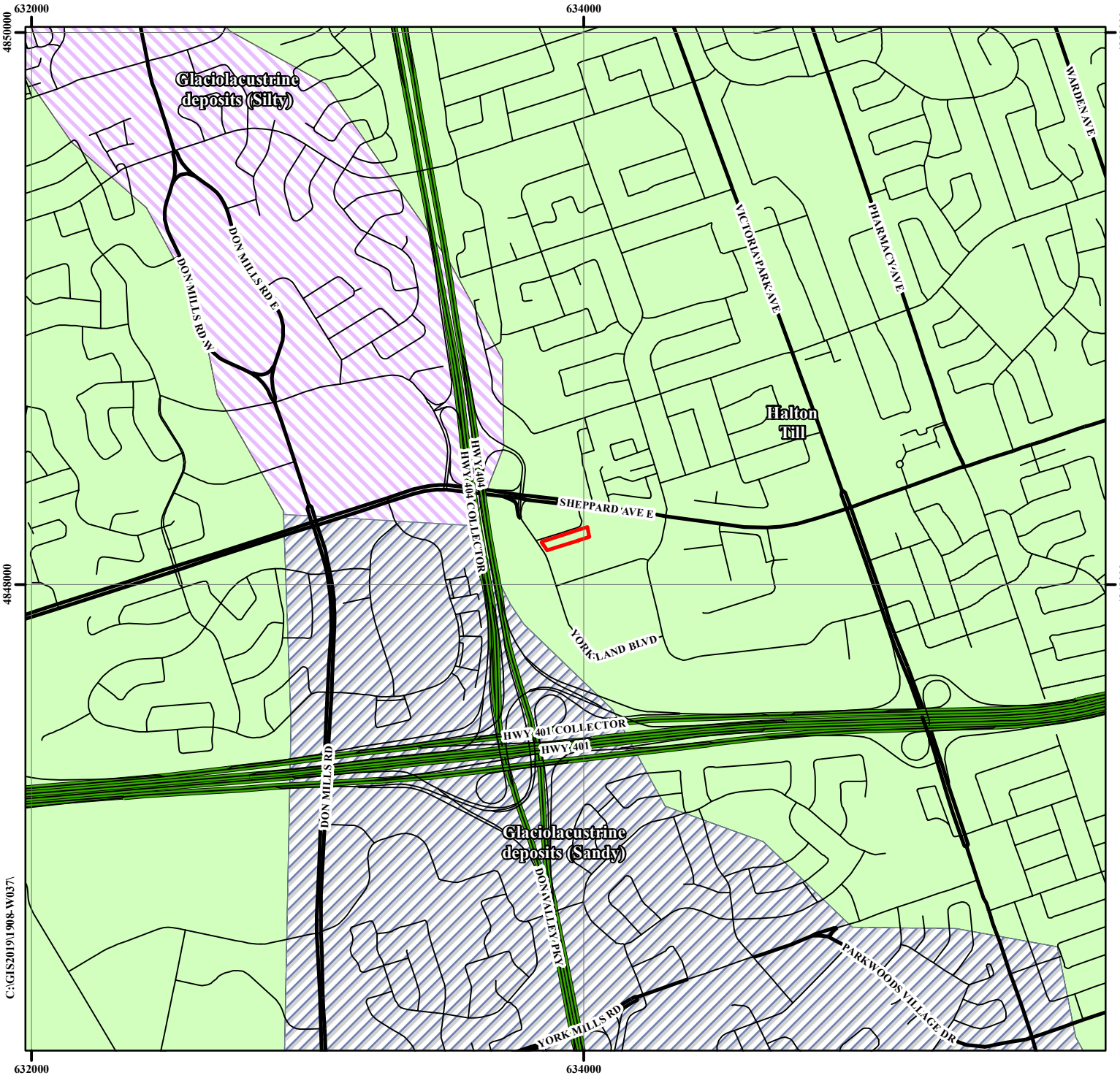
Reference No. 1908-W037

Date: September 20, 2019

Scale:

0 30 60 120 180 240 300
Metres

Drawing No. 3



Source:Ontario Geological Survey, 1997, Surface Geology of Ontario; Ontario Geological Survey, Miscellaneous Released-Data 0014

N

Approximate Boundary of Subject Site

Glaciolacustrine deposits (Sandy)
Material: sand, gravelly sand and gravel, nearshore and beach deposits

Glaciolacustrine deposits (Silty)
Material: silt and clay, minor sand, basin and quiet water deposits

Halton Till
Material: predominantly silt to silty clay matrix, high in matrix carbonate content and clast poor

Expressway/Freeway

Major Road

Local Road

Soil Engineers Ltd.

Title: Quarternary and Surface Geology Map

Project:

Hydrogeological Assessment
Proposed Residential Development
1 Herons Hill Way
City of Toronto

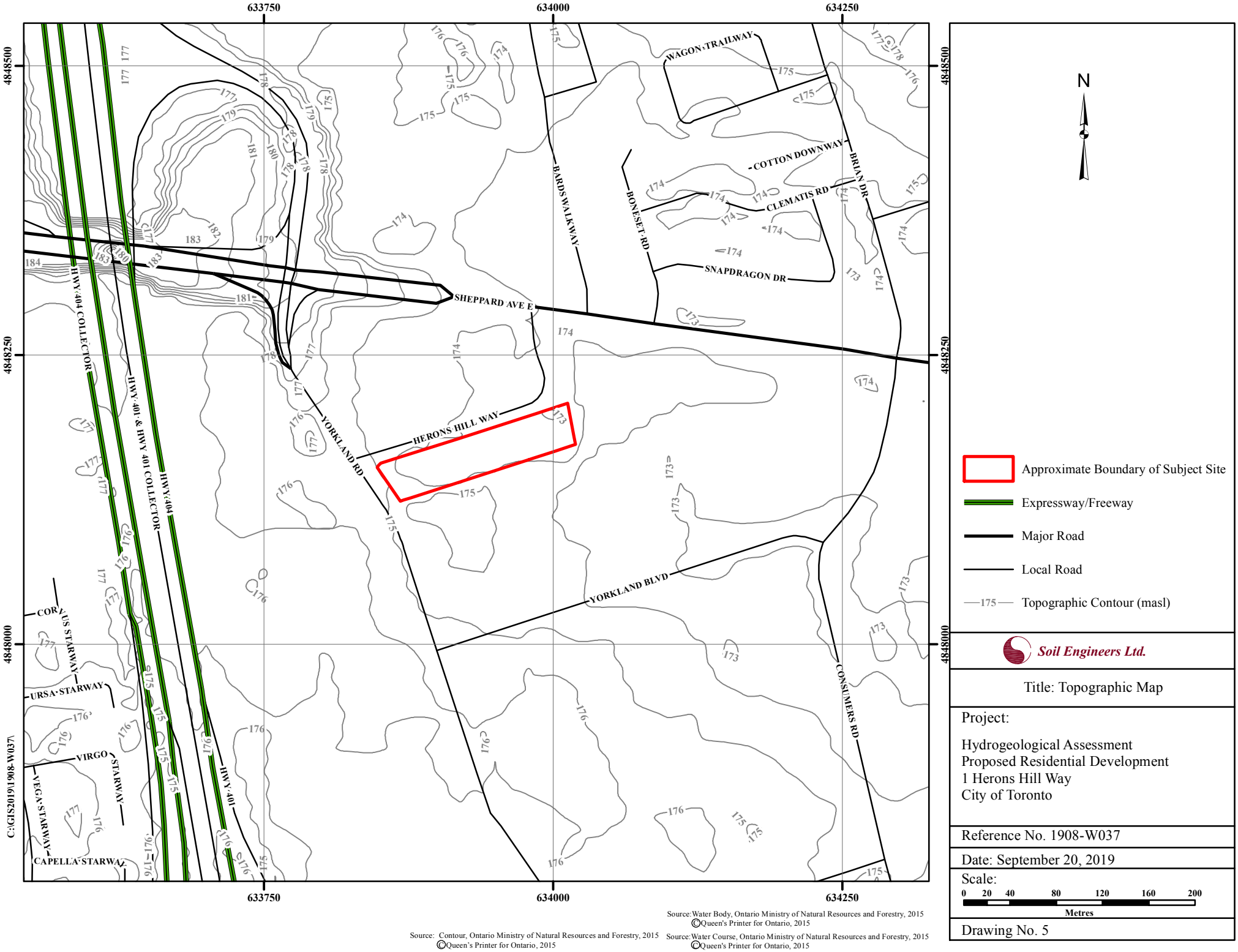
Reference No. 1908-W037

Date: September 20, 2019

Scale:

0 100 200 400 600 800 1,000
Metres

Drawing No. 4


633750
634000
634250
4848500
4848250
4848000
WAGON TRAILWAY
COTTON DOWNWAY
BRIAN DR
CLEMATIS RD
BONESET RD
BARDSWALK WAY
SNAPDRAGON DR
SHEPPARD AVE E
HWY 404 COLLECTOR
HWY 401 & HWY 401 COLLECTOR
HWY 404
YORKLAND RD
HERONS HILL WAY
YORKLAND BLVD
CONSUMERS RD
CORVUS STARWAY
URSA STARWAY
VIRGO STARWAY
VEGA STARWAY
CAPELLA STARWAY
HWY 401
N
Approximate Boundary of Subject Site
Expressway/Freeway
Major Road
Local Road
175 Topographic Contour (masl)
Soil Engineers Ltd.
Title: Topographic Map
Project:
Hydrogeological Assessment
Proposed Residential Development
1 Herons Hill Way
City of Toronto
Reference No. 1908-W037
Date: September 20, 2019
Scale:
0 20 40 80 120 160 200
Metres
Drawing No. 5
C:\GIS\2019\1908-W037\
Source: Contour, Ontario Ministry of Natural Resources and Forestry, 2015
©Queen's Printer for Ontario, 2015
Source: Water Body, Ontario Ministry of Natural Resources and Forestry, 2015
©Queen's Printer for Ontario, 2015
Source: Water Course, Ontario Ministry of Natural Resources and Forestry, 2015
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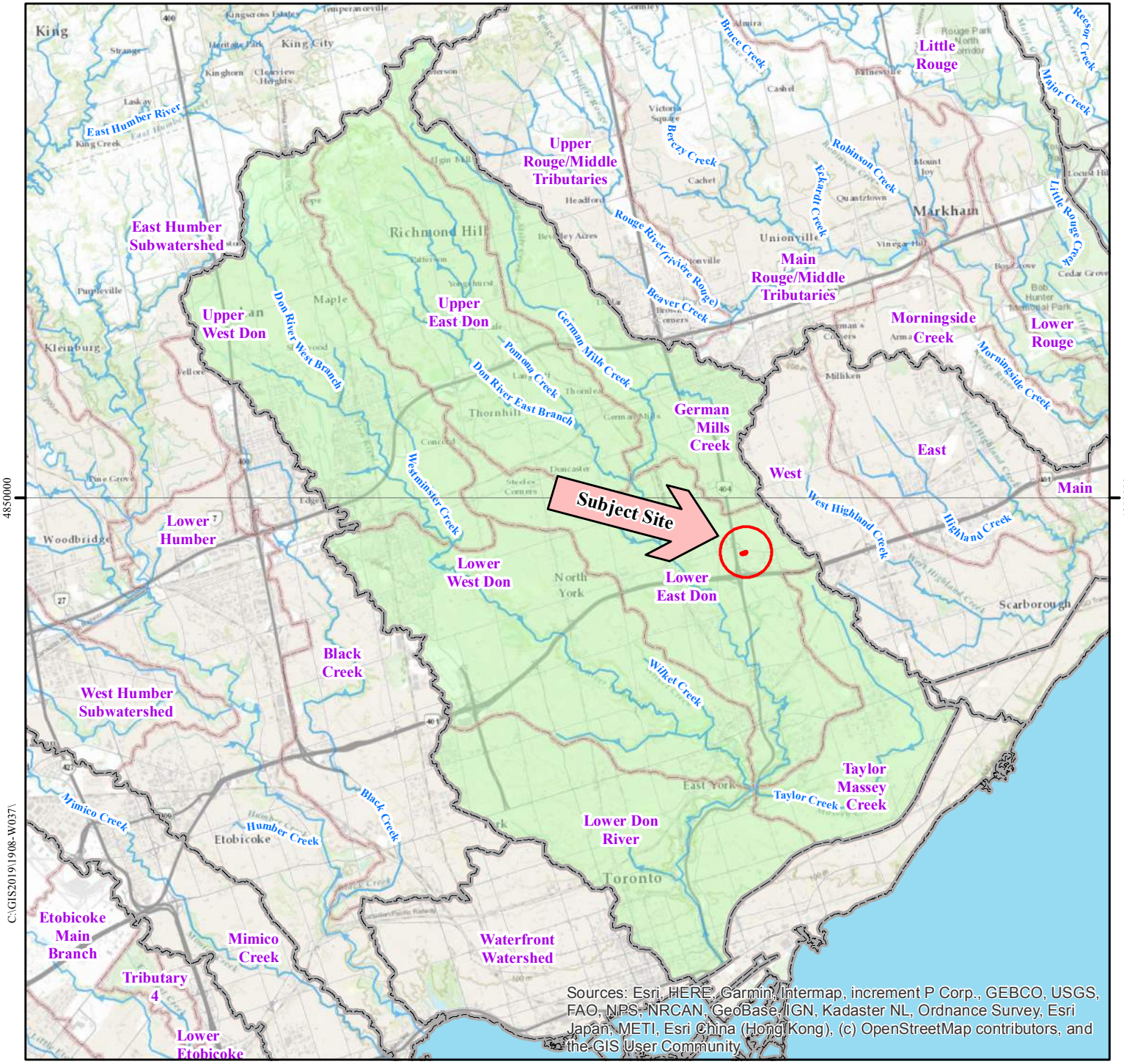


this mapping was produced by SEL and should be used for information purposes only.
Data sources used in its production are of varying quality and accuracy and all boundaries should be considered approximate.

N

Watershed:

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

Soil Engineers Ltd.

Title: Watershed and Subwatershed Map

Project:

Hydrogeological Assessment
Proposed Residential Development
1 Herons Hill Way
City of Toronto

Reference No. 1908-W037

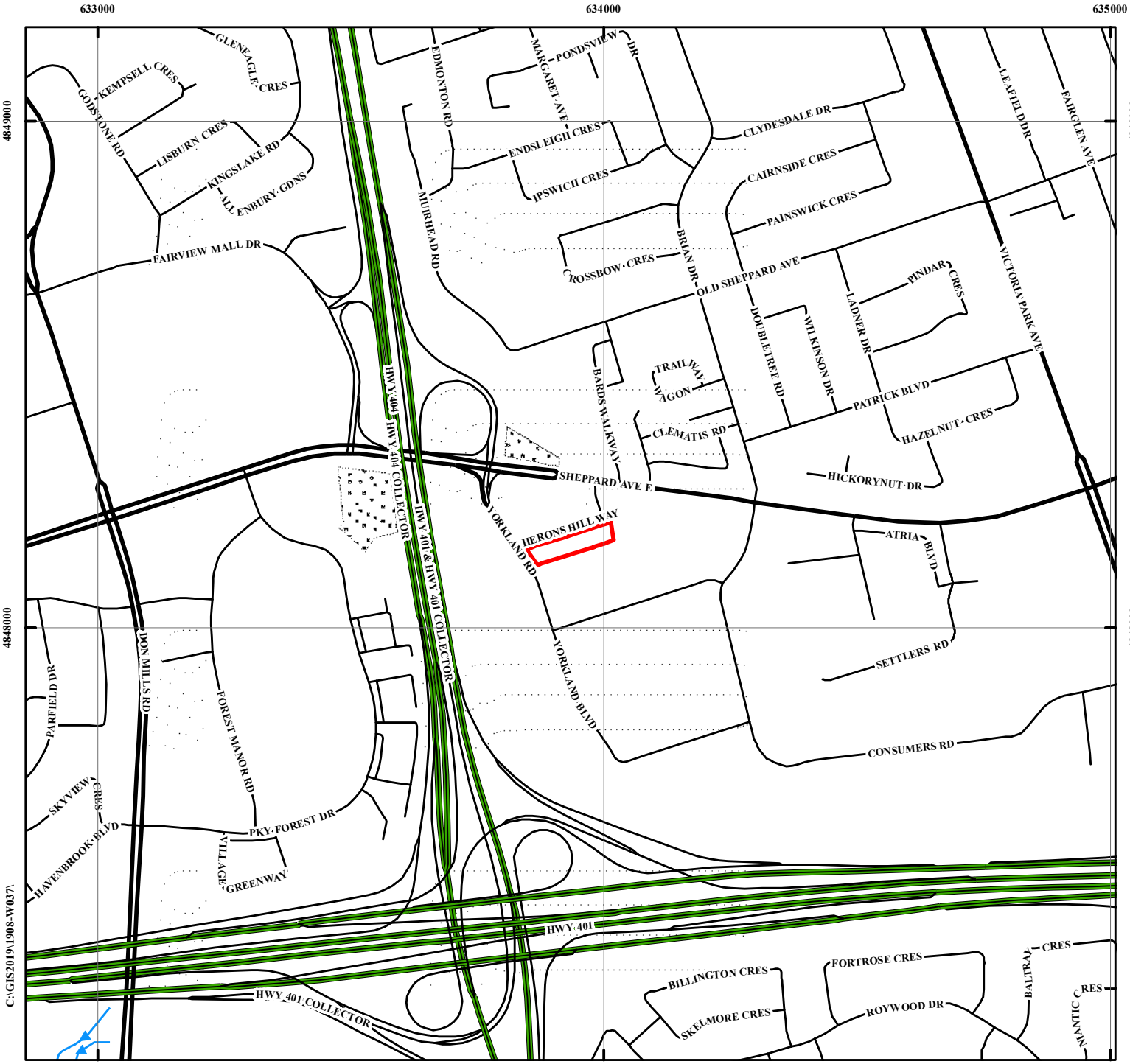
Date: September 20, 2019

Scale:

0 4,650 9,300 18,600 27,900 37,200 46,500

Metres

Drawing No. 6



Approximate Boundary of Subject Site

Wooded Area

Watercourse

Expressway/Freeway

Major Road

Local Road

Soil Engineers Ltd.

Title: Natural Features and Protection Area Plan

Project:

Hydrogeological Assessment
Proposed Residential Development
1 Herons Hill Way
City of Toronto

Reference No. 1908-W037

Date: September 20, 2019

Scale:

0 55 110 220 330 440 550

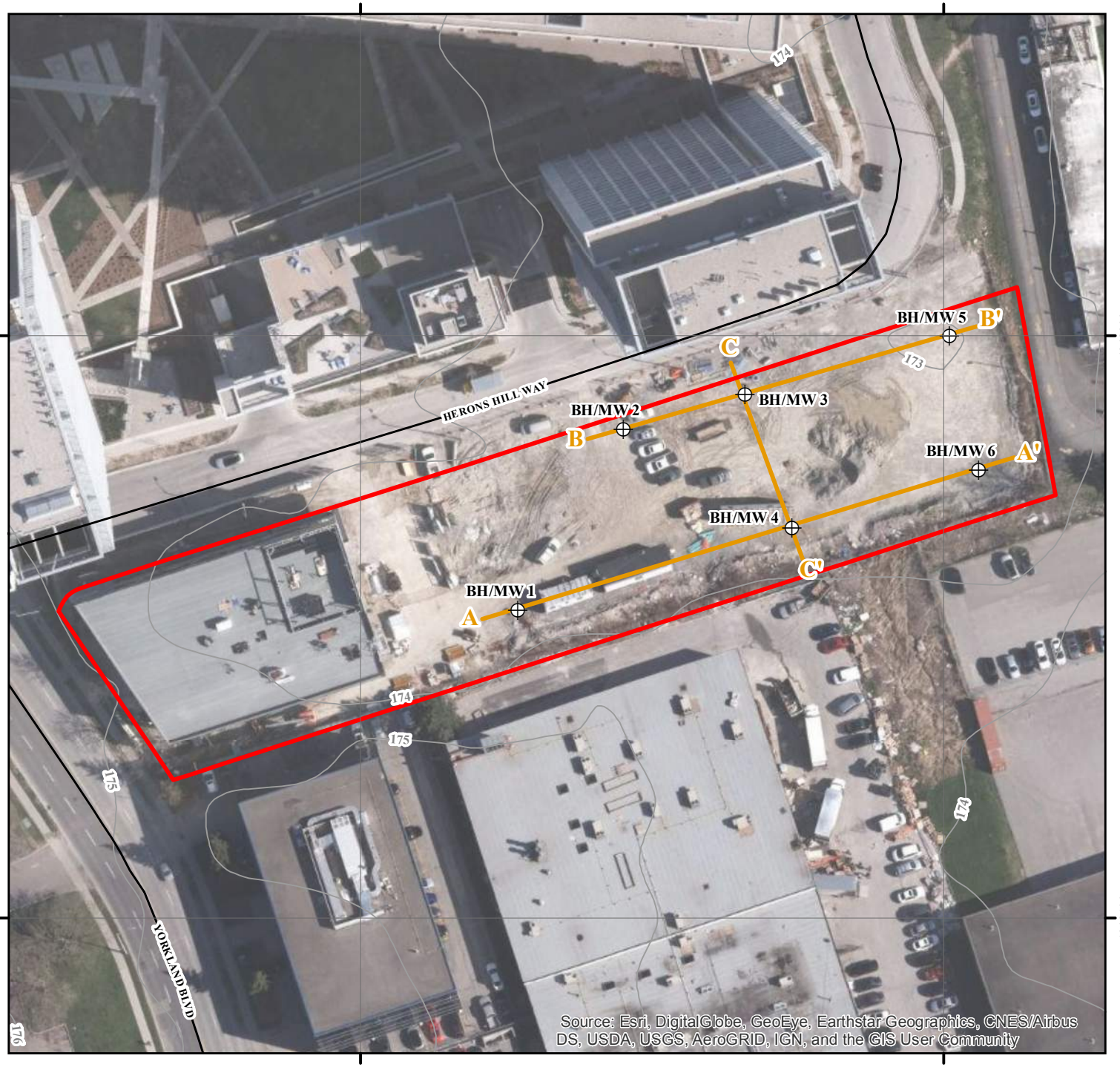
Metres

Drawing No. 7

C:\GIS2019\1908-W037\

Contains information licensed under the Open Government Licence – Ontario, 2019
Includes information: Provincial Park, Conservation Reserve, Area of Natural and Scientific Interest, Wetland, Niagara Escarpment Protection Area, Oak Ridges Moraine Conservation and Wilderness Areas

Source: Ministry of Natural Resources and Forestry
©Queen's Printer for Ontario, 2019



Source: Ministry of Natural Resources and Forestry
©Queen's Printer for Ontario, 2019

N

Approximate Boundary of Subject Site

Borehole with Monitoring Well

Local Road

A A' Cross-Section Direction

175 Topographic Contour (masl)

Soil Engineers Ltd.

Title: Cross-Section Key Plan

Project:

Hydrogeological Assessment
Proposed Residential Development
1 Herons Hill Way
City of Toronto

Reference No. 1908-W037

Date: November 21, 2019

Scale:

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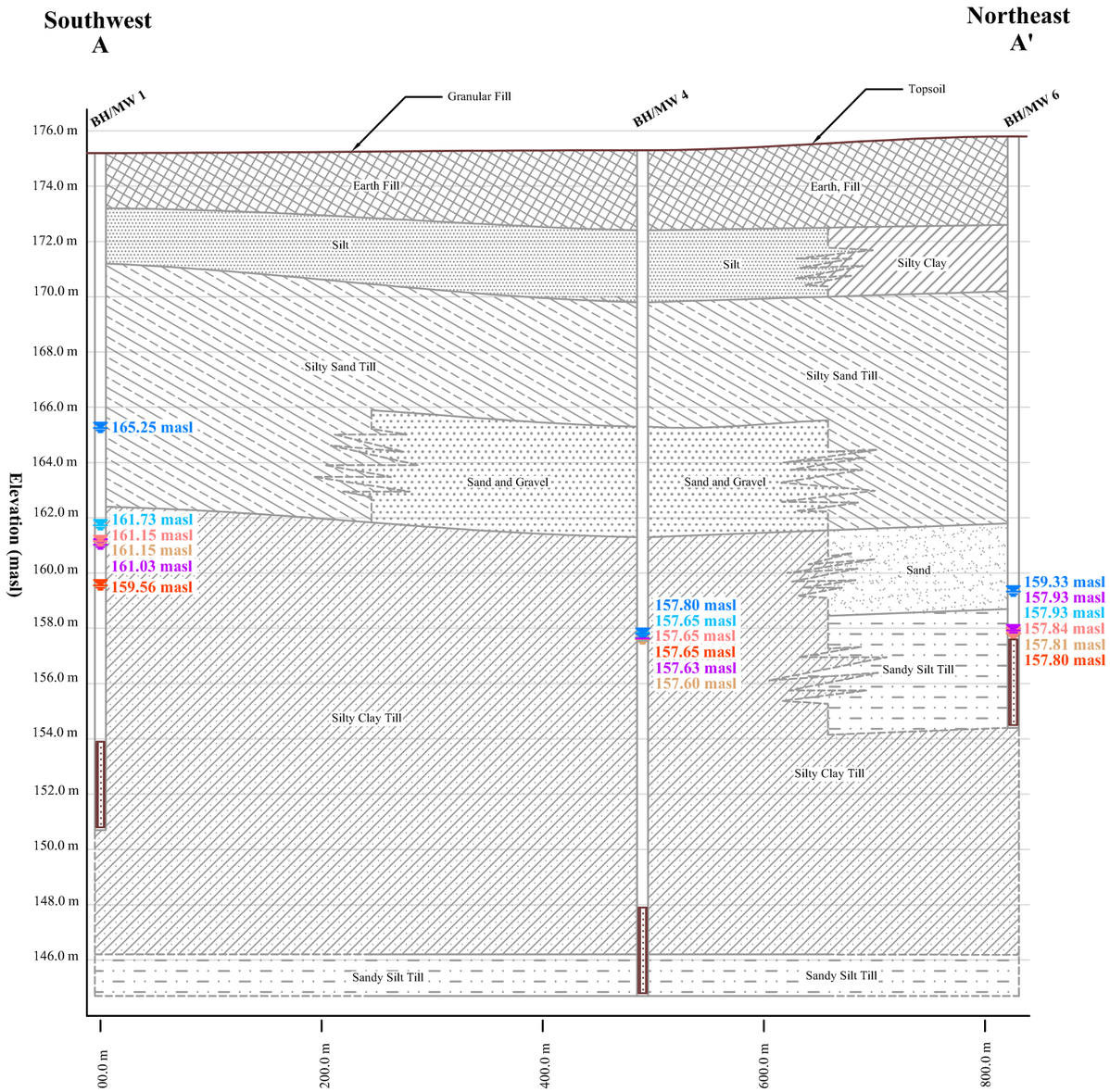
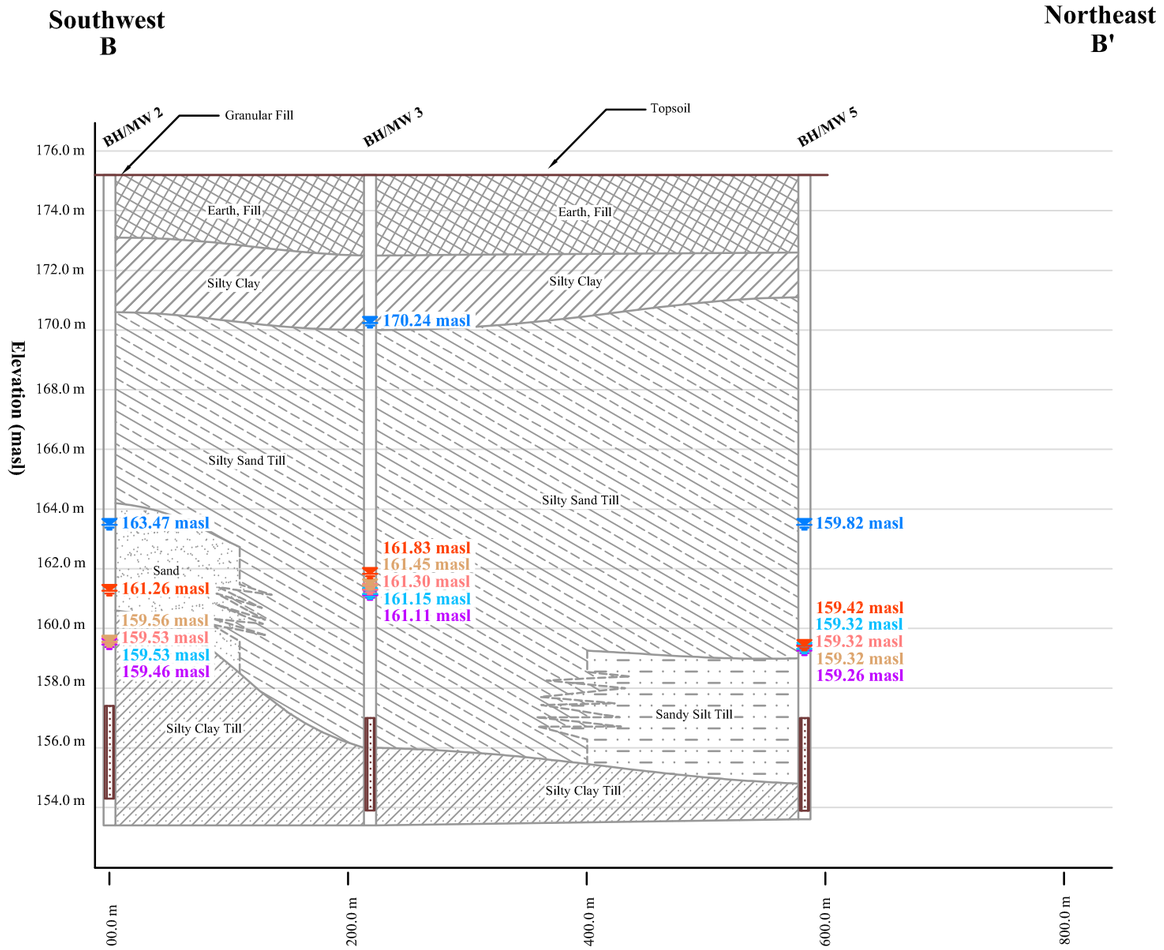
Metres

Drawing No. 8-1

C:\GIS\2019\1908-W037\



Section A-A'



Section B-B'

C:Projects/2019 Jobs/1908-W037

- Earth, Fill
- Sand and Gravel
- Silt
- Silty Clay
- Silty Clay, Till
- Silty Sand, Till
- Sandy Silt, Till
- Sand
- 3.1 m Screen

- Water Table on August 28, 2018
- Water Table on September 12, 2019
- Water Table on September 25, 2019
- Water Table on October 9, 2019
- Water Table on October 24, 2019
- Water Table on November 4, 2019

Soil Engineers Ltd.
CONSULTING SOIL, FOUNDATION & ENVIRONMENTAL ENGINEERS

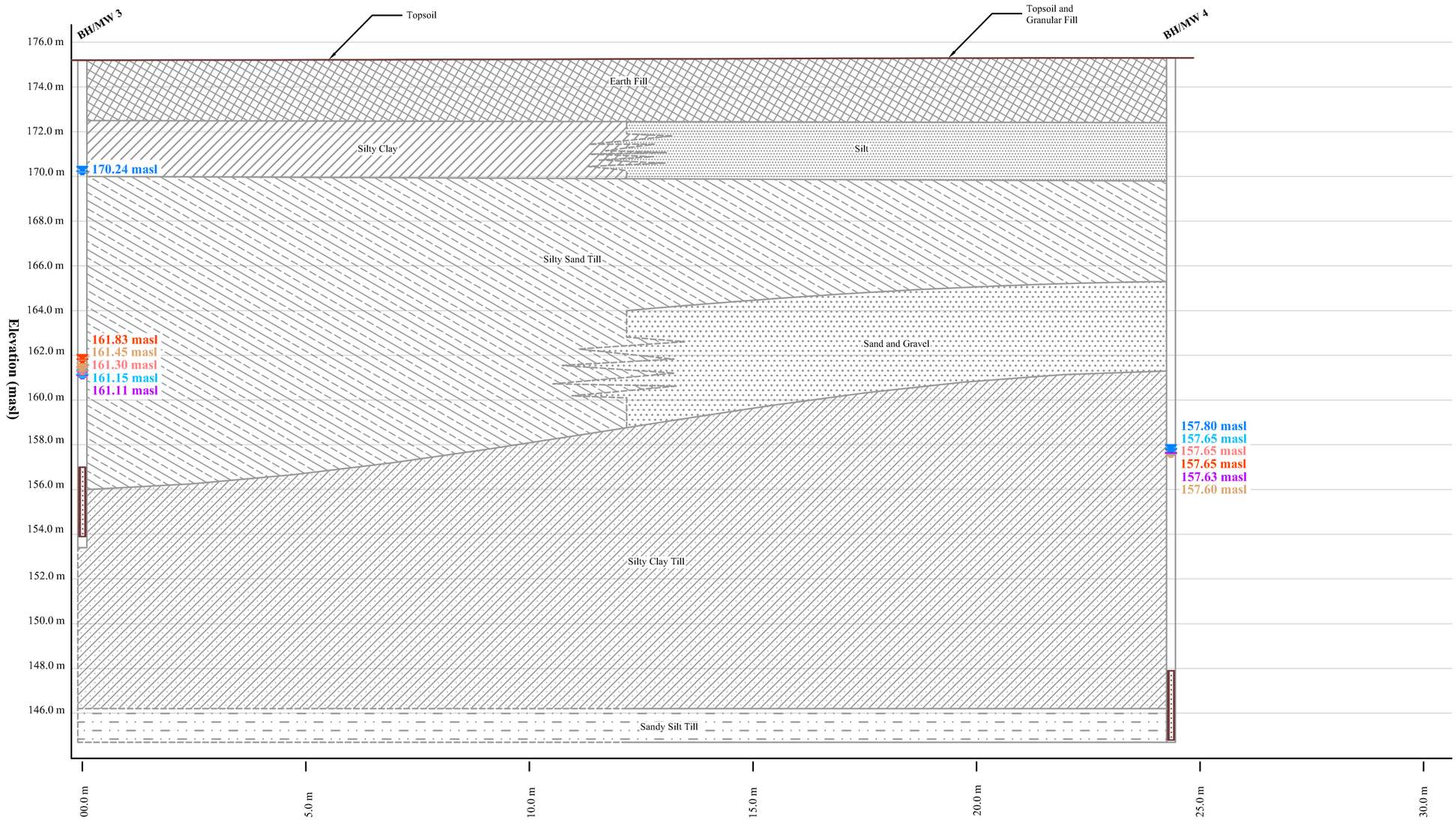
Title: Geological Cross-Section (A-A' and B-B')

Project: Hydrogeological Assessment
Proposed Residential Development
1 Herons Hill Way, City of Toronto

Reference No:	Date:	Scale: V	Scale: H	Drawing No.
1908-W037	November, 2019	1:200	1:500	8-2A

Northwest
C

Southeast
C'



Section C-C'

Earth, Fill
Sand and Gravel
Silt
Silty Clay
Silty Clay, Till
Silty Sand, Till
Sandy Silt, Till
3.1 m Screen

Water Table on August 28, 2018
Water Table on September 12, 2019
Water Table on September 25, 2019
Water Table on October 9, 2019
Water Table on October 24, 2019
Water Table on November 4, 2019

C:Projects/2019 Jobs/1908-W037

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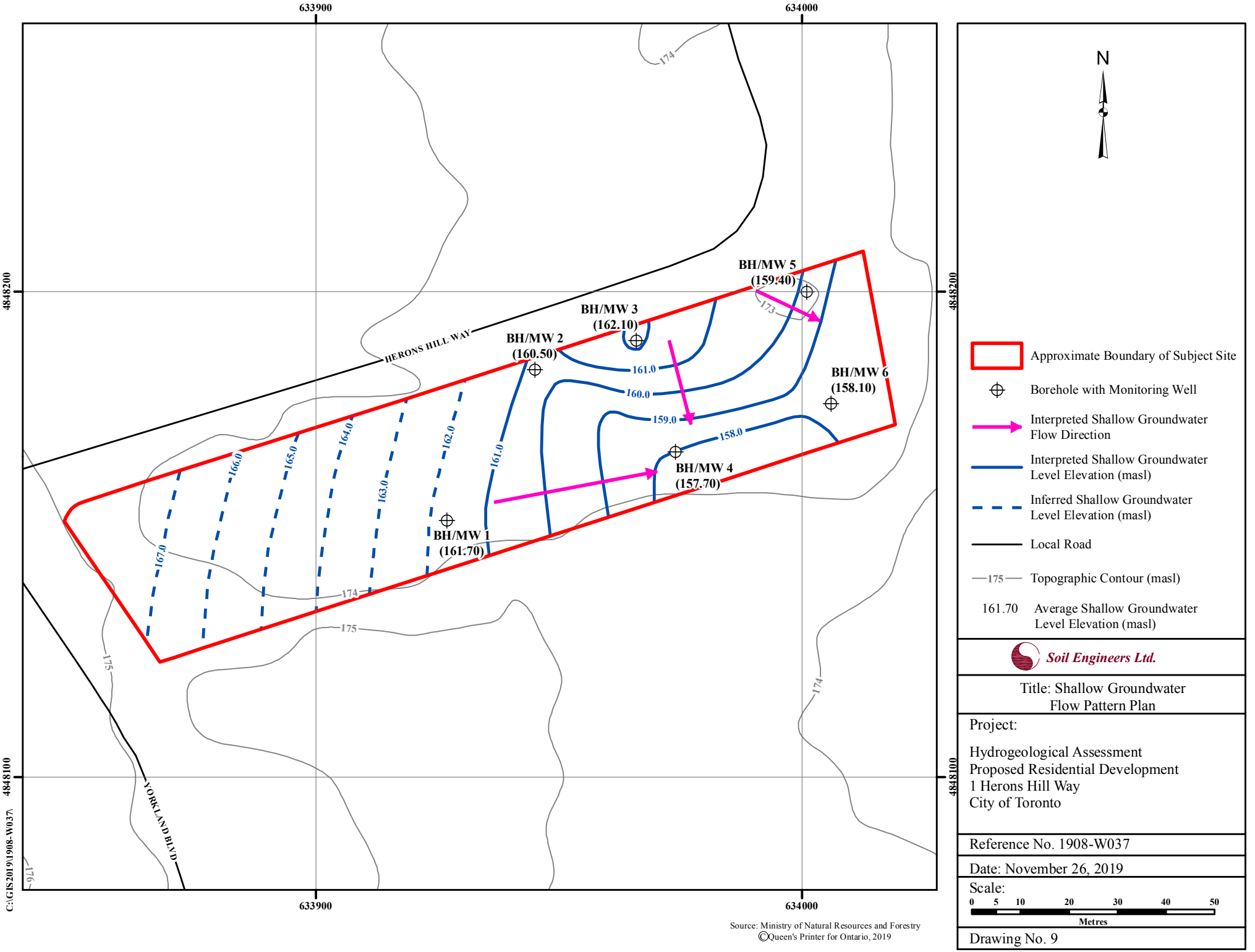
CONSULTING SOIL, FOUNDATION & ENVIRONMENTAL ENGINEERS

Title: Geological Cross-Section (C-C')

Project: Hydrogeological Assessment
Proposed Residential Development
1 Herons Hill Way, City of Toronto

Reference No:	Date:	Scale: V	Scale: H	Drawing No.
1908-W037	November, 2019	1:200	1:100	8-2B


633900
634000
4848200
4848100
HERONS HILL WAY
YORKLAND BLVD
BH/MW 1
(161.70)
BH/MW 2
(160.50)
BH/MW 3
(162.10)
BH/MW 4
(157.70)
BH/MW 5
(159.40)
BH/MW 6
(158.10)
167.0
166.0
165.0
164.0
163.0
162.0
161.0
160.0
159.0
158.0
174
175
176
173
N
Approximate Boundary of Subject Site
Borehole with Monitoring Well
Interpreted Shallow Groundwater Flow Direction
Interpreted Shallow Groundwater Level Elevation (masl)
Inferred Shallow Groundwater Level Elevation (masl)
Local Road
175 Topographic Contour (masl)
161.70 Average Shallow Groundwater Level Elevation (masl)
Soil Engineers Ltd.
Title: Shallow Groundwater Flow Pattern Plan
Project:
Hydrogeological Assessment
Proposed Residential Development
1 Herons Hill Way
City of Toronto
Reference No. 1908-W037
Date: November 26, 2019
Scale:
0 5 10 20 30 40 50
Metres
Drawing No. 9
C:\GIS\2019\1908-W037\
Source: Ministry of Natural Resources and Forestry
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FAX: (705) 721-7864	FAX: (905) 542-2769	FAX: (905) 725-1315	FAX: (905) 881-8335	FAX: (705) 684-8522	FAX: (905) 725-1315	FAX: (905) 542-2769

APPENDIX 'A'

MECP WATER WELL RECORDS SUMMARY

REFERENCE NO. 1903-W049

Ontario Water Well Records

WELL ID	MECP WWR ID	Construction Method	Well Depth (m)**	Well Usage		Water Found (m)**	Static Water Level (m)**	Top of Screen Depth (m)**	Bottom of Screen Depth (m)**
				Final Status	First Use				
1	7183889	Boring	4.58	-	Test Hole	-	-	1.22	4.27
2	7244493	Boring	15.25	Observation Wells	Monitoring	-	-	12.20	15.25
3	7116440	Boring	-	Observation Wells	Monitoring	-	-	-	-
4	6905047	Cable Tool	-	Water Supply	Domestic	43.62	19.83	-	-
5	6905069	Cable Tool	-	Water Supply	Commerical	20.74	7.02	19.82	21.96
6	6905068	Cable Tool	-	Abandoned-Supply	-	-	-	-	-
7	6905070	Rotary (Convent.)	-	Test Hole	Not Used	8.85	8.85	-	-
8	7148392	Direct Push	2.14	Monitoring and Test Hole	Monitoring and Test Hole	-	-	1.19	2.14
9	7148393	Direct Push	2.14	Monitoring and Test Hole	Monitoring and Test Hole	-	-	1.19	2.14
10	7140484	Rotary (Convent.)	19.52	Monitoring and Test Hole	Test Hole	-	11.13	17.39	18.91
11	7113783	Other Method	14.64	Dewatering	Dewatering	13.73	7.81	10.68	13.73
12	7113782	Other Method	14.34	Dewatering	Dewatering	13.42	9.24	10.37	13.42
13	7109181	Rotary (Air)	16.47	-	-	18.00	-	17.08	18.00
14	7177031	Direct Push	7.63	Monitoring and Test Hole	Monitoring and Test Hole	-	-	4.27	7.63
15	7219783	-	-	Abandoned-Other	-	-	-	-	-
16	7160218	Boring	25.00	Observation Wells	Monitoring and Test Hole	14.00		-	-
17	7113781	Other Method	20.74	Dewatering	Dewatering	18.91	7.56	16.16	18.00
18	7113780	Other Method	19.82	Dewatering	Monitoring	18.91	7.14	15.86	18.91
19	7219782	-	0.00	Abandoned-Other	-	-	-	-	-
20	7050330	Rotary (Reverse)	13.12	-	-	13.12	-	-	-
21	7177029	Direct Push	7.63	Monitoring and Test Hole	Monitoring and Test Hole	-	-	4.58	7.63
22	7219784	-	-	Abandoned-Other	-	-	-	-	-
23	7219780	-	-	Abandoned-Other	-	-	-	-	-
24	7229413	-	-	-	-	-	-	-	-
25	7050331	Rotary (Air)	15.86	Test Hole	-	15.86	-	-	-
26	7176567	-	-	-	-	-	-	-	-
27	7233536	-	-	-	-	-	-	-	-
28	7233537	-	-	-	-	-	-	-	-
29	7233538	-	-	-	-	-	-	-	-
30	6930091	Other Method	5.49	Observation Wells	-	-	-	2.44	5.49
31	7219786		0.00	Abandoned-Other	-	-	-	-	-
32	7258710	Direct Push	6.10	Monitoring and Test Hole	Monitoring and Test Hole	-	-	3.05	6.10
33	7258712	Direct Push	6.10	Monitoring and Test Hole	Monitoring and Test Hole	-	-	3.05	6.10
34	7171218	-	-	Abandoned-Other	-	-	-	-	-
35	7269593	Boring	21.96	Observation Wells	Monitoring	-	-	18.91	21.96
36	7258708	Direct Push	6.10	Monitoring and Test Hole	Monitoring and Test Hole	-	-	3.05	6.10

Ontario Water Well Records

WELL ID	MECP WWR ID	Construction Method	Well Depth (m)**	Well Usage		Water Found (m)**	Static Water Level (m)**	Top of Screen Depth (m)**	Bottom of Screen Depth (m)**
				Final Status	First Use				
37	7258722	Direct Push	6.10	Monitoring and Test Hole	Monitoring and Test Hole	-	-	3.05	6.10
38	7258719	Direct Push	3.66	Monitoring and Test Hole	Monitoring and Test Hole	-	-	0.61	3.66
39	7181850	Direct Push	6.10	Test Hole	Monitoring and Test Hole	-	-	3.10	6.10
40	7258709	Direct Push	6.10	Monitoring and Test Hole	Monitoring and Test Hole	-	-	3.05	6.10
41	7052311	Other Method	4.60	Observation Wells	Not Used	2.70	-	-	-
42	7258720	Direct Push	9.15	Monitoring and Test Hole	Monitoring and Test Hole	-	-	7.63	9.15
43	7168425	-	-	doned Monitoring and Test	Monitoring	-	-	-	-
44	7168424	Other Method	-	doned Monitoring and Test	Monitoring	-	-	-	-
45	7165045	-	-	-	-	-	-	-	-
46	7188566	-	-	-	-	-	-	-	-
47	7258723	Direct Push	6.10	Monitoring and Test Hole	Monitoring and Test Hole	-	-	3.05	6.10
48	7258725	Direct Push	6.10	Monitoring and Test Hole	Monitoring and Test Hole	-	-	6.10	6.10
49	7258724	Direct Push	6.10	Monitoring and Test Hole	Monitoring and Test Hole	-	-	3.05	6.10
50	7185156	Boring	9.15	Abandoned-Other	Monitoring	-	-	6.10	9.15
51	7258717	Direct Push	7.63	Monitoring and Test Hole	Monitoring and Test Hole	-		6.10	7.63
52	7258713	Direct Push	6.10	Monitoring and Test Hole	Monitoring and Test Hole	-	-	3.05	6.10
53	7258718	Direct Push	3.97	Monitoring and Test Hole	Monitoring and Test Hole	-	-	0.92	3.97
54	7258711	Direct Push	6.10	Monitoring and Test Hole	Monitoring and Test Hole	-	-	3.05	6.10
55	7258716	Direct Push	3.97	Monitoring and Test Hole	Monitoring and Test Hole	-	-	0.92	3.97
56	7258715	Direct Push	7.63	Monitoring and Test Hole	Monitoring and Test Hole	-	-	6.10	7.63
57	7135809	-	5.60	Observation Wells	Monitoring	1.40	-	2.60	5.60
58	7258714	Direct Push	6.10	Monitoring and Test Hole	Monitoring and Test Hole	-	-	3.05	6.10
59	7167857	Boring	12.90	Observation Wells	Monitoring	3.10	-	9.10	12.20
60	7269540	-	-	-	-	-	-	-	-
61	7274223	Sonic	15.00	-	-	2.11	-	12.00	15.00
62	7219260	Jetting	19.00	Dewatering	Dewatering	4.00	-	16.00	19.00
63	7219261	Jetting	19.00	Dewatering	Dewatering	4.00	-	16.00	19.00
64	7164640	-	-	-	-	-	-	-	-

Notes:

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

**metres below ground surface

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APPENDIX 'B'

RESULT OF SINGLE WELL RESPONSE TESTS

REFERENCE NO. 1908-W037

Falling Head Test (Slug Test)

Test Date:		12-Sep-19	
Piezometer/Well No.:		BH/MW 1	
Ground level:		175.20	m
Screen top level:		156.96	m
Screen bottom level:		153.86	m
Test El. (at midpoint of screen):		155.41	m
Test depth (at midpoint of screen):		19.79	m
Screen length	L=	3.1	m
Diameter of undisturbed portion	2R=	0.22	m
Standpipe diameter	2r=	0.05	m
Initial unbalanced head	Ho=	-0.937	m
Initial water depth		1.77	m
Aquifer material:		**SILTY CLAY TILL**	

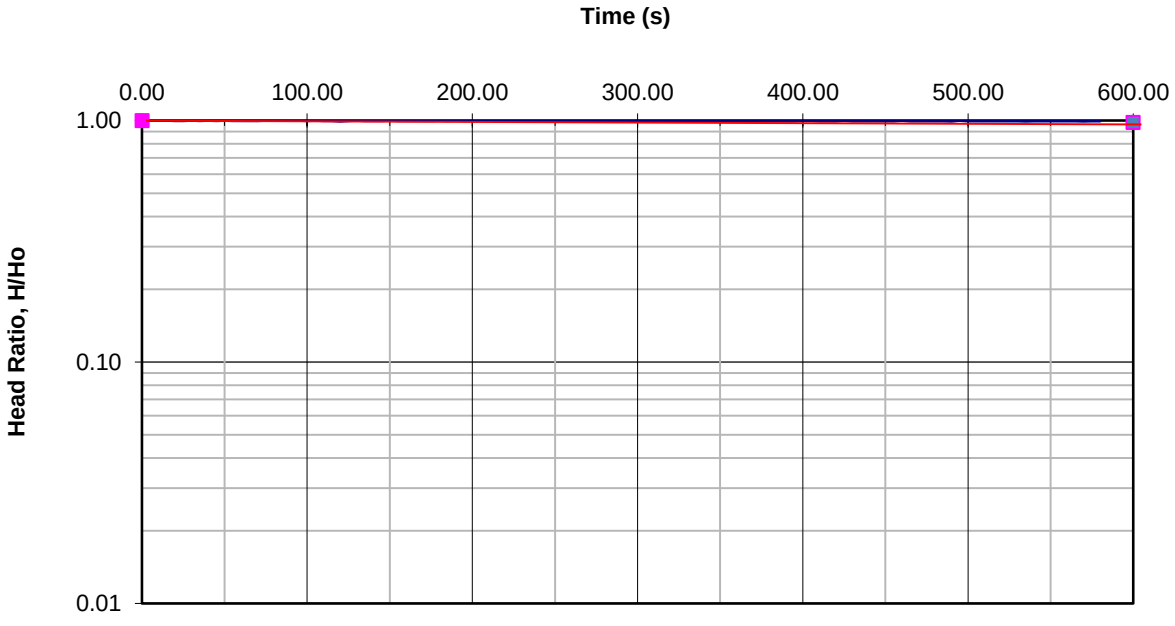
Shape factor $F = \frac{2 \times 3.14 \times L}{\ln(L/R)} = 5.83401$ m

Permeability $K = \frac{3.14 \times r2}{F \times (t2 - t1)} \times \ln(H1/H2)$ (Bouwer and Rice Method)

$\frac{\ln(H1/H2)}{(t2 - t1)} = 3.3671E\text{-}05$

K= **1.1E-06** cm/s

1.1E-08 m/s



Falling Head Test (Slug Test)

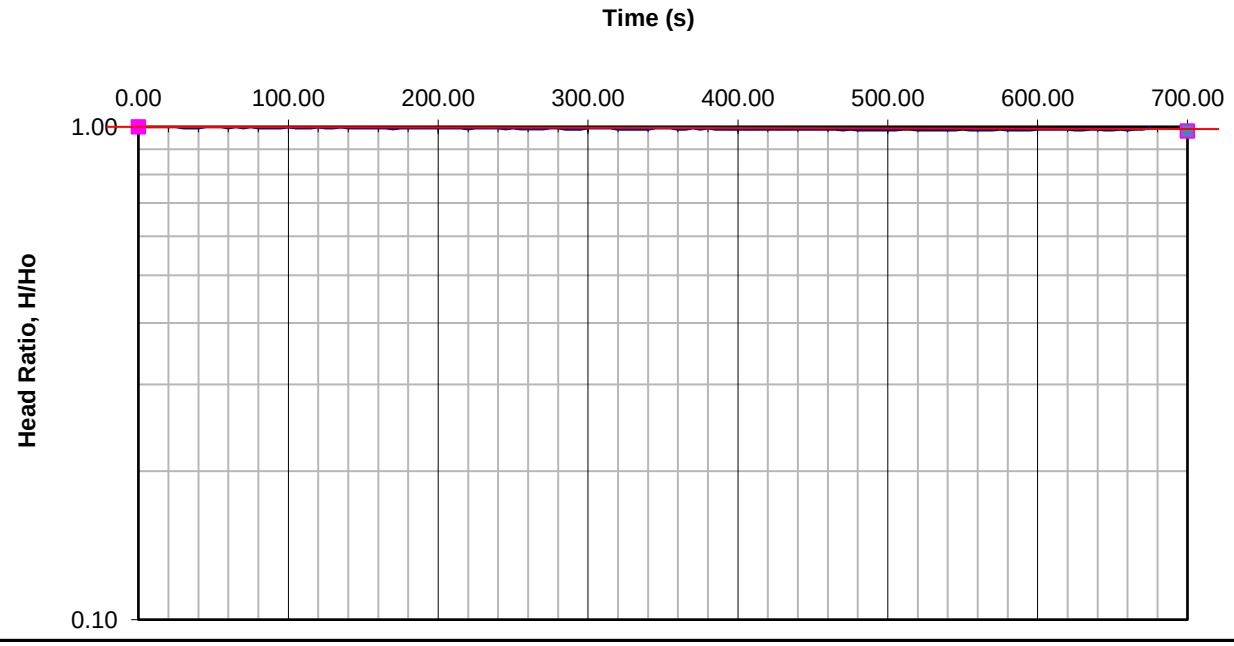
Test Date:		12-Sep-19	
Piezometer/Well No.:		BH/MW 3	
Ground level:		175.20	m
Screen top level:		156.96	m
Screen bottom level:		153.86	m
Test El. (at midpoint of screen):		155.41	m
Test depth (at midpoint of screen):		19.79	m
Screen length	L=	3.1	m
Diameter of undisturbed portion c	2R=	0.22	m
Standpipe diameter	2r=	0.05	m
Initial unbalanced head	Ho=	-0.704	m
Initial water depth		3.66	m
Aquifer material:		**SILTY SAND TILL/SILTY CLAY TILL**	

Shape factor $F = \frac{2 \times 3.14 \times L}{\ln(L/R)} = 5.83401$ m

Permeability $K = \frac{3.14 \times r2}{F \times (t2 - t1)} \times \ln(H1/H2)$ (Bouwer and Rice Method)

$\frac{\ln(H1/H2)}{(t2 - t1)} = 2.8861E\text{-}05$

K= **9.7E-07** cm/s
9.7E-09 m/s



Falling Head Test (Slug Test)

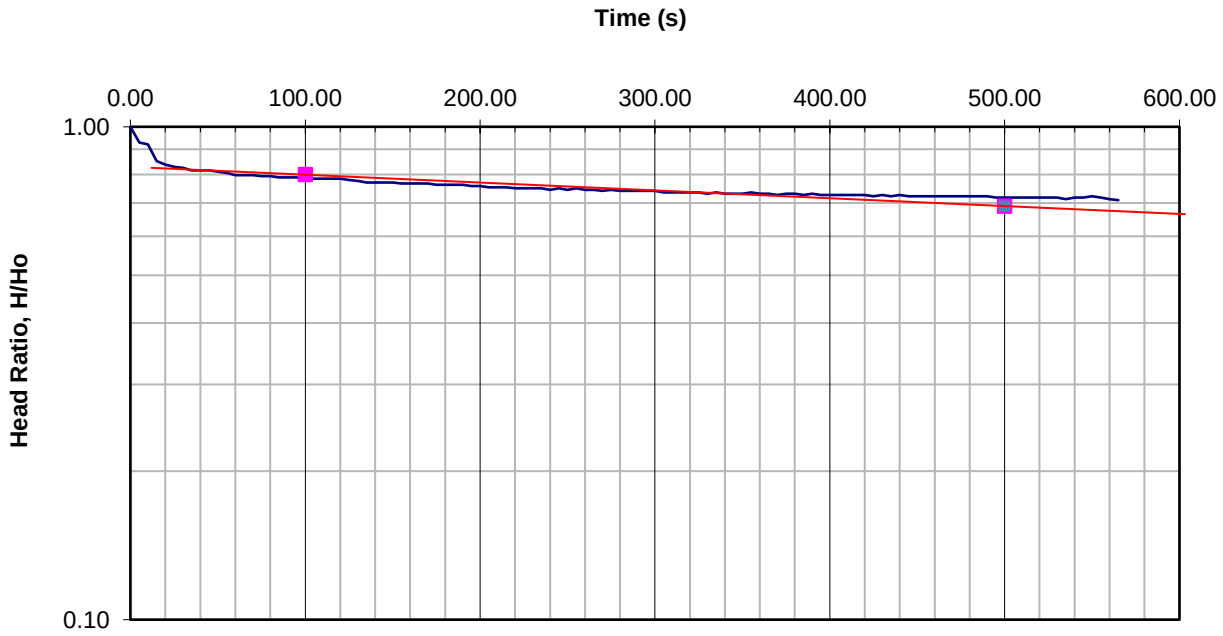
Test Date:		12-Sep-19	
Piezometer/Well No.:		BH/MW 5	
Ground level:		175.20	m
Screen top level:		156.96	m
Screen bottom level:		153.86	m
Test El. (at midpoint of screen):		155.41	m
Test depth (at midpoint of screen):		19.79	m
Screen length	L=	3.1	m
Diameter of undisturbed portion c	2R=	0.22	m
Standpipe diameter	2r=	0.05	m
Initial unbalanced head	Ho=	-0.796	m
Initial water depth		3.66	m
Aquifer material:		**SANDY SILT TILL/SILTY CLAY TILL**	

Shape factor $F = \frac{2 \times 3.14 \times L}{\ln(L/R)} = 5.83401$ m

Permeability $K = \frac{3.14 \times r2}{F \times (t2 - t1)} \times \ln(H1/H2)$ (Bouwer and Rice Method)

$\frac{\ln(H1/H2)}{(t2 - t1)} = 0.0003698$

K= **1.2E-05** cm/s
1.2E-07 m/s



Falling Head Test (Slug Test)

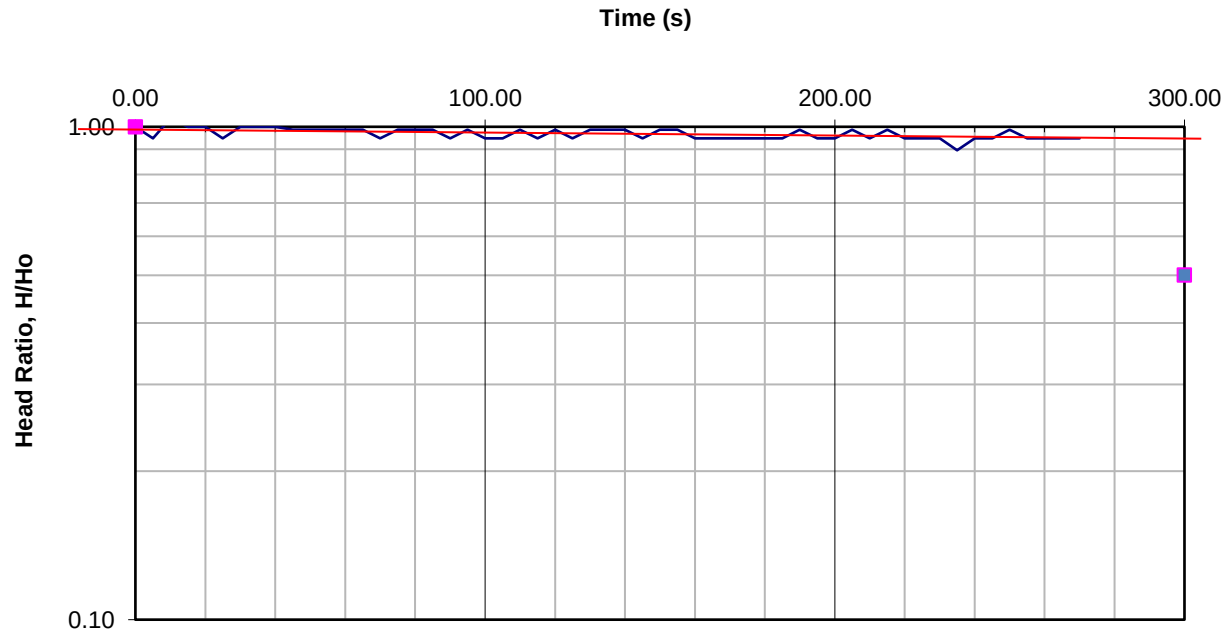
Test Date:		12-Sep-19	
Piezometer/Well No.:		BH/MW 6	
Ground level:		175.80	m
Screen top level:		157.56	m
Screen bottom level:		154.46	m
Test El. (at midpoint of screen):		156.01	m
Test depth (at midpoint of screen):		19.79	m
Screen length	L=	3.1	m
Diameter of undisturbed portion c	2R=	0.22	m
Standpipe diameter	2r=	0.05	m
Initial unbalanced head	Ho=	-0.077	m
Initial water depth		3.66	m
Aquifer material:		**SILTY SAND TILL/SANDY SILT TILL**	

Shape factor $F = \frac{2 \times 3.14 \times L}{\ln(L/R)} = 5.83401$ m

Permeability $K = \frac{3.14 \times r2}{F \times (t2 - t1)} \times \ln(H1/H2)$ (Bouwer and Rice Method)

$\frac{\ln(H1/H2)}{(t2 - t1)} = 0.00231049$

K= **7.8E-05** cm/s
7.8E-07 m/s



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APPENDIX 'C'

WATER QUALITY CERTIFICATE OF ANALYSIS

REFERENCE NO. 1908-W037

FINAL REPORT

CA14137-NOV19 R1

1908-W037 1 Heron's Hill Way Toronto

Prepared for

Soil Engineers Ltd.

FINAL REPORT

First Page

CLIENT DETAILS		LABORATORY DETAILS	
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		Laboratory	SGS Canada Inc.
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Contact	Yogiraj Rana	Telephone	705-652-2143
Telephone	705-341-1987	Facsimile	705-652-6365
Facsimile	416-754-8516	Email	brad.moore@sgs.com
Email	yogiraj.rana@soilengineersltd.com	SGS Reference	CA14137-NOV19
Project	1908-W037 1 Heron's Hill Way Toronto	Received	11/05/2019
Order Number		Approved	11/12/2019
Samples	Ground Water (2)	Report Number	CA14137-NOV19 R1
		Date Reported	11/27/2019

COMMENTS

RL - SGS Reporting Limit

Nonylphenol Ethoxylates is the sum of nonylphenol monoethoxylate and nonylphenol diethoxylate.

Total PAH is the sum of anthracene, benzo(a)pyrene, benzo(a)anthracene, benzo(e)pyrene, benzo(b,j)fluoranthene, benzo(k)fluoranthene, benzo(g,h,i)perylene, chrysene, dibenzo(a,h)anthracene, dibenzo(a,i)pyrene, dibenzo(a,j)acridine, 7H-dibenzo(c,g)carbazole, fluoranthene, indeno(1,2,3-c,d)pyrene, perylene, phenanthrene and pyrene..

Temperature of Sample upon Receipt: 8 degrees C
Cooling Agent Present:Yes
Custody Seal Present:Yes

Chain of Custody Number:011792

SIGNATORIES

Brad Moore Hon. B.Sc

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Client: Soil Engineers Ltd.
Project: 1908-W037 1 Heron's Hill Way Toronto
Project Manager: Yogiraj Rana
Samplers: N/A

PACKAGE: **SANSEW - General Chemistry** (WATER)

L1 = SANSEW / WATER / - - Toronto Sewer Use By Law Table 1 - Sanitary and Combined Sewer Discharge - BL_100_2016

L2 = SANSEW / WATER / - - Toronto Sewer Use By Law Table 2 - Storm Sewer Discharge - BL_100_2016

				Sample Number	8	
				Sample Name	BH/MW 4	
				Sample Matrix	Ground Water	
				Sample Date	04/11/2019	
Parameter	**Units**	**RL**	**L1**	**L2**	**Result**	
General Chemistry						
Biochemical Oxygen Demand (BOD5)	mg/L	2	300	15	5	
Total Kjeldahl Nitrogen	as N mg/L	0.5	100		< 0.5	
Total Suspended Solids	mg/L	2	350	15	57	

PACKAGE: **SANSEW - Metals and Inorganics** (WATER)

L1 = SANSEW / WATER / - - Toronto Sewer Use By Law Table 1 - Sanitary and Combined Sewer Discharge - BL_100_2016

L2 = SANSEW / WATER / - - Toronto Sewer Use By Law Table 2 - Storm Sewer Discharge - BL_100_2016

					Sample Number	8	9
					Sample Name	BH/MW 4	BH/MW 4 Dissolved
					Sample Matrix	Ground Water	Ground Water
					Sample Date	04/11/2019	04/11/2019
Parameter	**Units**	**RL**	**L1**	**L2**	**Result**	**Result**
Metals and Inorganics						
Fluoride	mg/L	0.06	10		0.71	
Cyanide (total)	mg/L	0.01	2	0.02	< 0.01	
Phosphorus (total)	mg/L	0.03				< 0.03
Aluminum (total)	mg/L	0.001	50		1.22	0.002
Antimony (total)	mg/L	0.0009	5		0.0012	0.0011
Arsenic (total)	mg/L	0.0002	1	0.02	0.0010	0.0008
Cadmium (total)	mg/L	0.000003	0.7	0.008	0.000012	0.000007
Chromium (total)	mg/L	0.00008	4	0.08	0.00206	< 0.00008

Client: Soil Engineers Ltd.
Project: 1908-W037 1 Heron's Hill Way Toronto
Project Manager: Yogiraj Rana
Samplers: N/A

PACKAGE: **SANSEW - Metals and Inorganics**
(WATER)

L1 = SANSEW / WATER / - - Toronto Sewer Use By Law Table 1 - Sanitary and Combined Sewer Discharge - BL_100_2016

L2 = SANSEW / WATER / - - Toronto Sewer Use By Law Table 2 - Storm Sewer Discharge - BL_100_2016

Sample Number					8	9
Sample Name					BH/MW 4	BH/MW 4 Dissolved
Sample Matrix					Ground Water	Ground Water
Sample Date					04/11/2019	04/11/2019
Parameter	**Units**	**RL**	**L1**	**L2**	**Result**	**Result**
Metals and Inorganics (continued)						
Cobalt (total)	mg/L	0.000004	5		0.000627	0.000030
Copper (total)	mg/L	0.0002	2	0.04	0.0036	0.0008
Lead (total)	mg/L	0.00001	1	0.12	0.00085	0.00002
Manganese (total)	mg/L	0.00001	5	0.05	0.0392	0.00302
Molybdenum (total)	mg/L	0.00004	5		0.0122	0.0118
Nickel (total)	mg/L	0.0001	2	0.08	0.0028	0.0011
Phosphorus (total)	mg/L	0.003	10	0.4	0.082	0.034
Selenium (total)	mg/L	0.00004	1	0.02	0.00022	0.00022
Silver (total)	mg/L	0.00005	5	0.12	< 0.00005	< 0.00005
Tin (total)	mg/L	0.00006	5		0.00644	0.00130
Titanium (total)	mg/L	0.00005	5		0.0430	0.00008
Zinc (total)	mg/L	0.002	2	0.04	0.010	< 0.002

Client: Soil Engineers Ltd.
Project: 1908-W037 1 Heron's Hill Way Toronto
Project Manager: Yogiraj Rana
Samplers: N/A

PACKAGE: **SANSEW - Microbiology** (WATER)

L1 = SANSEW / WATER / - - Toronto Sewer Use By Law Table 1 - Sanitary and Combined Sewer Discharge - BL_100_2016

L2 = SANSEW / WATER / - - Toronto Sewer Use By Law Table 2 - Storm Sewer Discharge - BL_100_2016

Sample Number	8
Sample Name	BH/MW 4
Sample Matrix	Ground Water
Sample Date	04/11/2019

Parameter	Units	RL	L1	L2	Result
Microbiology					
E. Coli	cfu/100mL	-		200	< 2↑

PACKAGE: **SANSEW - Nonylphenol and Ethoxylates** (WATER)

L1 = SANSEW / WATER / - - Toronto Sewer Use By Law Table 1 - Sanitary and Combined Sewer Discharge - BL_100_2016

L2 = SANSEW / WATER / - - Toronto Sewer Use By Law Table 2 - Storm Sewer Discharge - BL_100_2016

Sample Number	8
Sample Name	BH/MW 4
Sample Matrix	Ground Water
Sample Date	04/11/2019

Parameter	Units	RL	L1	L2	Result
Nonylphenol and Ethoxylates					
Nonylphenol	mg/L	0.001	0.02	0.001	< 0.001
Nonylphenol Ethoxylates	mg/L	0.01	0.2	0.01	< 0.01
Nonylphenol diethoxylate	mg/L	0.01			< 0.01
Nonylphenol monoethoxylate	mg/L	0.01			< 0.01

PACKAGE: **SANSEW - Oil and Grease** (WATER)

L1 = SANSEW / WATER / - - Toronto Sewer Use By Law Table 1 - Sanitary and Combined Sewer Discharge - BL_100_2016

L2 = SANSEW / WATER / - - Toronto Sewer Use By Law Table 2 - Storm Sewer Discharge - BL_100_2016

Sample Number	8
Sample Name	BH/MW 4
Sample Matrix	Ground Water
Sample Date	04/11/2019

Parameter	Units	RL	L1	L2	Result

Client: Soil Engineers Ltd.
Project: 1908-W037 1 Heron's Hill Way Toronto
Project Manager: Yogiraj Rana
Samplers: N/A

PACKAGE: **SANSEW - Oil and Grease** (WATER)

L1 = SANSEW / WATER / - - Toronto Sewer Use By Law Table 1 - Sanitary and Combined Sewer Discharge - BL_100_2016

L2 = SANSEW / WATER / - - Toronto Sewer Use By Law Table 2 - Storm Sewer Discharge - BL_100_2016

Sample Number	8
Sample Name	BH/MW 4
Sample Matrix	Ground Water
Sample Date	04/11/2019

Parameter	Units	RL	L1	L2	Result
Oil and Grease					
Oil & Grease (total)	mg/L	2			< 2
Oil & Grease (animal/vegetable)	mg/L	4	150		< 4
Oil & Grease (mineral/synthetic)	mg/L	4	15		< 4

PACKAGE: **SANSEW - Other (ORP)** (WATER)

L1 = SANSEW / WATER / - - Toronto Sewer Use By Law Table 1 - Sanitary and Combined Sewer Discharge - BL_100_2016

L2 = SANSEW / WATER / - - Toronto Sewer Use By Law Table 2 - Storm Sewer Discharge - BL_100_2016

Sample Number	8
Sample Name	BH/MW 4
Sample Matrix	Ground Water
Sample Date	04/11/2019

Parameter	Units	RL	L1	L2	Result
Other (ORP)					
pH	no unit	0.05	11.5	9.5	7.91
Chromium VI	mg/L	0.0002	2	0.04	0.0002
Mercury (total)	mg/L	0.00001	0.01	0.0004	< 0.00001

PACKAGE: **SANSEW - PAHs** (WATER)

L1 = SANSEW / WATER / - - Toronto Sewer Use By Law Table 1 - Sanitary and Combined Sewer Discharge - BL_100_2016

L2 = SANSEW / WATER / - - Toronto Sewer Use By Law Table 2 - Storm Sewer Discharge - BL_100_2016

Sample Number	8
Sample Name	BH/MW 4
Sample Matrix	Ground Water
Sample Date	04/11/2019

Parameter	Units	RL	L1	L2	Result

PACKAGE: **SANSEW - PAHs** (WATER)

L1 = SANSEW / WATER / - - Toronto Sewer Use By Law Table 1 - Sanitary and Combined Sewer Discharge - BL_100_2016

L2 = SANSEW / WATER / - - Toronto Sewer Use By Law Table 2 - Storm Sewer Discharge - BL_100_2016

Sample Number	8
Sample Name	BH/MW 4
Sample Matrix	Ground Water
Sample Date	04/11/2019

Parameter	Units	RL	L1	L2	Result
PAHs					
Benzo(b+j)fluoranthene	mg/L	0.0001			< 0.0001

PACKAGE: **SANSEW - PCBs** (WATER)

L1 = SANSEW / WATER / - - Toronto Sewer Use By Law Table 1 - Sanitary and Combined Sewer Discharge - BL_100_2016

L2 = SANSEW / WATER / - - Toronto Sewer Use By Law Table 2 - Storm Sewer Discharge - BL_100_2016

Sample Number	8
Sample Name	BH/MW 4
Sample Matrix	Ground Water
Sample Date	04/11/2019

Parameter	Units	RL	L1	L2	Result
PCBs					
Polychlorinated Biphenyls (PCBs) - Total	mg/L	0.0001	0.001	0.0004	< 0.0001

PACKAGE: **SANSEW - Phenols** (WATER)

L1 = SANSEW / WATER / - - Toronto Sewer Use By Law Table 1 - Sanitary and Combined Sewer Discharge - BL_100_2016

L2 = SANSEW / WATER / - - Toronto Sewer Use By Law Table 2 - Storm Sewer Discharge - BL_100_2016

Sample Number	8
Sample Name	BH/MW 4
Sample Matrix	Ground Water
Sample Date	04/11/2019

Parameter	Units	RL	L1	L2	Result
Phenols					
4AAP-Phenolics	mg/L	0.002	1	0.008	< 0.002

PACKAGE: **SANSEW - SVOCs** (WATER)

Sample Number	8
Sample Name	BH/MW 4

Client: Soil Engineers Ltd.
Project: 1908-W037 1 Heron's Hill Way Toronto
Project Manager: Yogiraj Rana
Samplers: N/A

PACKAGE: **SANSEW - SVOCs** (WATER)

L1 = SANSEW / WATER / - - Toronto Sewer Use By Law Table 1 - Sanitary and Combined Sewer Discharge - BL_100_2016

L2 = SANSEW / WATER / - - Toronto Sewer Use By Law Table 2 - Storm Sewer Discharge - BL_100_2016

Sample Number	8
Sample Name	BH/MW 4
Sample Matrix	Ground Water
Sample Date	04/11/2019

Parameter	Units	RL	L1	L2	Result
SVOCs					
di-n-Butyl Phthalate	mg/L	0.002	0.08	0.015	< 0.002
Bis(2-ethylhexyl)phthalate	mg/L	0.002	0.012	0.0088	< 0.002
3,3-Dichlorobenzidine	mg/L	0.0005	0.002	0.0008	< 0.0005
Pentachlorophenol	mg/L	0.0005	0.005	0.002	< 0.0005
PAHs (Total)	mg/L	-	0.005	0.002	< 0.001
Perylene	mg/L	0.0005			< 0.0005

PACKAGE: **SANSEW - SVOCs - PAHs** (WATER)

L1 = SANSEW / WATER / - - Toronto Sewer Use By Law Table 1 - Sanitary and Combined Sewer Discharge - BL_100_2016

L2 = SANSEW / WATER / - - Toronto Sewer Use By Law Table 2 - Storm Sewer Discharge - BL_100_2016

Sample Number	8
Sample Name	BH/MW 4
Sample Matrix	Ground Water
Sample Date	04/11/2019

Parameter	Units	RL	L1	L2	Result
SVOCs - PAHs					
7Hdibenzo(c,g)carbazole	mg/L	0.0001			< 0.0001
Anthracene	mg/L	0.0001			< 0.0001
Benzo(a)anthracene	mg/L	0.0001			< 0.0001
Benzo(a)pyrene	mg/L	0.0001			< 0.0001
Benzo[e]pyrene	mg/L	0.0001			< 0.0001
Benzo(ghi)perylene	mg/L	0.0002			< 0.0002
Benzo(k)fluoranthene	mg/L	0.0001			< 0.0001
Chrysene	mg/L	0.0001			< 0.0001

Client: Soil Engineers Ltd.
Project: 1908-W037 1 Heron's Hill Way Toronto
Project Manager: Yogiraj Rana
Samplers: N/A

PACKAGE: **SANSEW - SVOCs - PAHs** (WATER)

L1 = SANSEW / WATER / - - Toronto Sewer Use By Law Table 1 - Sanitary and Combined Sewer Discharge - BL_100_2016

L2 = SANSEW / WATER / - - Toronto Sewer Use By Law Table 2 - Storm Sewer Discharge - BL_100_2016

Sample Number	8
Sample Name	BH/MW 4
Sample Matrix	Ground Water
Sample Date	04/11/2019

Parameter	Units	RL	L1	L2	Result
SVOCs - PAHs (continued)					
Dibenzo(a,h)anthracene	mg/L	0.0001			< 0.0001
Dibenzo(a,i)pyrene	mg/L	0.0001			< 0.0001
Dibenzo(a,j)acridine	mg/L	0.0001			< 0.0001
Fluoranthene	mg/L	0.0001			< 0.0001
Indeno(1,2,3-cd)pyrene	mg/L	0.0002			< 0.0002
Phenanthrene	mg/L	0.0001			< 0.0001
Pyrene	mg/L	0.0001			< 0.0001

PACKAGE: **SANSEW - VOCs** (WATER)

L1 = SANSEW / WATER / - - Toronto Sewer Use By Law Table 1 - Sanitary and Combined Sewer Discharge - BL_100_2016

L2 = SANSEW / WATER / - - Toronto Sewer Use By Law Table 2 - Storm Sewer Discharge - BL_100_2016

Sample Number	8
Sample Name	BH/MW 4
Sample Matrix	Ground Water
Sample Date	04/11/2019

Parameter	Units	RL	L1	L2	Result
VOCs					
Chloroform	mg/L	0.0005	0.04	0.002	0.0041
1,2-Dichlorobenzene	mg/L	0.0005	0.05	0.0056	< 0.0005
1,4-Dichlorobenzene	mg/L	0.0005	0.08	0.0068	< 0.0005
cis-1,2-Dichloroethene	mg/L	0.0005	4	0.0056	< 0.0005
trans-1,3-Dichloropropene	mg/L	0.0005	0.14	0.0056	< 0.0005
Methylene Chloride	mg/L	0.0005	2	0.0052	< 0.0005
1,1,2,2-Tetrachloroethane	mg/L	0.0005	1.4	0.017	< 0.0005

PACKAGE: **SANSEW - VOCs** (WATER)

Sample Number	8
Sample Name	BH/MW 4
Sample Matrix	Ground Water
Sample Date	04/11/2019

L1 = SANSEW / WATER / - - Toronto Sewer Use By Law Table 1 - Sanitary and Combined Sewer Discharge - BL_100_2016

L2 = SANSEW / WATER / - - Toronto Sewer Use By Law Table 2 - Storm Sewer Discharge - BL_100_2016

Parameter	Units	RL	L1	L2	Result
VOCs (continued)					
Tetrachloroethylene (perchloroethylene)	mg/L	0.0005	1	0.0044	< 0.0005
Trichloroethylene	mg/L	0.0005	0.4	0.0076	< 0.0005

PACKAGE: **SANSEW - VOCs - BTEX** (WATER)

Sample Number	8
Sample Name	BH/MW 4
Sample Matrix	Ground Water
Sample Date	04/11/2019

L1 = SANSEW / WATER / - - Toronto Sewer Use By Law Table 1 - Sanitary and Combined Sewer Discharge - BL_100_2016

L2 = SANSEW / WATER / - - Toronto Sewer Use By Law Table 2 - Storm Sewer Discharge - BL_100_2016

Parameter	Units	RL	L1	L2	Result
VOCs - BTEX					
Benzene	mg/L	0.0005	0.01	0.002	< 0.0005
Ethylbenzene	mg/L	0.0005	0.16	0.002	< 0.0005
Toluene	mg/L	0.0005	0.016	0.002	< 0.0005
Xylene (total)	mg/L	0.0005	1.4	0.0044	< 0.0005
m-p-xylene	mg/L	0.0005			< 0.0005
o-xylene	mg/L	0.0005			< 0.0005

EXCEEDANCE SUMMARY

Parameter	Method	Units	Result	SANSEW / WATER / - - Toronto Sewer Use By Law Table 1 - Sanitary and Combined Sewer Discharge - BL_100_2016 L1	SANSEW / WATER / - - Toronto Sewer Use By Law Table 2 - Storm Sewer Discharge - BL_100_2016 L2
BH/MW 4					
Chloroform	EPA 5030B/8260C	mg/L	0.0041		0.002
Total Suspended Solids	SM 2540D	mg/L	57		15

QC SUMMARY

Biochemical Oxygen Demand

Method: SM 5210 I Internal ref.: ME-CA-IENVIEWL-LAK-AN-007

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Biochemical Oxygen Demand (BOD5)	BOD0012-NOV19	mg/L	2	< 2	5	30	88	70	130	121	70	130

Cyanide by SFA

Method: SM 4500 I Internal ref.: ME-CA-IENVISFA-LAK-AN-005

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Cyanide (total)	SKA0063-NOV19	mg/L	0.01	<0.01	ND	10	96	90	110	84	75	125

Fluoride by Specific Ion Electrode

Method: SM 4500 I Internal ref.: ME-CA-IENVIEWL-LAK-AN-014

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Fluoride	EWL0106-NOV19	mg/L	0.06	<0.06	0	10	101	90	110	104	75	125

QC SUMMARY

Hexavalent Chromium by SFA

Method: EPA218.6/EPA3060A | Internal ref.: ME-CA-[ENV]SKA-LAK-AN-012

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Chromium VI	SKA0060-NOV19	mg/L	0.0002	<0.0002	ND	20	102	80	120	NV	75	125

Mercury by CVAAS

Method: EPA 7471A/SM 3112B | Internal ref.: ME-CA-[ENV]SPE-LAK-AN-004

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Mercury (total)	EHG0007-NOV19	mg/L	0.00001	< 0.00001	ND	20	114	80	120	114	70	130

QC SUMMARY

Metals in aqueous samples - ICP-MS

Method: SM 3030/EPA 200.8 | Internal ref.: ME-CA-IENVISPE-LAK-AN-006

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Silver (total)	EMS0025-NOV19	mg/L	0.00005	<0.00005	ND	20	100	90	110	95	70	130
Aluminum (total)	EMS0025-NOV19	mg/L	0.001	<0.001	5	20	107	90	110	105	70	130
Arsenic (total)	EMS0025-NOV19	mg/L	0.0002	<0.0002	ND	20	100	90	110	104	70	130
Cadmium (total)	EMS0025-NOV19	mg/L	0.000003	<0.000003	ND	20	98	90	110	97	70	130
Cobalt (total)	EMS0025-NOV19	mg/L	0.000004	<0.000004	0	20	101	90	110	101	70	130
Chromium (total)	EMS0025-NOV19	mg/L	0.00008	<0.00008	ND	20	103	90	110	106	70	130
Copper (total)	EMS0025-NOV19	mg/L	0.0002	<0.0002	0	20	102	90	110	NV	70	130
Manganese (total)	EMS0025-NOV19	mg/L	0.00001	<0.00001	1	20	102	90	110	89	70	130
Molybdenum (total)	EMS0025-NOV19	mg/L	0.00004	<0.00004	13	20	102	90	110	109	70	130
Nickel (total)	EMS0025-NOV19	mg/L	0.0001	<0.0001	3	20	102	90	110	100	70	130
Lead (total)	EMS0025-NOV19	mg/L	0.00001	<0.00001	7	20	94	90	110	91	70	130
Phosphorus (total)	EMS0025-NOV19	mg/L	0.003	<0.003	ND	20	97	90	110	NV	70	130
Antimony (total)	EMS0025-NOV19	mg/L	0.0009	<0.0009	ND	20	93	90	110	NV	70	130
Selenium (total)	EMS0025-NOV19	mg/L	0.00004	<0.00004	ND	20	98	90	110	113	70	130
Tin (total)	EMS0025-NOV19	mg/L	0.00006	<0.00006	ND	20	101	90	110	NV	70	130
Titanium (total)	EMS0025-NOV19	mg/L	0.00005	<0.00005	ND	20	100	90	110	NV	70	130
Zinc (total)	EMS0025-NOV19	mg/L	0.002	<0.002	1	20	100	90	110	106	70	130

QC SUMMARY

Microbiology

Method: SM 9222D | Internal ref.: ME-CA-IENVIMIC-LAK-AN-006

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
E. Coli	BAC9070-NOV19	cfu/100mL	-	ACCEPTED	ACCEPTED							

Nonylphenol and Ethoxylates

Method: ASTM D7065-06 | Internal ref.: ME-CA-IENVIGC-LAK-AN-015

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Nonylphenol diethoxylate	GCM0110-NOV19	mg/L	0.01	< 0.01			86	55	120			
Nonylphenol Ethoxylates	GCM0110-NOV19	mg/L	0.01	< 0.01								
Nonylphenol monoethoxylate	GCM0110-NOV19	mg/L	0.01	< 0.01			92	55	120			
Nonylphenol	GCM0110-NOV19	mg/L	0.001	< 0.001			84	55	120			

QC SUMMARY

Oil & Grease

Method: MOE E3401 | Internal ref.: ME-CA-[ENV]GC-LAK-AN-019

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Oil & Grease (total)	GCM0088-NOV19	mg/L	2	<2	NSS	20	91	75	125			

Oil & Grease-AV/MS

Method: MOE E3401/SM 5520F | Internal ref.: ME-CA-[ENV]GC-LAK-AN-019

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Oil & Grease (animal/vegetable)	GCM0088-NOV19	mg/L	4	< 4	NSS	20	NA	70	130			
Oil & Grease (mineral/synthetic)	GCM0088-NOV19	mg/L	4	< 4	NSS	20	NA	70	130			

pH

Method: SM 4500 | Internal ref.: ME-CA-[ENV]EWL-LAK-AN-006

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
pH	EWL0099-NOV19	no unit	0.05	NA	0		101			NA		

QC SUMMARY

Phenols by SFA

Method: SM 5530B-D | Internal ref.: ME-CA-[ENVISFA-LAK-AN-006

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
4AAP-Phenolics	SKA0052-NOV19	mg/L	0.002	<0.002	7	10	101	90	110	89	75	125

Phosphorus by SFA

Method: SM 4500-P J | Internal ref.: ME-CA-[ENVISFA-LAK-AN-003

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Phosphorus (total)	SKA0057-NOV19	mg/L	0.03	<0.03	5	10	101	90	110	97	75	125

Polychlorinated Biphenyls

Method: MOE E3400/EPA 8082A | Internal ref.: ME-CA-[ENVIGC-LAK-AN-001

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Polychlorinated Biphenyls (PCBs) - Total	GCM0119-NOV19	mg/L	0.0001	<0.0001	ND	30	96	60	140	86	60	140

QC SUMMARY

Semi-Volatile Organics

Method: EPA 3510C/8270D | Internal ref.: ME-CA-[ENV]GC-LAK-AN-005

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
3,3-Dichlorobenzidine	GCM0116-NOV19	mg/L	0.0005	< 0.0005	NSS	30	96	30	130	NSS	30	130
7Hdibenzo(c,g)carbazole	GCM0122-NOV19	mg/L	0.0001	< 0.0001	NSS	30	94	50	140	NSS	50	140
Anthracene	GCM0122-NOV19	mg/L	0.0001	< 0.0001	NSS	30	84	50	140	NSS	50	140
Benzo(a)anthracene	GCM0122-NOV19	mg/L	0.0001	< 0.0001	NSS	30	93	50	140	NSS	50	140
Benzo(a)pyrene	GCM0122-NOV19	mg/L	0.0001	< 0.0001	NSS	30	83	50	140	NSS	50	140
Benzo(b+j)fluoranthene	GCM0122-NOV19	mg/L	0.0001	< 0.0001	NSS	30	92	50	140	NSS	50	140
Benzo[e]pyrene	GCM0122-NOV19	mg/L	0.0001	< 0.0001	NSS	30	78	50	140	NSS	50	140
Benzo(ghi)perylene	GCM0122-NOV19	mg/L	0.0002	< 0.0002	NSS	30	91	50	140	NSS	50	140
Benzo(k)fluoranthene	GCM0122-NOV19	mg/L	0.0001	< 0.0001	NSS	30	92	50	140	NSS	50	140
Bis(2-ethylhexyl)phthalate	GCM0122-NOV19	mg/L	0.002	< 0.002	NSS	30	96	50	140	NSS	50	140
Chrysene	GCM0122-NOV19	mg/L	0.0001	< 0.0001	NSS	30	92	50	140	NSS	50	140
di-n-Butyl Phthalate	GCM0122-NOV19	mg/L	0.002	< 0.002	NSS	30	97	50	140	NSS	50	140
Dibenzo(a,h)anthracene	GCM0122-NOV19	mg/L	0.0001	< 0.0001	NSS	30	90	50	140	NSS	50	140
Dibenzo(a,i)pyrene	GCM0122-NOV19	mg/L	0.0001	< 0.0001	NSS	30	89	50	140	NSS	50	140
Dibenzo(a,j)acridine	GCM0122-NOV19	mg/L	0.0001	< 0.0001	NSS	30	93	50	140	NSS	50	140
Fluoranthene	GCM0122-NOV19	mg/L	0.0001	< 0.0001	NSS	30	90	50	140	NSS	50	140
Indeno(1,2,3-cd)pyrene	GCM0122-NOV19	mg/L	0.0002	< 0.0002	NSS	30	91	50	140	NSS	50	140
Pentachlorophenol	GCM0122-NOV19	mg/L	0.0005	< 0.0005	NSS	30	94	50	140	NSS	50	140
Perylene	GCM0122-NOV19	mg/L	0.0005	< 0.0005	NSS	30	92	50	140	NSS	50	140
Phenanthrene	GCM0122-NOV19	mg/L	0.0001	< 0.0001	NSS	30	83	50	140	NSS	50	140

QC SUMMARY

Semi-Volatile Organics (continued)

Method: EPA 3510C/8270D | Internal ref.: ME-CA-[ENVIGC-LAK-AN-005

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Pyrene	GCM0122-NOV19	mg/L	0.0001	< 0.0001	NSS	30	90	50	140	NSS	50	140

Suspended Solids

Method: SM 2540D | Internal ref.: ME-CA-[ENVIEWL-LAK-AN-004

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Total Suspended Solids	EWL0095-NOV19	mg/L	2	< 2	1	10	NV	90	110	NA		

Total Nitrogen

Method: SM 4500-N C/4500-NO3- F | Internal ref.: ME-CA-[ENVISFA-LAK-AN-002

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Total Kjeldahl Nitrogen	SKA0054-NOV19	as N mg/L	0.5	<0.5	10	10	102	90	110	107	75	125

QC SUMMARY

Volatile Organics

Method: EPA 5030B/8260C | Internal ref.: ME-CA-[ENV]GC-LAK-AN-004

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
1,1,2,2-Tetrachloroethane	GCM0104-NOV19	mg/L	0.0005	<0.0005	ND	30	102	60	130	102	50	140
1,2-Dichlorobenzene	GCM0104-NOV19	mg/L	0.0005	<0.0005	ND	30	101	60	130	99	50	140
1,4-Dichlorobenzene	GCM0104-NOV19	mg/L	0.0005	<0.0005	ND	30	102	60	130	99	50	140
Benzene	GCM0104-NOV19	mg/L	0.0005	<0.0005	ND	30	98	60	130	99	50	140
Chloroform	GCM0104-NOV19	mg/L	0.0005	<0.0005	ND	30	99	60	130	93	50	140
cis-1,2-Dichloroethene	GCM0104-NOV19	mg/L	0.0005	<0.0005	ND	30	97	60	130	98	50	140
Ethylbenzene	GCM0104-NOV19	mg/L	0.0005	<0.0005	ND	30	101	60	130	99	50	140
m-p-xylene	GCM0104-NOV19	mg/L	0.0005	<0.0005	ND	30	103	60	130	101	50	140
Methylene Chloride	GCM0104-NOV19	mg/L	0.0005	<0.0005	ND	30	104	60	130	103	50	140
o-xylene	GCM0104-NOV19	mg/L	0.0005	<0.0005	ND	30	102	60	130	99	50	140
Tetrachloroethylene (perchloroethylene)	GCM0104-NOV19	mg/L	0.0005	<0.0005	ND	30	101	60	130	98	50	140
Toluene	GCM0104-NOV19	mg/L	0.0005	<0.0005	ND	30	100	60	130	99	50	140
trans-1,3-Dichloropropene	GCM0104-NOV19	mg/L	0.0005	<0.0005	ND	30	99	60	130	97	50	140
Trichloroethylene	GCM0104-NOV19	mg/L	0.0005	<0.0005	ND	30	99	60	130	93	50	140

QC SUMMARY

Method Blank: a blank matrix that is carried through the entire analytical procedure. Used to assess laboratory contamination.

Duplicate: Paired analysis of a separate portion of the same sample that is carried through the entire analytical procedure. Used to evaluate measurement precision.

LCS/Spike Blank: Laboratory control sample or spike blank refer to a blank matrix to which a known amount of analyte has been added. Used to evaluate analyte recovery and laboratory accuracy without sample matrix effects.

Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate laboratory accuracy with sample matrix effects.

Reference Material: a material or substance matrix matched to the samples that contains a known amount of the analyte of interest. A reference material may be used in place of a matrix spike.

RL: Reporting limit

RPD: Relative percent difference

AC: Acceptance criteria

Multielement Scan Qualifier: as the number of analytes in a scan increases, so does the chance of a limit exceedance by random chance as opposed to a real method problem. Thus, in multielement scans, for the LCS and matrix spike, up to 10% of the analytes may exceed the quoted limits by up to 10% absolute and the spike is considered acceptable.

Duplicate Qualifier: for duplicates as the measured result approaches the RL, the uncertainty associated with the value increases dramatically, thus duplicate acceptance limits apply only where the average of the two duplicates is greater than five times the RL.

Matrix Spike Qualifier: for matrix spikes, as the concentration of the native analyte increases, the uncertainty of the matrix spike recovery increases. Thus, the matrix spike acceptance limits apply only when the concentration of the matrix spike is greater than or equal to the concentration of the native analyte.

LEGEND

FOOTNOTES

NSS	Insufficient sample for analysis.
RL	Reporting Limit.
↑	Reporting limit raised.
↓	Reporting limit lowered.
NA	The sample was not analysed for this analyte
ND	Non Detect

Samples analysed as received. Solid samples expressed on a dry weight basis. "Temperature Upon Receipt" is representative of the whole shipment and may not reflect the temperature of individual samples.

Analysis conducted on samples submitted pursuant to or as part of Reg. 153/04, are in accordance to the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act" published by the Ministry and dated March 9, 2004 as amended.

SGS provides criteria information (such as regulatory or guideline limits and summary of limit exceedances) as a service. Every attempt is made to ensure the criteria information in this report is accurate and current, however, it is not guaranteed. Comparison to the most current criteria is the responsibility of the client and SGS assumes no responsibility for the accuracy of the criteria levels indicated. This document is issued, on the Client's behalf, by the Company under its General Conditions of Service available on request and accessible at http://www.sgs.com/terms_and_conditions.htm. The Client's attention is drawn to the limitation of liability, indemnification and jurisdiction issues defined therein. Any other holder of this document is advised that information contained hereon reflects the Company's findings at the time of its intervention only and within the limits of Client's instructions, if any. The Company's sole responsibility is to its Client and this document does not exonerate parties to a transaction from exercising all their rights and obligations under the transaction documents.

This report must not be reproduced, except in full. This report supersedes all previous versions.

-- End of Analytical Report --

SGS Request for Laboratory Services and CHAIN OF CUSTODY

No: 011792

Page _____ of _____

Environment, Health & Safety - Lakefield: 185 Concession St., Lakefield, ON K0L 2H0 Phone: 705-652-2000 Fax: 705-652-6365 Web: www.sgs.com/environment
- London: 657 Consortium Court, London, ON, N6E 2S8 Phone: 519-672-4500 Toll Free: 877-848-8060 Fax: 519-672-0361

Laboratory Information Section - Lab use only

Received By: Kim Sheard
Received Date: 11 05 19 (mm/dd/yy)
Received Time: 16 : 45 (hr : min)
Received By (signature):
Custody Seal Present: Yes ☑ No ☐
Custody Seal Intact: Yes ☐ No ☐
Cooling Agent Present: Yes ☑ No ☐ Type: ice
Temperature Upon Receipt (°C) 8.8.8
LAB LIMS #: OA 14137 - NOV19

REPORT INFORMATION

Company: Soil Engineers ltd
Contact: Yogiraj Rana
Address: 90 West Beaver Creek Road, Richmond Hill
Phone: 647-223-1743
Fax:
Email: yogiraj.rana@soilengineersltd.com

INVOICE INFORMATION

☑ (same as Report Information)
Company:
Contact:
Address:
Phone:
Email:

Quotation #:
Project #: 1908-W037
P.O. #:
Site Location/ID: See comments

TURNAROUND TIME (TAT) REQUIRED

☑ Regular TAT (5-7days)

TAT's are quoted in business days (exclude statutory holidays & weekends). Samples received after 6pm or on weekends: TAT begins next business day

RUSH TAT (Additional Charges May Apply): ☐ 1 Day ☐ 2 Days ☐ 3 Days ☐ 4 Days

PLEASE CONFIRM RUSH FEASIBILITY WITH SGS REPRESENTATIVE PRIOR TO SUBMISSION

Specify Due Date:

NOTE: DRINKING (POTABLE) WATER SAMPLES FOR HUMAN CONSUMPTION MUST BE SUBMITTED WITH SGS DRINKING WATER CHAIN OF CUSTODY

REGULATIONS

Regulation 153/04:
☐ Table 1 ☐ Res/Park Soil Texture: ☐ Coarse
☐ Table 2 ☐ Ind/Com ☐ Medium
☐ Table 3 ☐ Agri/Other ☐ Fine
☐ Table _____

Other Regulations:
☐ Reg 347/558 (3 Day min TAT)
☐ PWQO ☐ MMER
☐ CCME ☐ Other:
☐ MISA

Sewer By-Law:
☑ Sanitary
☑ Storm
Municipality: Toronto

RECORD OF SITE CONDITION (RSC) ☐ YES ☐ NO

ANALYSIS REQUESTED

	SAMPLE IDENTIFICATION	DATE SAMPLED	TIME SAMPLED	# OF BOTTLES	MATRIX	M&I: Field Filtered (Y/N)	M&I: Metals & Inorganics (incl CrVI, CN,Hg pH,(B(HWS),EC,SAR–soil) (Cl, N#–water)	M&I: Full Metals Suite (ICP metals plus B(HWS-soil only) Hg, CrVI	M&I: ICP Metals only (Sb,As,Ba,Be,B,Cd,Cr,Co,Cu,Pb,Mo,Ni, Se,Ag,Ti,U,V,Zn	SVOC: PAHs only	SVOC: SVOCs (all incl PAHs, ABNs, CPs	PCB: PCBs Total ☐ Aroclor ☐	PHC: F1-F4 + BTEX	PHC: F1-F4 only no BTEX	VOC: VOCs all incl BTEX	VOC: BTEX only	Pest: Pesticides Organochlorine or specify other	Other (please specify)	Other	Other	Other	Other	Other	Other	TCLP: Specify TCLP tests ☐M&I ☐VOC ☐PCB ☐B(a)P ☐ABN ☐Ignit.	COMMENTS:
1	BH/MW 4	NOV-4-19	3:50PM	#19	GW	√												Sewer Use: Toronto Specify pkg: Storm, Sanitary	Water Characterization Pkg ☐ General ☐ Extended						1 Hesons Hill way, Toronto.
2																										
3																										
4																										
5																										
6																										
7																										
8																										
9																										
10																										
11																										
12																										

Observations/Comments/Special Instructions

Sampled By (NAME): **Signature:** Date: _____/_____/_____ (mm/dd/yy)

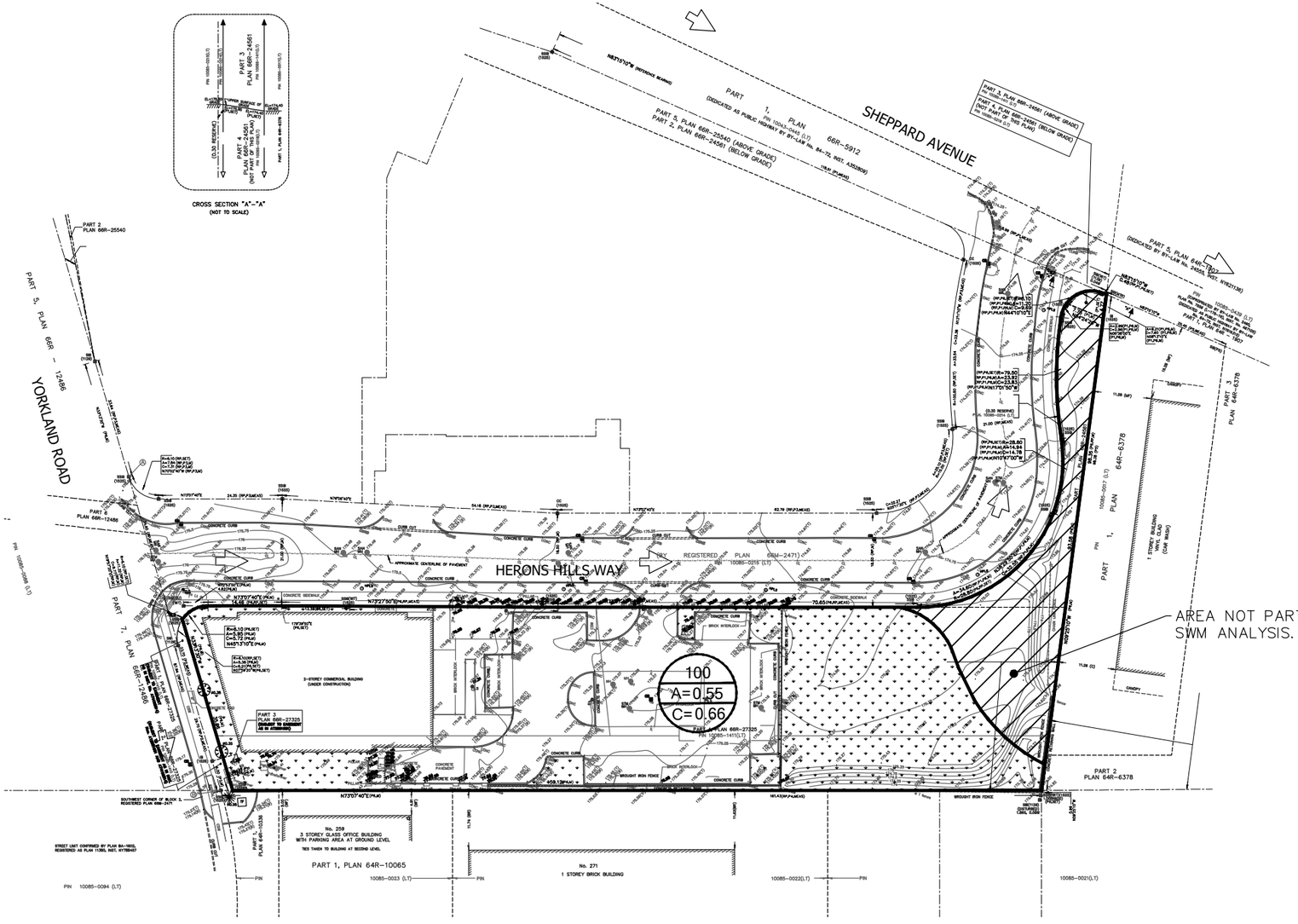
Relinquished by (NAME): **Signature:** Date: _____/_____/_____ (mm/dd/yy)

Pink Copy - Client
Yellow & White Copy - SGS

Revision #: 1.2
Date of Issue: 09 Sept, 2019

Note: Submission of samples to SGS is acknowledgement that you have been provided direction on sample collection/handling and transportation of samples. {2} Submission of samples to SGS is considered authorization for completion of work. Signatures may appear on this form or be retained on file in the contract, or in an alternative format (e.g. shipping documents). {3} Results may be sent by email to an unlimited number of addresses for no additional cost. Fax is available upon request. This document is issued by the Company under its General Conditions of Service accessible at http://www.sgs.com/terms_and_conditions.htm. (Printed copies are available upon request.) Attention is drawn to the limitation of liability, indemnification and jurisdiction issues defined therein.

Appendix D



LEGEND

100
A=0.55
C=0.66

AREA ID
AREA
RUNOFF COEFFICIENT

OVERLAND FLOW ROUTE

DRAINAGE BOUNDARY

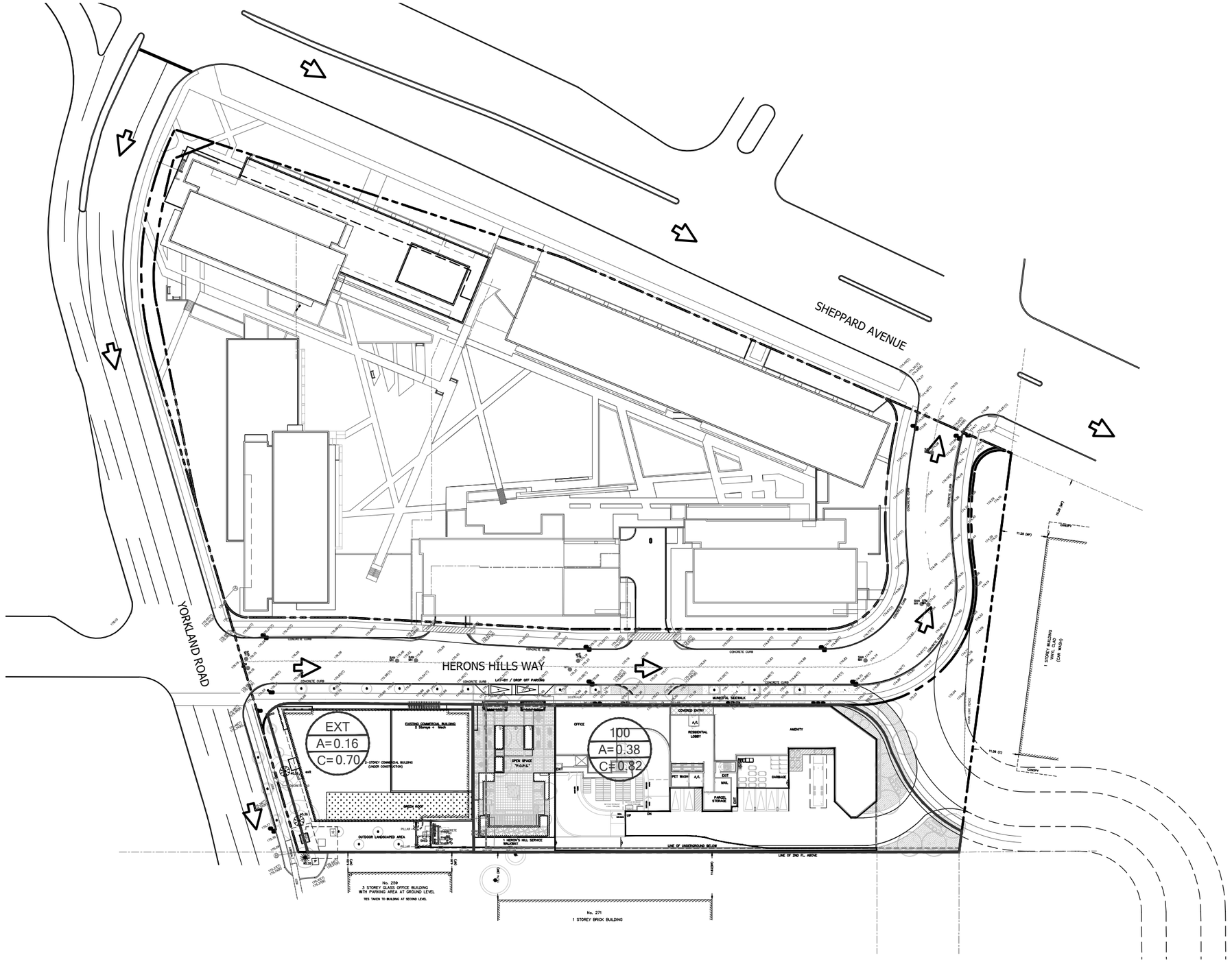
counterpoint ENGINEERING

COUNTERPOINT ENGINEERING INC.
8395 Jane St., Suite 100, Vaughan, ON L4K 5Y2 Phone 905.326.1404 Fax 905.326.1405

1 HERONS HILL WAY
MIXED USE DEVELOPMENT
NORTH YORK, ON

EXISTING STORM DRAINAGE PLAN

DESIGNED BY: TO	DATE: NOVEMBER 2019
	PROJECT No. 19049
CHECKED BY: JF	FIGURE No. 2
SCALE: 1:1000	



LEGEND

100
A=0.37
C=0.90

AREA ID
AREA
RUNOFF COEFFICIENT

OVERLAND FLOW ROUTE

DRAINAGE BOUNDARY

counterpoint ENGINEERING
COUNTERPOINT ENGINEERING INC.
8395 Jane St., Suite 100, Vaughan, ON L4K 5Y2 Phone 905.326.1404 Fax 905.326.1405

1 HERONS HILL WAY
MIXED USE DEVELOPMENT
NORTH YORK, ON

PROPOSED STORM DRAINAGE PLAN

DESIGNED BY: TO	DATE: NOVEMBER 2019
CHECKED BY: JF	PROJECT No. 19049
SCALE: 1:1000	FIGURE No. 3

Counterpoint Engineering

Allowable Release Rate

Project Name: One Herons Hill Way

Project Number: 19049

Rational Method - 2 Year Predevelopment

Jarvis Street

Event:		2	years
ABC's:	A	21.8	
	C	0.78	
Time of Concentration:	t	10	min
Runoff Coefficient:	C	0.5	
Site Area	A	0.550	ha
Intensity	i	88.19	mm/hr
$i=A/(T)^c$			
Flow	Q	0.067	m^3/s
Q=CiA/360		**67.4**	**l/s**

Counterpoint Engineering

Project Name: One Herons Hill Way
Project Number: 19049

Rainfall Data			
Location:	Toronto	a	59.7
Event	100 Year	b	0
		c	0.8

Area ID	Area (ha)	Runoff Coefficient	t_c (min)	Storage Available (m^3)	Storage Required (m^3)	Allowable Release Rate (L/s)	Description	Orifice Size (mm)	Actual Release Rate (L/s)
Ex. SITE	0.180	0.70	10						
	0.180								

AREA ID Ex. SITE

Composite RC Value	Area [ha]	RC	RC * Area
Green Roof/Pervious Area	0.080	0.45	0.0360
Roof	0.100	0.90	0.0900
Landscape			0.0000
Impervious Area			0.0000
	0.180	Total	0.1260
	Divided by Total Area =		0.70

AREA ID 0

Composite RC Value	Area [ha]	RC	RC * Area
Green Roof	0.000	0.45	0.0000
Building/Impervious Area	0.000	0.90	0.0000
	0.000	Total	0.0000
	Divided by Total Area =		#DIV/0!

Counterpoint Engineering

Modified Rational **Area:** **SITE**

Project Name: One Herons Hill Way
Project Number: 19049

Rainfall Data			
Location:	Toronto	a	59.700
Event	100 Year	b	0.000
		c	0.800

Site Data		
Area	0.550	ha
Runoff Coefficient	0.83	
AC	0.46	
Tc	10	
Time Increment	10	
Release Rate	67.4	l/s
Storage Required	151	m^3

Time	Rainfall Intensity	Storm Runoff	Runoff Volume	Released Volume	Storage Volume	
(min)	(mm/hr)	(m^3/s)	(m^3)	(m^3)	(m^3)	
10	250	0.32	192	40	151	********
20	144	0.18	220	81	139	
30	104	0.13	239	121	117	
40	83	0.11	253	162	91	
50	69	0.09	264	202	62	
60	60	0.08	274	243	32	
70	53	0.07	283	283	0	
80	47	0.06	290	323	-33	
90	43	0.06	297	364	-66	
100	40	0.05	304	404	-100	
110	37	0.05	310	445	-135	
120	34	0.04	315	485	-170	
130	32	0.04	320	525	-205	
140	30	0.04	325	566	-241	
150	29	0.04	329	606	-277	
160	27	0.03	334	647	-313	
170	26	0.03	338	687	-349	
180	25	0.03	342	728	-386	
190	24	0.03	345	768	-423	
200	23	0.03	349	808	-459	
210	22	0.03	352	849	-496	
220	21	0.03	356	889	-534	
230	20	0.03	359	930	-571	

Counterpoint Engineering

Water Balance

One herons Hill

City of Toronto's Green Standard Tier 1 Section QW 2.2

Initial Abstraction Asphalt, I	1	mm
Initial Abstraction Pervious, P	5	mm
Initial Abstraction Roof, R	1	mm
Toronto's small design rainfall event has 5mm excess rainfall		

Type of Area	Area	Units	% Redevelopment Area
Impervious Roof Area	0.158	ha	29%
Asphalt	0.110	ha	20%
Pervious / Green Roof Area	0.282	ha	51%
Total Area	0.550	ha	100%

Initial Abstraction= Percent Impervious (Roof) *R + Percent Impervious (Asphalt)* I + Percent Previous Green Roof * P

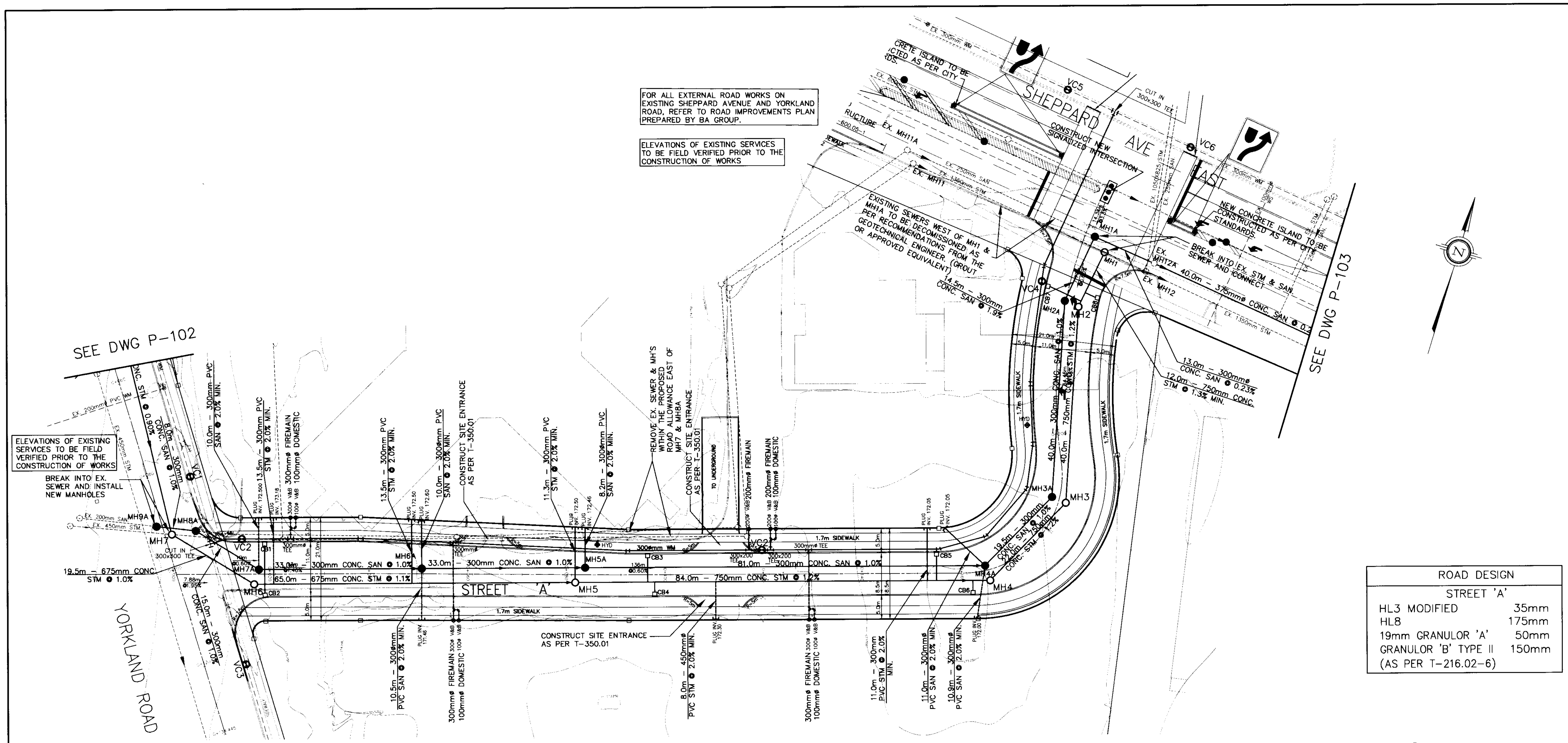
Initial Abstraction= 0.29 x 1mm + 0.20 x 1mm + 0.51 x 5mm

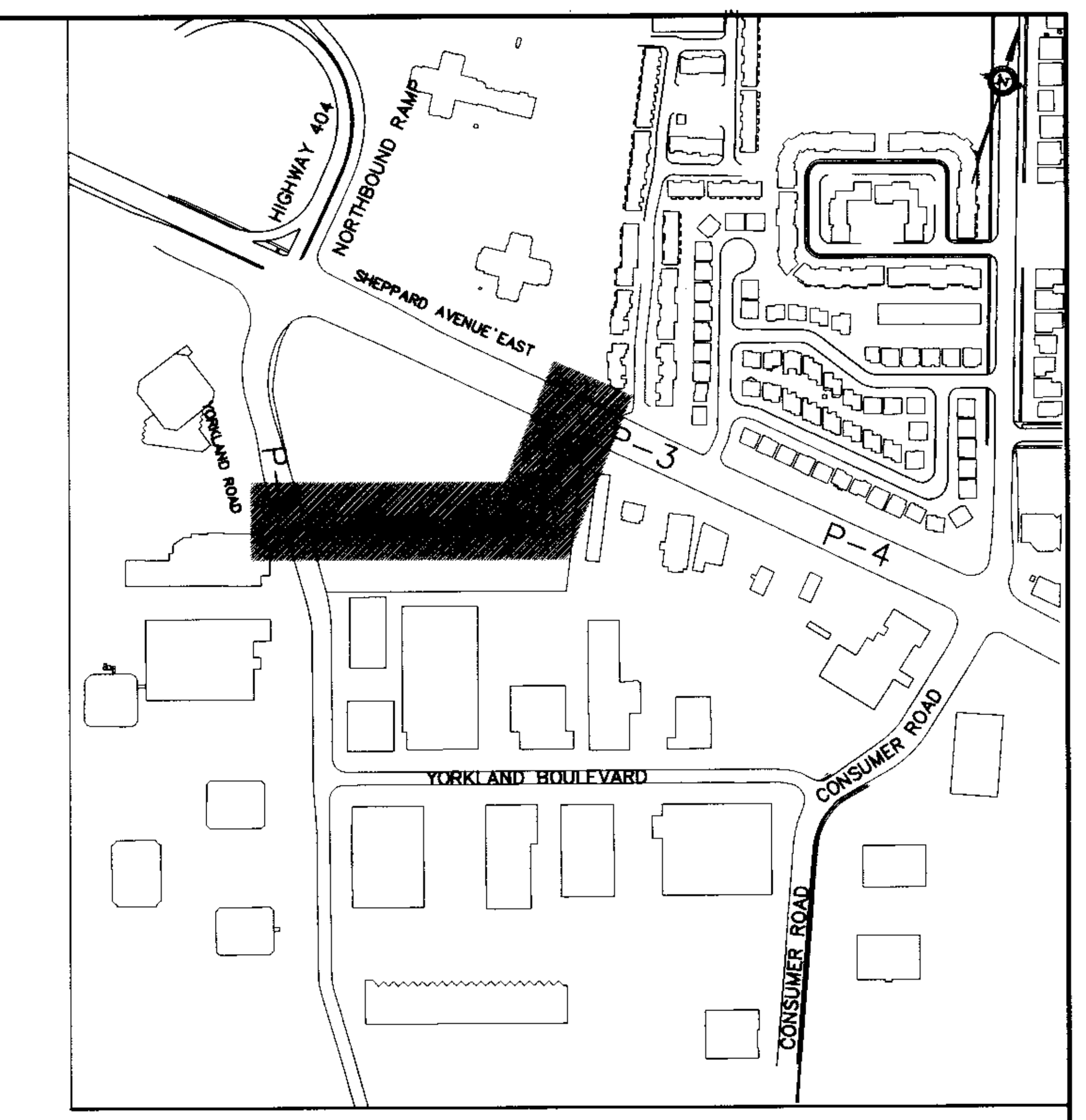
Initial Abstraction (credit)= 3.05 mm

Required Development Retention = (Excess Rainfall- Initial Abstraction) * (Total Development Area)

Required Development Retention = (5mm - 3.1 mm) x (0.550)ha

Required Development Retention (debit)= 10.8 m^3





KEY PLAN
N.T.S.

NOTES:

1) FOR GENERAL NOTES AND LEGEND SEE DWG. GN-101.
2) MEASUREMENTS IN METRES AND/OR MILLIMETRES UNLESS OTHERWISE SHOWN.
3) CONTRACTOR TO VERIFY LOCATION AND DEPTH OF ALL EXISTING SERVICES AND UTILITIES WITHIN THE SHEPPARD AVE. RIGHT-OF-WAY PRIOR TO INSTALLATION OF UNDERGROUND SERVICES (REFER TO GENERAL NOTES FOR MINIMUM CLEARANCES).

ROAD DESIGN	
STREET 'A'	
HL3 MODIFIED	35mm
HL8	175mm
19mm GRANULOR 'A'	50mm
GRANULOR 'B' TYPE II	150mm
(AS PER T-216.02-6)	

BENCH MARK

ELEVATIONS ARE GEODETIC AND REFERRED TO THE CITY OF TORONTO BENCHMARK No. NY 29006 HAVING AN ELEVATON OF 175.357 m.

CONTRACTOR TO BE RESPONSIBLE FOR LOCATION OF ALL EXIST'G U/G & OVERHEAD UTILITIES. VARIOUS UTILITIES CONCERNED TO BE GIVEN REQUIRED ADVANCE NOTICE PRIOR TO ANY DIGGING, FOR STAKE OUT. THE CONSULTANT ASSUMES NO RESPONSIBILITY FOR THE ACCURACY OF THE LOCATION OF EXISTING UTILITIES AS INDICATED ON THIS DRAWING.

ROAD IMPROVEMENTS PLAN PREPARED BY BA GROUP (DATED 2005/DEC/21)
SITE PLAN PREPARED BY GRAZIANI + CORAZZA ARCHITECTS INC. (DATED 2006/FEB/16)
TOPO PLAN PREPARED BY DAVID HORWOOD LTD (DATED 2001/APT/11-PART I, 2006/FEB/06 - PART II)

DIGITAL INFORMATION

No.	DATE	REVISIONS	INITIAL	SIGNED
4.	18/MAY/07	GRADING/SERVICE CONNECTIONS REVISED & ROAD IMPROVEMENT INFORMATION ADDED	S.K	
3.	12/JUN/06	FINAL SUBMISSION	JB	
2.	03/MAR/06	SECOND SUBMISSION	JB	
1.	14/JUN/05	FIRST SUBMISSION	JB	

Monarch
A Taylor Woodrow Company

SERNAS ASSOCIATES
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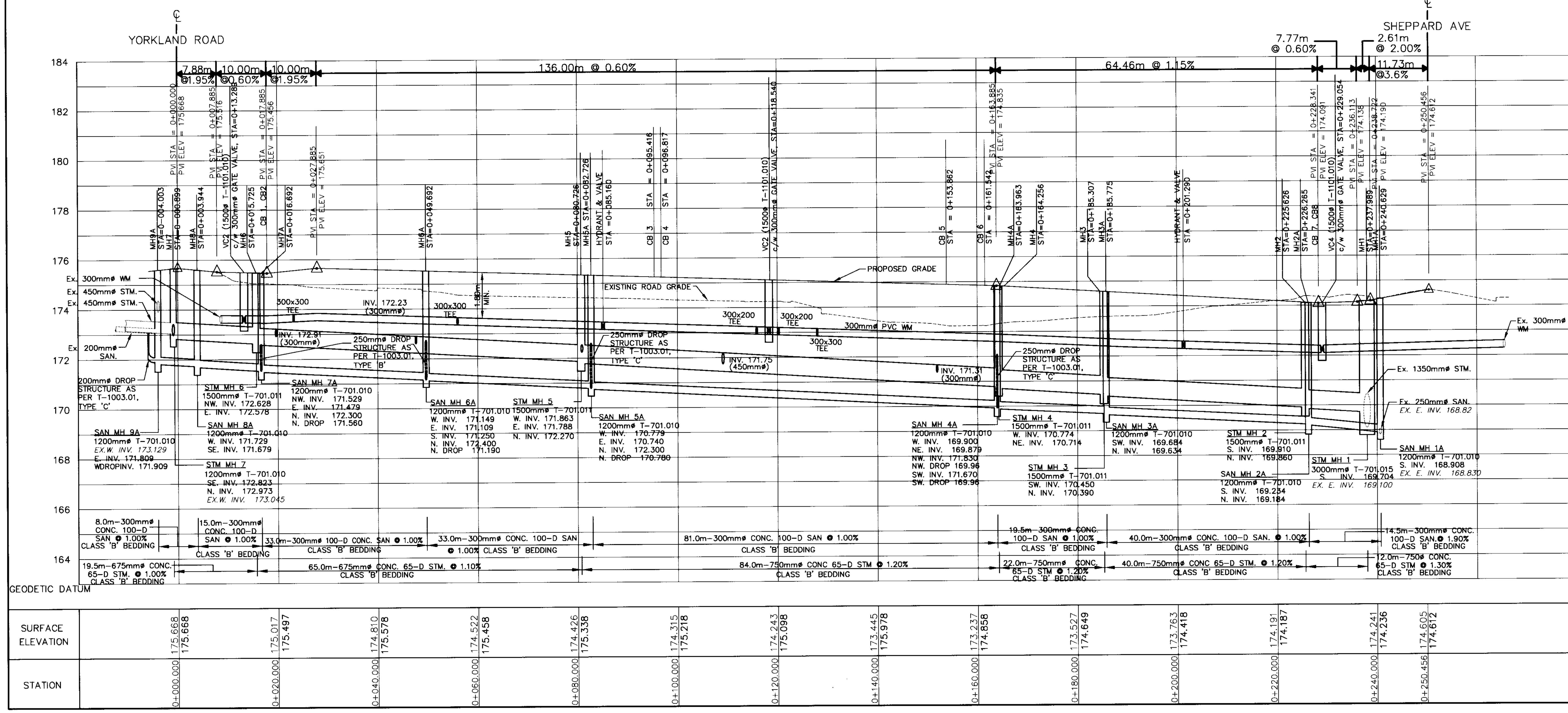
C.W. PATTERSON
PROVINCE OF ONTARIO

TORONTO TECHNICAL SERVICES DIVISION

ACCEPTED TO BE IN ACCORDANCE WITH THE CITY OF TORONTO STANDARDS.
THIS ACCEPTANCE IS NOT TO BE CONSTRUED AS VERIFICATION OF ENGINEERING CONTENT.

MANAGER, DEVELOPMENT ENGINEERING DATE:



HERON'S HILL

~~STREET 'A'~~ HERONS HILL WAY

FROM STA. 0+000.000 TO STA. 0+250.456

DESIGN	J.B.	DRAWN	S.Z.	CHECKED	E.D.	CONTRACT No. 04357
SCALE:	HORIZONTAL 1:500 VERTICAL 1:100			DRAWING NUMBER		P-101
DATE:	MAY, 2005					