January 31, 2019 Project No. 19115432

Ms. Melinda Holland
Pickering Harbour Company Limited
c/o The Biglieri Group Ltd.
20 Leslie Street, Suite 121
Toronto, Ontario M4M 3L4

PRELIMINARY HYDROGEOLOGICAL ASSESSMENT, PROPOSED MIXED USE DEVELOPMENT, 591 LIVERPOOL ROAD, PICKERING, ONTARIO

Dear Ms. Holland,

Golder Associates Ltd. ("Golder") is pleased to provide Pickering Harbour Company Limited c/o The Biglieri Group ("TBG") with this revised letter report summarizing the findings from our preliminary hydrogeological assessment for the property located at 591 Liverpool Road, Pickering, Ontario (the "Site"). It is our understanding that this assessment is to support the design of a proposed mix use development. This letter should be read in conjunction with the geotechnical investigation report completed by Haddad Geotechnical Inc. ("Haddad") entitled, "*Geotechnical Investigation and Slope Stability Assessment, Proposed Residential and Commercial Development at Pickering Harbour, 591 Liverpool Road, Pickering, Ontario*", dated May 15, 2017 ("Geotechnical Report").

BACKGROUND

The Site is currently used as a boat storage facility and currently contains a portable building, shed and a one storey building and is approximately 24,250 square metres ("m^2") (2.4 hectares) in area. The Site is relatively flat with ground surface elevations ranging between 76.3 metres above sea level ("masl") (BH5) and 77.2 masl (BH9).

It is our understanding that the proposed development of the Site includes the construction of two buildings as well as associated parking structures. The proposed building details are as follows:

- A multi-storey building located at the northern boundary of the Site with a podium containing commercial uses at the ground floor and a 23-storey point tower (Building 1); and,
- A multi-storey building located at the southern boundary of the Site with a podium containing commercial uses at the ground floor and a 23-storey tower (Building 2).

The number of proposed underground parking levels is two based on the updated development plans provided by TBG via email received on January 16, 2019 provided as Attachment A.. Assuming that each level of underground parking is 3 m in height, the estimated depth of the excavation to allow for two levels of underground parking is approximately 6 m (20 feet) or an approximate elevation of 70.8 masl.

Haddad completed a geotechnical investigation between February 13, 2017 and February 16, 2017. The proposed testing program was revised during the investigation due to the shallow depth to bedrock with fewer boreholes advanced to depths shallower than that originally proposed. The geotechnical investigation included the drilling of ten boreholes with three boreholes completed as a 50 millimetre ("mm") monitoring well. One borehole (i.e., MW1) was cored into the underlying bedrock encountered at approximately 9 metres below ground surface ("mbgs") (67.97 masl). A borehole location plan is provided as Attachment B.

SCOPE OF WORK

Golder completed the following tasks in association with our preliminary hydrogeological assessment:

- Visited Site on February 15, 2017 to visually inspect soil samples collected from BH1 to identify potential water bearing zones;
- Conducted an initial field monitoring event which included the measurement of water levels from three monitoring wells installed as part of the geotechnical investigation completed by Haddad and the development of each well. Borehole logs and monitoring well details from the Haddad geotechnical investigation are provided as Attachment B;
- Completed a second field monitoring event which included the measurement of water levels from all three wells and single well response tests ("SWRT") to establish the bulk hydraulic conductivity of the soils at two of the three monitoring wells (i.e., MW1 and MW2);
- Collected one groundwater sample from monitoring well MW2 to characterize water quality with respect to the Regional Municipality of Durham's ("ROD") storm sewer use by-law (No. 55-2013);
- Completed a review of the Haddad Geotechnical Report including borehole logs and available soil gradations; and,
- Reviewed available Ministry of Environment, Conservation and Parks ("MECP") water well records within a 500 m radius of the Site.

FIELD INVESTIGATION

As described in the Geotechnical Report, ten boreholes (i.e., BH1, BH2, BH5 to BH7, BH9 to BH12 and BH14) were advanced at the Site and three locations (i.e., BH1, BH2 and BH6) were completed as 50 mm diameter groundwater monitoring wells identified as MW1, MW2 and MW3; respectively.

Following the drilling and well installations, Golder visited the Site on March 1, 2017 to collect water levels from each monitoring well. Each well was also developed using Waterra® tubing equipped with a foot valve. During development monitoring wells MW1 and MW3 were purged dry three times after removing 48 litres ("L") and 30 L; respectively. Approximately 65 L of water was removed from well MW2.

A second Site visit was conducted on March 3, 2017 and SWRTs were carried out at two of the three monitoring wells (i.e., MW1 and MW2). Hydraulic conductivity values were estimated from the SWRT data using the Bouwer and Rice (1976) slug test solution. The SWRTs were completed by lowering the water table using manual purging techniques and recording the resulting water level recovery at each well location.

One groundwater sample was collected and submitted for laboratory testing of the parameters listed under the ROD's storm sewer use by-law criteria (No. 55-2013). The groundwater sample was placed in a cooler containing ice and delivered to Maxxam Analytics Inc. ("Maxxam") for analysis.

SUMMARY OF FINDINGS

Physical Setting

A review of available published data indicates that the Site is located in close proximity to silts and clays associated with deep water deposits of glacial Lake Iroquois but also modern river deposits consisting of sand, silt and minor gravel (Sharpe, 1980).

The subsurface conditions identified and reported in the Geotechnical Report, as part of the geotechnical drilling program, indicate predominantly native deposits of sandy clayey silt, silty sand, gravelly sand, gravelly silty sand and sand and silt. Gravelly or silty sand was identified at all borehole locations; however, upon review of the available gradations, silt size particles are present between 16% and 39% in all boreholes advanced at the Site. Based on a review of soil samples during drilling, Golder noted that the silty sand deposit was likely dense glacial silty sand till. Overlying the native soils at each borehole was fill material of varying thickness (between 2.2 and 4.2 m) consisting of sand, gravel, silt and clay.

Bedrock was encountered at six boreholes (i.e., BH1, BH2, BH5, BH6, BH7 and BH9) and consisted of grey shale, as described by Haddad. Bedrock was cored at one location (i.e., BH1) with bedrock identified as grey shale with approximately 5 mm thick bands of limestone throughout. Bedrock was encountered at depths between 7.7 m (BH7) and 10.7 m (BH2) or at relative elevations of between 66.4 masl (BH2) and 69.2 masl (BH7). At each borehole where bedrock was encountered between 1.6 m (BH2) and 4.6 m (BH7) of weathered bedrock was drilled through using 100 mm diameter augers. This practice also occurred at BH1 where shale bedrock was encountered at approximately 8.8 mbgs (67.9 masl), but augered to 12.2 mbgs (64.9 masl) where the borehole was further advanced using bedrock coring techniques to a depth of 13.8 mbgs (63.27 masl).

Golder visited the Site on February 15, 2017 to visually inspect soil samples collected from BH1. Golder arrived at the Site with soil samples available for our inspection. At the time, Haddad had used augers to auger through the upper bedrock and were preparing to core approximately 3 m of bedrock at BH1. The samples consisted of fill material from surface changing to clayey silt till at approximately 3 mbgs. This was underlain by a silty sand till approximately 4.5 mbgs until shale bedrock was encountered at approximately 8.8 mbgs. As indicated, Haddad used augers to penetrate the bedrock at BH1 to a depth of 12 mbgs where they switched to bedrock coring techniques to complete the borehole. Based on geologic conditions, oxidation level of glacial till material, including field observations of borehole cave at 6 mbgs, the water table was estimated to be between 4.5 and 6 mbgs. Borehole cave at the same depth was observed at BH2 according to the borehole logs which were provided to Golder on May 1, 2017. The remaining borehole logs indicate the possible depth to water being 3.5 mbgs to 5.0 mbgs based on oxidized soil conditions and observation of water levels in the open boreholes after drilling was completed, although this could be related to the piezometric head of the shallow bedrock and/or seepage through the fill materials. However, water levels remained deep after drilling borehole BH9 (10.7 mbgs) which also penetrated the shale bedrock. As such, the overburden material, while permeable in localized areas, did not warrant the installation of a pumping well for aquifer testing purposes. It is noted; however, that once Haddad completed coring of bedrock at BH1, based on a review of the borehole logs, the water level reportedly recovered to a depth of approximately 3 mbgs within the open borehole. It is unknown whether this water depth is related to water used during coring, seepage of water from the fill material, or if this represented the piezometric head of the shale aquifer. Haddad did not install a monitoring well into the bedrock to determine this. It is noted that the upper shale was augered with no core available to review with the water level measurements mainly ranging from 3 mbgs to 6 mbgs within the open boreholes. The Rock Quality Designation (“RQD”) of core retrieved below the auger depth at BH1 is considered fair to good with sections of the rock permeable. It is

possible that the shallow bedrock is under pressure, but without a shallow bedrock well installed, this determination cannot be made. It is recommended that a monitoring well be installed and sealed within the upper shale bedrock. Bedrock coring techniques are recommended to advance the borehole within the bedrock. This information would be used in conjunction with the existing shallow monitoring wells to determine the potential for uplift pressures and/or water level once overburden material has been removed for the installation of the underground parking levels. A SWRT should also be completed at this proposed location.

Borehole logs and gradations provided by Haddad are provided as Attachment B.

MECP Water Well Record Search

A desktop search of the MECP Water Well Records database was conducted to identify any wells within a 500 m radius of the Site. The desktop water well record search identified 13 wells within 500 m of the Site, all of which are located at off-Site locations. All water well locations documented within 500 m of the Site are presented on Figure 1 with well details provided in Table 1.

Based on the database search, of the 13 well records found, five wells were reported as abandoned, three reported as water supply wells (1907327, 4601886 and 46018879), and five observation and/or test holes (1914735, 1914737, 1914738, 7159903 and 7159904).

The off-Site wells, which were not abandoned, were reported with depths between 4.0 and 15.2 mbgs. Subsurface conditions described at these off-Site locations generally consisted of a layer or layers of clay, silty and sand with bedrock (i.e., black shale) encountered at two locations (i.e., 4603774 and 7159903). Six of the off-Site wells are located north of the Site with two wells (i.e., 1914737 and 1914735) located east and southeast; respectively.

During advancement of the geotechnical boreholes, the soil encountered consisted fill underlain by native soil consisting of either sandy clayey silt, silty sand, gravelly sand, gravelly silt sand and sand and silt. The conditions encountered at the Site are generally consistent with the geology described at the water well records identified within a 500 m radius of the Site. Bedrock was encountered at off-Site water well 4601886 at an approximate elevation of 72.8 masl, consistent with the on-Site conditions.

Water Level Monitoring and Single Well Response Testing

The static water level was recorded at three of the 13 MECP water well records identified within 500 m of the Site. Static water levels recorded from the three water supply wells (1907327 advanced 1985, 4601886 advanced 1961, and 4601887 advanced 1963) were 2.4 m (70.8 masl) at 1907327, 4.0 m (74.9 masl) at 4601886 and 2.4 m (75.3 masl) at 4601887. The depth of these water wells are between 6.1 m and 8.2 m below existing grade. Well 4601886 was installed within the shale bedrock; whereas, wells 4601887 and 1907327 were installed in the overburden. Well 4601886, the bedrock well, was used for domestic use and is approximately 275 m north of the Site and has a water level elevation of 74.9 masl.

The water levels recorded on the water well record search for overburden wells are consistent with water levels measured at the Site where ground surface is 77 masl, on average, and water levels were recorded at 1.54 mbgs (MW1), 1.60 mbgs (MW2) and 1.68 mbgs (MW3) corresponding to elevations between 75.46 masl and 75.32 masl. It is noted that these levels are higher than that anticipated based on geologic conditions and could be related to storm water collecting within the granular fill material during the spring monitoring events. The monitoring wells were installed in separate boreholes and not influenced by potentially high piezometric head of

the underlying shale aquifer. A summary of the on-Site groundwater conditions is provided in the following table and includes water levels recorded by Golder and Haddad.

Borehole ID	Ground Surface Elevation (masl)	March 1, 2017		March 3, 2017		March 22, 2017		May 10, 2017	
		Water Level (mbgs)	Elevation (masl)	Water Level (mbgs)	Elevation (masl)	Water Level (mbgs)	Elevation (masl)	Water Level (mbgs)	Elevation (masl)
MW1	77.07	1.52	75.55	1.54	75.53	*2.3*	*74.77*	*1.45*	*75.62*
MW2	77.10	1.52	75.58	1.60	75.50	*1.86*	*75.24*	*0.32*	*76.78*
MW3	77.07	1.40	75.67	1.68	75.39	*1.87*	*75.20*	*NR*	*NR*

Notes:
March 1, 2017 and March 3, 2017 were measured by Golder
Italicized values are water levels recorded by Haddad during the geotechnical investigaton (March 22, 2017 and May10, 2017
NR – no value recorded

As reported in the Geotechnical Report borehole BH1/MW1 was advanced into the underlying shale bedrock. Upon completion the borehole caved up to a depth of approximately 11.6 m which is within the bedrock and the water level was recorded at 3 m below ground surface. No well was installed in bedrock at this or any location at the Site.

SWRTs were completed at wells MW1 and MW2 to estimate the bulk hydraulic conductivity of the surrounding soils. Well MW1 was screened straddling both a native silty sand and clayey sandy silt unit. Monitoring well MW2 was screened straddling a native silty sand unit and fill material described as silt and clay with some sand and occasional gravel.

The analysis of the SWRT data indicated that the hydraulic conductivity of the screened soils is between 1.6×10^{-6} metres per second ("m/s") (at MW2) and 2.5×10^{-6} m/s (at MW1). Based on a review of the soil samples and the determination that the material is likely glacial till, these test responses are indicative of this material. Golder did complete calculations using the Hazen method in the upper fill materials, where warranted, with estimated results in the 10^{-5} m/s to 10^{-6} m/s indicating that the upper fill material is permeable and could pose a water issue during construction. As such, positive dewatering is likely required. Further to this, it is possible that the bedrock aquifer is under pressure, although unconfirmed. As indicated, it is recommended that one monitoring well be installed and sealed within the shallow bedrock to make this determination. Should the piezometric head in the shallow bedrock extend to within 3 m of surface, the aquifer may have to be depressurized during excavation of the overburden material for underground parking. The analysis of the SWRT data has been provided as Attachment C.

One groundwater sample was collected from well MW2 once the SWRT was completed on March 3, 2017. The sample results were compared to the ROD storm sewer use by-law criteria as outlined in By-Law No. 55-2013, Table 2. Based on the results, all parameters tested met the applicable criteria with the exception of total suspended solids ("TSS") (result of 120 milligram per litre ("mg/L") compared to criteria value of 15 mg/L), total Kjeldahl nitrogen ("TKN") (result of 1.3 mg/L compared to criteria value of 1 mg/L) and total manganese (result of 6 mg/L compared to criteria value of 0.15 mg/L). Should water be discharged to a storm sewer, resampling for

the analysis of TSS, TKN and manganese is required and/or treatment will be necessary to discharge into the storm sewer.

The laboratory certificate of analysis is provided as Attachment D.

CONCLUSIONS

The geologic conditions encountered at the Site, as reported in the Geotechnical Report completed by Haddad, consisted mostly of layers of native sandy clayey silt, silty sand, gravelly sand, gravelly silty sand and sand and silt. These native soil types are consistent with soil conditions described in available water well records within 500 m of the Site. These deposits are consistent with modern river deposits. Shale bedrock was encountered at six boreholes at the Site between 7.7 m and 10.7 m (66.2 masl to 69.4 masl).

The static water level at the Site is between 74.8 masl and 75.2 masl, which corresponds to between 1.9 mbgs and 2.3 mbgs. This is consistent with measurements recorded for the available overburden water well records reviewed as part of this assessment; however, could be influenced by the wet spring. One off-Site well was identified installed in shale bedrock and the water level recorded at this well located approximately 275 m north of the Site is 4.0 m or at a relative elevation of 74.9 masl. No bedrock well was installed at the Site.

Given that the geometric mean hydraulic conductivity of the native silty sand and sandy clayey silt material is 8.9 x 10^{-7} m/s, it is anticipated that any groundwater that may be encountered during construction may be managed using sump pump techniques. It is noted that the monitoring wells installed at MW1 and MW2 were screened across two soil horizons. Specifically, MW1 is screened in silty sand and a finer grained material, sandy clayey silt, and MW2 is screened in silty sand and fill material consisting of silty and clay. The results of the SWRTs have been influenced based on the well screen interval being tested. However, as indicated above, the fill material is permeable with an estimated bulk hydraulic conductivity being 10^{-5} m/s to 10^{-6} m/s and will collect water during rain events which might be better managed by positive dewatering methods such as a well point or eductor system. Further to this, should the piezometeric head of the shallow bedrock aquifer lie within the overburden material, depressurization of the shallow bedrock aquifer will be required. Given Haddad was able to auger through the upper bedrock, an eductor system could be installed within the bedrock and up into the overburden serving both purposes.

Shale bedrock was cored at BH1 and the water level at this borehole recorded at 3 m below grade immediately upon borehole completion. This may indicate that groundwater is under hydrostatic pressure within the underlying bedrock. Considering that up to two levels of underground parking are proposed for the development of the Site (as per development drawing provided as Attachment A), it is recommended that one monitoring well be installed and sealed in bedrock to measure the static water level in the bedrock aquifer.

Should discharge be directed to storm sewers, a water sample should be collected and analyzed for concentrations of TSS, TKN and manganese. If resampling were to be conducted it is recommended that parameters listed under the Provincial Water Quality Objectives (“PWQO”) that are not included in the ROD By-Law 55-2013 be included, such as aluminum, ammonia and oil and grease, to determine if discharge water could be directed to nearby drainage swales should they exist near the Site. Should the resample results still exceed ROD By-law 55-2013, mitigation controls will need to be applied.

Presently, it appears that a MECP Permit to Take Water ("PTTW") will be required for the Site. Once the shallow bedrock monitoring well is installed and a SWRT completed, the determination of whether a MECP Category 2 or Category 3 PTTW will be required with the latter allowing more water taking than Category 2.

CLOSURE

We trust that this summary meets your current requirements. As mentioned above, this letter should be read in conjunction with the Geotechnical Report provided under separate cover. Should you have any questions regarding the content of this letter please do not hesitate to contact our office.

Yours truly,

Golder Associates Ltd.

Chris Pons, B.Sc.
Environmental Scientist

Shawn Bonneville, P.Geo., C.E.T.
Associate, Senior Environmental Consultant

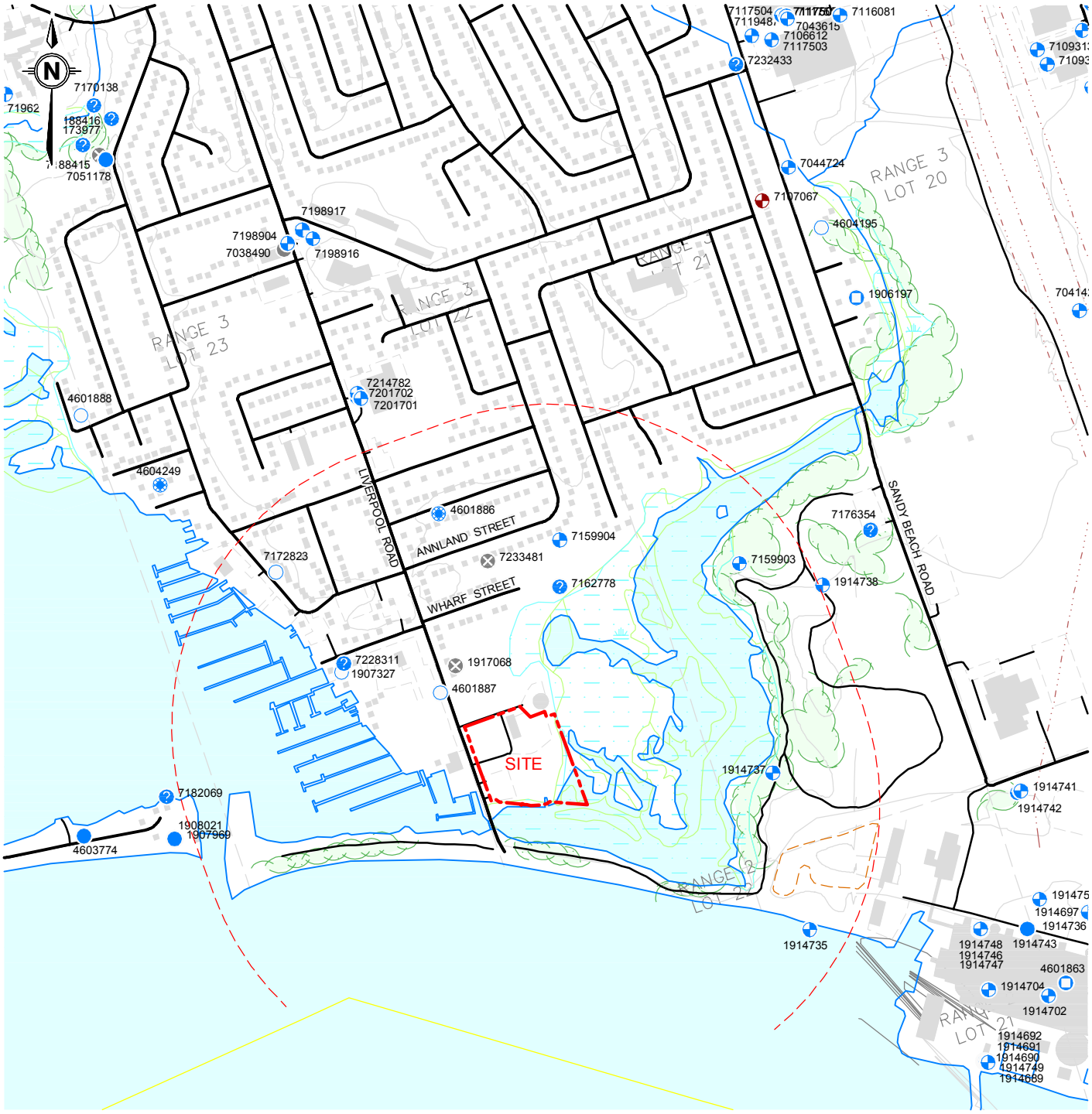
CP/SB/lb

Attachments: Figure 1: Record of Available Water Wells
Table 1: Summary of Ministry of the Environment and Climate Change Water Well Records
Attachment A: Proposed Development Drawing
Attachment B: Borehole Location Plan, Borehole Logs, Gradations
Attachment C: Single Well Response Test Analysis
Attachment D: Laboratory Certificate of Analysis

https://golderassociates.sharepoint.com/sites/102612/deliverables/letters/19115432 ltr 31jan2019 biglieri hydrogeo final.docx

FIGURE 1

Record of Available Water Wells



- Shallow Dug or Bored <10 m
- Deep Bored Well >10 m
- Drilled Overburden Well
- Test or Observation Well
- Details not Recorded

0 200 400 600 m

1:10000

Wells are located to MOE Water Well Bulletin Data, Queen's Printer 2017
Locations and elevations are subject to field verification.

CLIENT
PICKERING HARBOUR COMPANY LIMITED
c/o THE BIGLIERI GROUP LTD.

PROJECT
PRELIMINARY HYDROGEOLOGICAL INVESTIGATION
591 LIVERPOOL ROAD, PICKERING, ONTARIO

TITLE
REPORTED WATER WELL LOCATIONS

CONSULTANT
GOLDER

YYYY-MM-DD	2017-06-05
PREPARED	JPR
DESIGN	
REVIEW	
APPROVED	

PROJECT No.	Phase	Rev.	Figure
1771738	-	01	1

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IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI A

25 mm

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TABLE 1

Summary of Ministry of the Environment and Climate Change Water Well Records

TABLE 1
SUMMARY OF MINISTRY OF THE ENVIRONMENT AND CLIMATE CHANGE WATER WELL RECORDS
591 Liverpool Road, Pickering, Ontario

LABEL	CON LOT	DATE mmm-yr	EASTING NORTHING	ELEV masl	WTR mbgl	FND Qu	SCR TOP mbgl	LEN m	SWL mbgl	RATE L/min	TIME min	PL mbgl	DRILLER METHOD	TYPE STAT	WELL NAME DESCRIPTION OF MATERIALS
1907327	3 23	May-85	654135 4853143	73.2	6.7 4.3 2.4 2.4 2.4	Fr Fr Fr Fr Fr			2.4	32	30	3.7	2214 BR	WS DO	**MOE# 1907327** 0.0 FILL 0.6 GREY CLAY STNS PCKD 2.4 BRWN SAND 3.0 GREY CLAY STNS CMTD 4.3 GREY CLAY SAND LYRD 6.1 GREY CLAY PCKD 6.7 GREY CLAY SAND LYRD 8.2
1914735		Jul-99	654935 4852703	73.8	3.0	Fr	0.9	-1.5	NR				6032 OTH	OW NU	**MOE# 1914735** 0.0 BRWN GRVL FILL 0.6 BRWN CLAY SILT FILL 1.5 BRWN SILT SAND CLAY 2.1 BRWN SILT CLAY WBRG 4.0
1914737		Jul-99	654872 4852971	78.3	4.0	Fr	0.0	-3.0	NR				6032 OTH	OW NU	**MOE# 1914737** 0.0 BRWN SILT TPSL SOFT 0.3 BRWN SAND GRVL SHLE 0.6 BRWN CLAY SAND GRVL 1.5 GREY SILT CLAY SOFT 5.5 BLCK CLAY GRVL 5.8 GREY CLAY GRVL 6.1
1914738		Jul-99	654957 4853292	79.9	4.0 3.7	Fr Fr	7.6	-1.5	NR				6032 OTH	OW NU	**MOE# 1914738** 0.0 BRWN SILT TPSL DRY 0.3 BRWN SAND SILT SLTY 0.6 BRWN CLAY SILT 2.1 GREY SILT CLAY SAND 4.6 BRWN CLAY SILT SOFT 7.6 GREY SILT SAND SOFT 10.7
1917068		Apr-04	654330 4853154	78.0					NR				1663 DG	AQ NU	**MOE# 1917068** 0.0
4601886	3 22	Nov-61	654301 4853414	78.9	6.1	Fr			4.0				5412 BR	WS DO	**MOE# 4601886** 0.0 BRWN CLAY STNS 2.4 BRWN CLAY SHLE 6.1 SHLE 6.4
4601887	3 23	Jun-63	654304 4853108	77.7	4.0	Fr			2.4		60		5412 BR	WS DO	**MOE# 4601887** 0.0 BRWN CLAY STNS 1.5 BLUE CLAY STNS 4.0 MSND 4.6 BLUE CLAY MSND 6.1
7159903		Feb-11	654815 4853329	NR	7.6	Fr	12.2 9.1	-3.0 -3.0	NR				4102 RC	TH TH	**MOE# 7159903 TAG#A042535** 0.0 BRWN CLAY STNS 7.6 BRWN GRVL CGVL 8.5 BLCK SHLE 15.2
7159904		Feb-11	654508 4853369	NR	4.0	Fr	4.0	-9.1	NR				4102 RC	TH TH	**MOE# 7159904 TAG#A042534** 0.0 BRWN CLAY STNS 4.0 BLCK SHLE 13.1
7162778		Jan-11	654508 4853289	NR					NR				6607 -	- -	**MOE# 7162778 TAG#A110340** 0.0
7172823		Apr-11	654023 4853314	NR					NR				7219 -	AB -	**MOE# 7172823 TAG#A107216** 0.0
7228311		Sep-14	654139 4853158	NR					NR				7215 -	- -	**MOE# 7228311 TAG#A163837** 0.0
7233481		Nov-14	654385 4853333	NR					NR				4102 -	AB -	**MOE# 7233481** 0.0

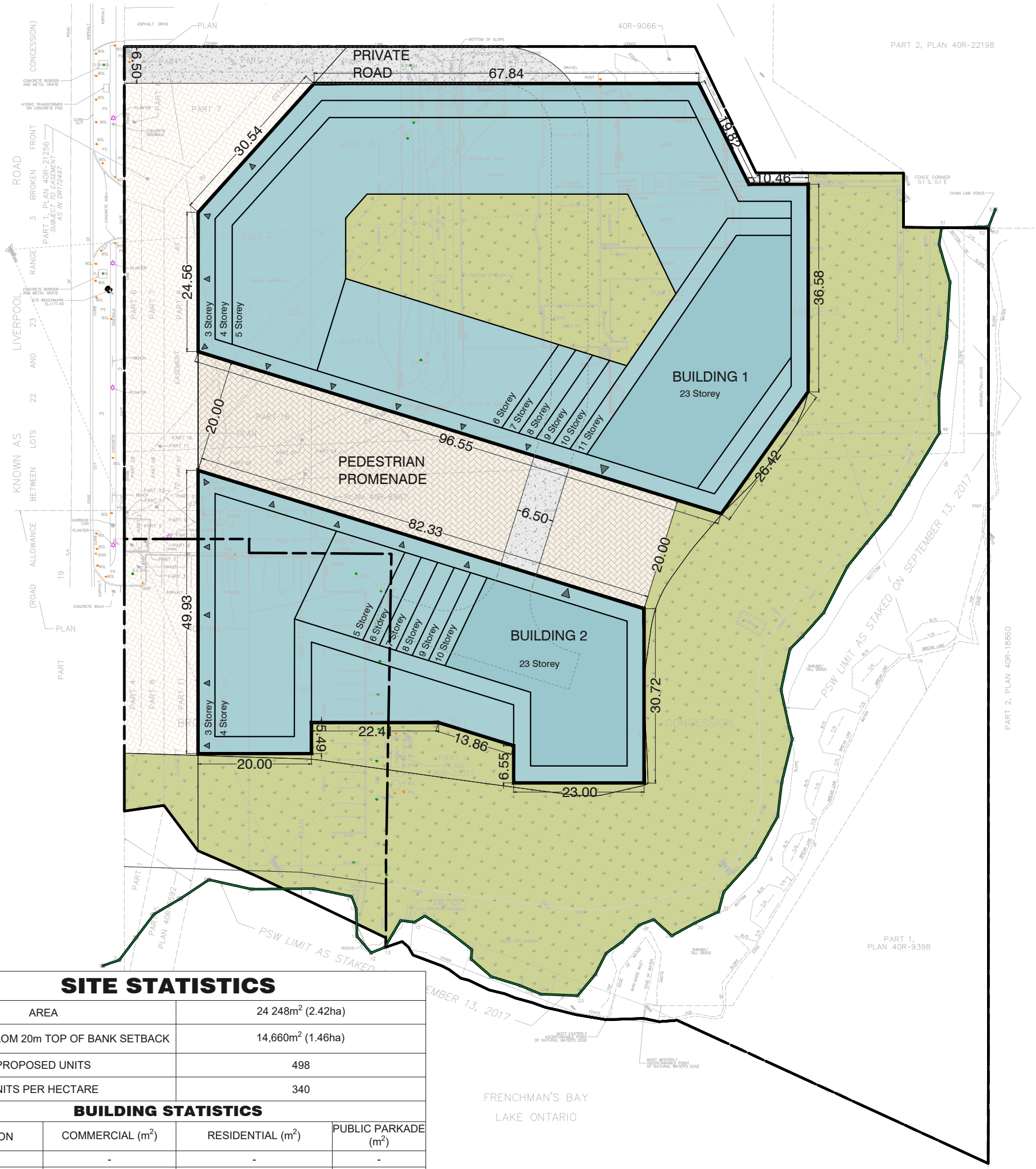
Notes:

QUALITY:		TYPE:		USE:				METHOD :	
Fr	Fresh	WS	Water Supply	CO	Comercial	NU	Not Used	CT	Cable Tool
Mn	Mineral	AQ	Abandoned Quality	DO	Domestic	IR	Irrigation	JT	Jetting
Sa	Salty	AS	Abandoned Supply	MU	Municipal	AL	Alteration	RC	Rotary Conventional
Su	Sulphur	AB	Abandonment Record	PU	Public	MO	Monitoring	RA	Rotary Air
--	Unrecorded	TH	Test Hole or Observation	ST	Stock	-	Not Recorded	BR	Boring

Easting and Northings UTM NAD 83 Zone 17, Translated from Recorded UTM NAD, subject to Field Verified Location or Improved Location Accuracy.

ATTACHMENT A

Proposed Development Drawing



SITE STATISTICS

AREA	24 248m^2 (2.42ha)
TOTAL AREA FROM 20m TOP OF BANK SETBACK	14,660m^2 (1.46ha)
PROPOSED UNITS	498
UNITS PER HECTARE	340

BUILDING STATISTICS

DESCRIPTION	COMMERCIAL (m^2)	RESIDENTIAL (m^2)	PUBLIC PARKADE (m^2)
BUILDING 1	-	-	-
FLOOR 1	1000	-	2016
FLOOR 2-16	-	34,736	-
BUILDING 2	-	-	-
FLOOR 1	900	-	5171
FLOOR 2-16	-	21,138	-
TOTAL	**1900**	55,874	7187

PARKING STATISTICS

DESCRIPTION	REQUIRED	PROPOSED UNDERGROUND (2 LEVELS)	PROPOSED ABOVEGROUND (1 LEVEL)
PUBLIC PARKING	240	-	142
PRIVATE PARKING	539	700	-
TOTAL PARKING	779	842	
PRIVATE PARKING BY USE			
RESIDENTIAL @ 0.95 SPACES PER UNIT	473		
COMMERCIAL @ 3 SPACES PER 100m^2	66		
TOTAL	539		

PREPARED FOR: PICKERING HARBOUR COMPANY LIMITED

Pickering Harbour Concept Plan

ADDRESS:
Pickering Harbour

Project No:
15360

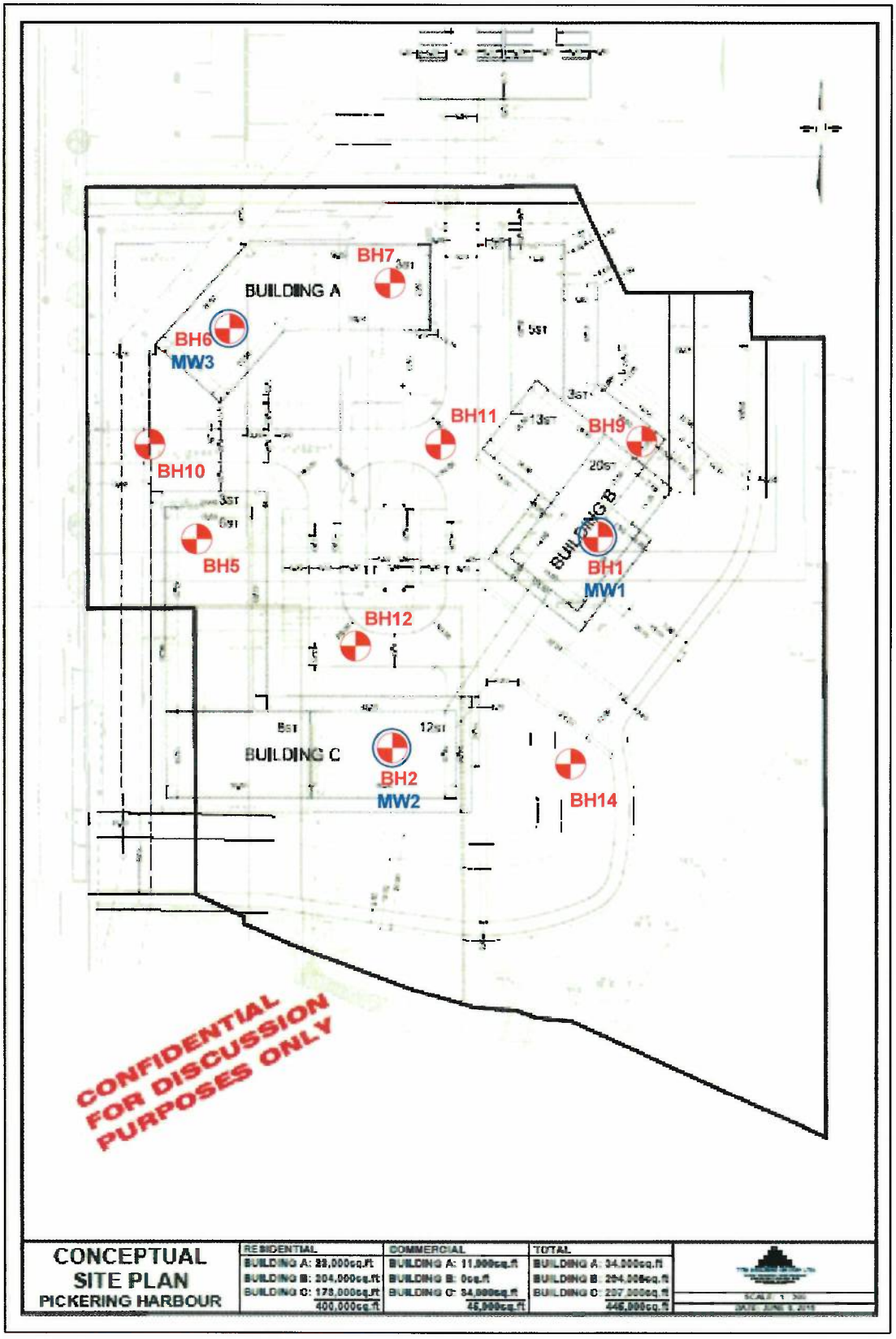
January 14, 2019

Designed By:
VG+JS

THE BIGLIERI GROUP LTD.
Planning | Development | Project Management

ATTACHMENT B

Borehole Location Plan, Borehole Logs, Gradations



BH: APPROXIMATE LOCATION OF 75' BOREHOLE

MW: APPROXIMATE LOCATION OF MONITORING WELLS

SCALE (APPROXIMATE)

0 25 50 75m

HADDAD GEOTECHNICAL INC.
151 Amber Street, Unit 17
Markham, Ontario, Canada, L3R 3B3
905-475-0951, fax: 905-475-8338
info@haddadgeo.com

591 LIVERPOOL ROAD, PICKERING

PRELIMINARY CONCEPTUAL SITE PLAN SHOWING APPROXIMATE LOCATION OF BOREHOLES & MONITORING WELLS

SCALE: AS INDICATED
DRAWN BY: FT

PROJECT: 16-11612
DRAWING No. 1
DATE: APRIL 26, 2017

HADDAD GEOTECHNICAL INC.

Engineering Data Sheet For Borehole No. 1

Project No. 16-11612
Drawing No. 2

Project: Proposed Mixed-Use Development
Location: 591 LIVERPOOL ROAD, PICKERING
Hole Location: see Drawing No. 1
Hole Elevation & Datum: 99.35±m, see Note 1
Start Date: 15/02/2017 | End Date: 15/02/2017 | Field Supervision: SR/GA

Split Spoon
Auger Sample
Shelby Tube
Core Sample
51mm dia Cone
Pocket Penetrometer
Unconfined Compression
Water Level
Vane Test, Sensitivity
51mm dia Split Spoon
Gradation Analysis Completed M

BH -1

MW -1

Description	Elev. ±m	Depth ±m
GROUND SURFACE	99.35	0.0
GRAVEL SURFACE GRANULAR MATERIALS FILL - medium compact sand and silt, with some gravels, occ. organic stains, brown, moist to very moist becomes clayey below 1.5±m depth		1.0
Layer of dark brown to black Peat in wet condition between 2±m to 2.3±m depth	97.05 (03/22/17)	2.0
SANDY CLAYEY SILT - trace gravels stiff to very stiff, brown, very moist	96.3 (upon borehole completion)	3.0
		4.0
SILTY SAND - trace to some clay, trace gravels, very dense, brown, moist	94.8	5.0
		6.0
		7.0
		8.0
WEATHERED SHALE	90.2	9.0
		10.0
		11.0
START OF CORING	87.2	12.0
SHALE BEDROCK, grey, fractured, limestone bands with 5±mm thickness throughout		13.0
CONTINUED ON DRAWING No. 3	85.6	14.0
		15.0

Strength and Penetration Resistance
C kPa
N (Standard Penetration Value) Blows/300mm
20 40 60 80

Sample No.	"N"	Moisture Content %	Vapour Reading (ppm)
AS0	–	5.9	1.2
SS1	27	5.8	0.9
SS2	12	10.9	1.2
SS3	15	19.9	1.1
SS4	18	13.6	0.9
SS5	9	13.8	1.8
SS6	59	7.4	1.8
SS7	58	6.2	3.2
SS8	50/5"	4.9	35.0
SS9	50/3"	4.2	28.1

RUN NUMBER	RUN LENGTH, m	RECOVERY, %	R.Q.D., %	CORE SIZE / CASING	JOINT SYSTEM	COMMENTS
1	1.70	96	66.0	NXL /NW		fair

HADDAD GEOTECHNICAL INC.

Project No. 16-11612
Drawing No. 3

Engineering Data Sheet For Borehole No. 1

Project: Proposed Mixed Use Development

Location: 591 LIVERPOOL ROAD, PICKERING

Hole Location: see Drawing No. 2

Hole Elevation & Datum: 137.81±m (geodetic), see Note 1

Start Date: 15/02/2017 | End Date: 15/02/2017 | Field Supervision: SR

Split Spoon | Auger Sample | Shelby Tube | Core Sample | 51mm dia Cone

Pocket Penetrometer | Unconfined Compression | Water Level | Vane Test, Sensitivity | 51mm dia Split Spoon

Gradation Analysis Completed M

Description	Elev. ±m	Depth ±m	RUN NUMBER	RUN LENGTH, m	RECOVERY, %	R.Q.D., %	CORE SIZE / CASING	JOINT SYSTEM	COMMENTS - ROCK QUALITY	Sample No.	"N"	Moisture Content %	Headspace Vapours ppm
CONTINUED FROM DRAWING No. 2	85.6	14.0											
SHALE BEDROCK, grey, fractured, limestone bands with 5±mm thickness throughout		15.0	2	1.27	98	72.0	NXL /NW		fair				
limestone band with 65±mm thickness observed within Run Number 3		16.0	3	1.52	92	80.0	NXL /NW		good				
		17.0	4	1.57	98	67.8	NXL /NW		fair				
END OF CORED HOLE	81.2	18.0											

NOTES:

1. Elevation datum, referenced to local datum, top of the Hydrant at the east side of the Liverpool Road and south side of entrance of the subject site, El. 100.00±m (assumed local datum) for the purposes of this report only.
2. Borehole caved to 11.6±m depth, water rose to 3±m below grade upon completion.
3. Monitoring well installed by Haddad Geotechnical Inc. to depth of 6±m below grade adjacent to the borehole and water level rose to 2.3 ±m below grade after 34 days, as recorded.

19.0
20.0
21.0
22.0
23.0
24.0
25.0
26.0
27.0
28.0
29.0

HADDAD GEOTECHNICAL INC.

Engineering Data Sheet For Borehole No. 2

Project No. 16-11612
Drawing No. 3

Project: Proposed Mixed-Use Development
Location: 591 Liverpool Road, Pickering
Hole Location: see Drawing No. 1
Hole Elevation & Datum: 99.38±m, see Note 1
Start Date: 13/02/2017 | End Date: 13/02/2017 | Field Supervision: SR

Split Spoon
Auger Sample
Shelby Tube
Core Sample
51mm dia Cone
Pocket Penetrometer
Unconfined Compression
Water Level
Vane Test, Sensitivity
51mm dia Split Spoon
Gradation Analysis Completed M

	Description	Elev. ±m	Depth ±m	Sample No.	"N"	Moisture Content %	Vapour Reading (ppm)
BH2	GROUND SURFACE MW2	99.38	0.0				
	GRAVEL SURFACE FILL - loose to medium compact gravelly sand with some silt, brown, moist			AS0	–	8.1	
	FILL - medium compact silt and clay, with trace to some sand, occ. gravel, occ. roots, occ. organic stains, brown to grey, moist to very moist	97.9	1.0	SS1	17	11.5	1.1
		97.5 (03/22/17)	2.0	SS2	4	13.7	3.6
	Layer of dark brown to black Peat in wet condition between 2.3±m to 2.5±m depth	97.1		SS3	7	10.7	30.2
			3.0	SS4	33	8.7	17.9
		95.3	4.0	SS5	61	5.6	5.4
	SILTY SAND - trace to some clay, trace gravels, very dense, occ. oxidized seams/pockets, brown, moist	94.8 (upon borehole completion)	5.0	SS6	50/6"	8.7	5.9
		93.3	6.0				
	GRAVELLY SAND - some silt, trace clay, very dense, grey, moist to very moist			SS7	58	8.1	3.1
	occ. shale fragments below 7.5±m depth		7.0				
	Layer of stiff to very stiff wet clay between 8±m to 8.2±m depth		8.0	SS8	15	6.0	3.6
			9.0	SS9	50/6"	1.3	3.1
			10.0				
	SHALE - very dense, weathered, grey, moist	88.7	11.0	SS10	50/3"	6.1	10.8
			12.0				
	END OF BOREHOLE	87.1		SS11	50/3"	-	11.9
			13.0				
			14.0				
			15.0				

Strength and Penetration Resistance
C kPa
N (Standard Penetration Value) Blows/300mm
20 40 60 80

NOTES:
1. Elevation datum, referenced to local datum, top of the Hydrant at the east side of the Liverpool Road and south side of entrance of the subject site, El. 100.00±m (assumed local datum) for the purposes of this report only.
2. Borehole caved to 5.8±m depth, water rose to 4.6±m below grade upon completion.
3. Monitoring well installed by Haddad Geotechnical Inc. to depth of 5.8±m below grade adjacent to the borehole and water level rose to 1.86 ±m below grade after 36 days, as recorded.

HADDAD GEOTECHNICAL INC.

Engineering Data Sheet For Borehole No. 5

Project No. 16-11612
Drawing No. 4

Project: Proposed Mixed-Use Development
Location: 591 Liverpool Road, Pickering
Hole Location: see Drawing No. 1
Hole Elevation & Datum: 98.61±m, see Note 1
Start Date: 16/02/2017 | End Date: 16/02/2017 | Field Supervision: SR

Split Spoon
Auger Sample
Shelby Tube
Core Sample
51mm dia Cone
Pocket Penetrometer
Unconfined Compression
Water Level
Vane Test, Sensitivity
51mm dia Split Spoon
Gradation Analysis Completed M

Description	Elev. ±m	Depth ±m	Sample No.	"N"	Moisture Content %	Vapour Reading (ppm)
GROUND SURFACE	98.61	0.0				
GRAVEL SURFACE FILL - sand and gravel with some silt and some clay, dark brown very moist			AS0	-	5.9	3.5
FILL - medium compact silt and clay, occ. gravel, occ. organic stains, dark brown to brown, moist to very moist		1.0	SS1	13	22.2	2.1
		2.0	SS2	26	13.9	1.9
	96.4					
SILTY SAND - some gravel, some clay, dense to very dense, occ. oxidized seams, brown, moist to very moist			SS3	60	8.5	2.3
		3.0	SS4	50/6"	7.7	2.5
becomes grey below 4±m depth		4.0	SS5	30	7.2	2.9
occ. wet seams below 5±m depth		5.0	SS6	43	6.2	3.4
	92.8					
		6.0	SS7	52	11.1	2.6
		7.0				
		8.0	SS8	50/6"	9.1	3.5
	90.6					
SHALE - very dense, weathered, grey, moist to very moist		9.0	SS9	50/3"	14.4	14.2
		10.0				
		11.0	SS10	50/2"	12.6	20.1
		12.0				
END OF BOREHOLE	86.4		SS11	50/2"	14.8	19.8
		13.0				
		14.0				
		15.0				

Strength and Penetration Resistance
C kPa
N (Standard Penetration Value) Blows/300mm
20 40 60 80

NOTES:
1. Elevation datum, referenced to local datum, top of the Hydrant at the east side of the Liverpool Road and south side of entrance of the subject site, El. 100.00±m (assumed local datum) for the purposes of this report only.
2. Borehole caved to 11±m depth, water rose to 5.8±m below existing grade upon completion.

HADDAD GEOTECHNICAL INC.

Engineering Data Sheet For Borehole No. 6

Project No. 16-11612
Drawing No. 5

Project: Proposed Mixed-Use Development
Location: 591 Liverpool Road, Pickering
Hole Location: see Drawing No. 1
Hole Elevation & Datum: 99.35±m, see Note 1
Start Date: 14/02/2017 | End Date: 14/02/2017 | Field Supervision: SR

Split Spoon
Auger Sample
Shelby Tube
Core Sample
51mm dia Cone
Pocket Penetrometer
Unconfined Compression
Water Level
Vane Test, Sensitivity
51mm dia Split Spoon
Gradation Analysis Completed M

	Description	Elev. ±m	Depth ±m	Sample No.	"N"	Moisture Content %	Vapour Reading (ppm)
BH6	GROUND SURFACE MW3	99.35	0.0				
	FILL - medium compact silt and clay with some sand, occ. gravel, occ. oxidized pockets, brown, moist to very moist	98.6		AS0	–	13.3	1.4
			1.0	SS1	15	11.0	1.6
		97.5 (03/22/17)	2.0	SS2	15	8.0	0.9
	SILTY SAND - some gravel, trace to some clay, medium dense to dense, occ. shale fragments, occ. oxidized seams, brown, moist to very moist	97.0		SS3	50/6"	7.7	1.1
		96.0 (upon borehole completion)	3.0	SS4	45	6.4	0.8
	becomes grey below 3.5±m depth		4.0	SS5	36	6.1	1.6
			5.0	SS6	29	7.0	36.1
			6.0	SS7	26	10.9	17.4
	becomes very dense and occ. shale fragments below 7.5±m depth		7.0	SS8	50/6"	7.3	13.2
		90.2	8.0				
	SHALE - very dense, weathered, grey, moist to very moist		9.0	SS9	50/3"	11.4	5.2
			10.0	SS10	50/2"	10.2	8.2
			11.0				
	END OF BOREHOLE	87.2	12.0	SS11	50/1"	14.9	7.1
			13.0				
			14.0				
			15.0				

Strength and Penetration Resistance
C kPa
N (Standard Penetration Value) Blows/300mm
20 40 60 80

NOTES:
1. Elevation datum, referenced to local datum, top of the Hydrant at the east side of the Liverpool Road and south side of entrance of the subject site, El. 100.00±m (assumed local datum) for the purposes of this report only.
2. Borehole caved to 11±m depth, water rose to 3.35±m below grade upon completion.
3. Monitoring well installed by Haddad Geotechnical Inc. to depth of 6.2±m below grade adjacent to the borehole and water level rose to 1.87 ±m below grade after 35 days, as recorded.

HADDAD GEOTECHNICAL INC.

Engineering Data Sheet For Borehole No. 7

Project No. 16-11612
Drawing No. 6

Project: Proposed Mixed-Use Development
Location: 591 Liverpool Road, Pickering
Hole Location: see Drawing No. 1
Hole Elevation & Datum: 99.14±m, see Note 1
Start Date: 14/02/2017 | End Date: 14/02/2017 | Field Supervision: SR

Split Spoon
Auger Sample
Shelby Tube
Core Sample
51mm dia Cone
Pocket Penetrometer
Unconfined Compression
Water Level
Vane Test, Sensitivity
51mm dia Split Spoon
Gradation Analysis Completed M

Description	Elev. ±m	Depth ±m	Sample No.	"N"	Moisture Content %	Vapour Reading (ppm)
GROUND SURFACE	99.14	0.0				
TOP SOIL FILL - loose to medium compact silt and clay with some sand, occ. gravel, occ. organic stains, occ. oxidized seams, brown, very moist to wet		1.0	AS0	-	21.9	25
		2.0	SS1	15	25.3	1.0
			SS2	8	7.3	1.4
	96.5	3.0	SS3	26	14.3	1.2
GRAVELY SILTY SAND - trace clay, medium dense to dense, occ. oxidized seams, grey, moist	96.1		SS4	23	2.9	1.3
		4.0	SS5	45	5.8	1.2
occ. wet seams below 4.5±m depth		5.0	SS6	46	5.6	2.6
becomes very dense below 6±m depth		6.0	SS7	50/6"	5.1	2.4
	91.5	7.0				
SHALE - very dense, weathered, grey, moist to very moist		8.0	SS8	50/6"	4.3	3.6
		9.0	SS9	50/2"	10.7	1.2
		10.0				
		11.0	SS10	50/2"	10.3	2.3
END OF BOREHOLE	86.9	12.0	SS11	50/2"	11.5	1.6
		13.0				
		14.0				
		15.0				

Strength and Penetration Resistance
C kPa
N (Standard Penetration Value) Blows/300mm
20 40 60 80

NOTES:
1. Elevation datum, referenced to local datum, top of the Hydrant at the east side of the Liverpool Road and south side of entrance of the subject site, El. 100.00±m (assumed local datum) for the purposes of this report only.
2. Borehole open to 12.2±m depth and water rose to 3±m below existing grade upon completion.

HADDAD GEOTECHNICAL INC.

Engineering Data Sheet For Borehole No. 9

Project No. 16-11612
Drawing No. 7

Project: Proposed Mixed-Use Development
Location: 591 Liverpool Road, Pickering
Hole Location: see Drawing No. 1
Hole Elevation & Datum: 99.47±m, see Note 1
Start Date: 13/02/2017 | End Date: 13/02/2017 | Field Supervision: SR

Split Spoon
Auger Sample
Shelby Tube
Core Sample
51mm dia Cone
Pocket Penetrometer
Unconfined Compression
Water Level
Vane Test, Sensitivity
51mm dia Split Spoon
Gradation Analysis Completed M

Description	Elev. ±m	Depth ±m	Sample No.	"N"	Moisture Content %	Vapour Reading (ppm)
GROUND SURFACE	99.47	0.0				
TOP SOIL FILL - loose to medium compact silt and clay with some sand, occ. gravel, occ. organic stains, occ. oxidized seams, dark brown, very moist to wet			AS0	-	10.9	1.2
		1.0	SS1	13	13.2	1.5
Layers of dark brown to black Peat in wet condition below 4.5±m depth		2.0	SS2	14	16.2	1.6
		3.0	SS3	7	23.7	1.8
			SS4	4	30.9	1.8
	95.3	4.0	SS5	27	13.9	1.5
GRAVELY SILTY SAND - trace clay, medium dense to very dense, occ. shale fragments, occ. oxidized seams, brown to grey, moist		5.0	SS6	79	5.7	3.8
	93.4	6.0	SS7	50/6"	4.3	1.7
SAND & SILT - some gravel, some clay, very dense, occ. shale fragments, grey, moist		7.0				
		8.0	SS8	50/6"	7.1	4.3
	90.3	9.0	SS9	50/2"	10.8	47.2
SHALE - very dense, weathered, grey, moist to very moist		10.0				
▽	88.8	11.0	SS10	50/2"	4.0	20.6
		12.0				
END OF BOREHOLE	87.3		SS11	50/1"	12.4	3.8
		13.0				
		14.0				
		15.0				

Strength and Penetration Resistance
C kPa
N (Standard Penetration Value) Blows/300mm
20 40 60 80

NOTES:
1. Elevation datum, referenced to local datum, top of the Hydrant at the east side of the Liverpool Road and south side of entrance of the subject site, El. 100.00±m (assumed local datum) for the purposes of this report only.
2. Borehole open to 12.2±m depth and water rose to 10.7±m below existing grade upon completion.

HADDAD GEOTECHNICAL INC.

Engineering Data Sheet For Borehole No. 10

Project No. 16-11612
Drawing No. 8

Project: Proposed Mixed-Use Development
Location: 591 Liverpool Road, Pickering
Hole Location: see Drawing No. 1
Hole Elevation & Datum: 99.38±m, see Note 1
Start Date: 16/02/2017 | End Date: 16/02/2017 | Field Supervision: SR

Split Spoon
Auger Sample
Shelby Tube
Core Sample
51mm dia Cone
Pocket Penetrometer
Unconfined Compression
Water Level
Vane Test, Sensitivity
51mm dia Split Spoon
Gradation Analysis Completed M

Description	Elev. ±m	Depth ±m	Sample No.	"N"	Moisture Content %	Vapour Reading (ppm)
GROUND SURFACE	99.38	0.0				
GRAVEL SURFACE FILL - loose to medium compact silt and sand with some clay and trace gravels, occ. organic stains, occ. roots, brown, very moist			AS0	-	11.6	2.6
		1.0	SS1	16	13.5	1.7
		2.0	SS2	13	14.9	2.6
		3.0	SS3	6	12.8	2.1
	96.0		SS4	22	7.5	2.1
SILTY SAND - some gravel, some clay, medium dense, brown to grey, moist		4.0	SS5	18	9.8	.2.1
		5.0	SS6	31	7.7	2.1
END OF BOREHOLE	94.2					

Strength and Penetration Resistance
C kPa
N (Standard Penetration Value) Blows/300mm
20 40 60 80

NOTES:
1. Elevation datum, referenced to local datum, top of the Hydrant at the east side of the Liverpool Road and south side of entrance of the subject site, El. 100.00±m (assumed local datum) for the purposes of this report only.
2. Borehole open and dry to 5.2±m depth, below existing grade upon completion.

HADDAD GEOTECHNICAL INC.

Engineering Data Sheet For Borehole No. 11

Project No. 16-11612
Drawing No. 9

Project: Proposed Mixed-Use Development
Location: 591 Liverpool Road, Pickering
Hole Location: see Drawing No. 1
Hole Elevation & Datum: 98.69±m, see Note 1
Start Date: 14/02/2017 | End Date: 14/02/2017 | Field Supervision: SR

Split Spoon
Auger Sample
Shelby Tube
Core Sample
51mm dia Cone
Pocket Penetrometer
Unconfined Compression
Water Level
Vane Test, Sensitivity
51mm dia Split Spoon
Gradation Analysis Completed M

Description	Elev. ±m	Depth ±m	Sample No.	"N"	Moisture Content %	Vapour Reading (ppm)
GROUND SURFACE	98.69	0.0				
GRAVEL SURFACE FILL - sand with some gravels, brown very moist to wet			AS0	-	7.4	1.1
FILL - loose to medium compact silt and clay with some sand, occ. gravels, occ. oxidized pockets, brown, wet	97.5	1.0	SS1	12	14.6	1.2
		2.0	SS2	8	13.9	1.0
	96.1	3.0	SS3	20	12.9	1.4
SILTY SAND - some gravel, some clay, medium dense to very dense, brown, moist			SS4	85	8.3	1.4
becomes grey below 4±m depth		4.0	SS5	53	7.4	1.0
occ. shale fragments below 4.5±m depth			SS6	50/6"	4.3	1.5
END OF BOREHOLE	93.8	5.0				
		6.0				
		7.0				
		8.0				
		9.0				
		10.0				
		11.0				
		12.0				
		13.0				
		14.0				
		15.0				

Strength and Penetration Resistance
C kPa
N (Standard Penetration Value) Blows/300mm
20 40 60 80

NOTES:
1. Elevation datum, referenced to local datum, top of the Hydrant at the east side of the Liverpool Road and south side of entrance of the subject site, El. 100.00±m (assumed local datum) for the purposes of this report only.
2. Borehole caved to 1.2±m depth below existing grade and wet at its base upon completion.

HADDAD GEOTECHNICAL INC.

Engineering Data Sheet For Borehole No. 12

Project No. 16-11612
Drawing No. 10

Project: Proposed Mixed-Use Development
Location: 591 Liverpool Road, Pickering
Hole Location: see Drawing No. 1
Hole Elevation & Datum: 99.12 ±m, see Note 1
Start Date: 13/02/2017 | End Date: 13/02/2017 | Field Supervision: SR

Split Spoon
Auger Sample
Shelby Tube
Core Sample
51mm dia Cone
Pocket Penetrometer
Unconfined Compression
Water Level
Vane Test, Sensitivity
51mm dia Split Spoon
Gradation Analysis Completed M

Description	Elev. ±m	Depth ±m	Sample No.	"N"	Moisture Content %	Vapour Reading (ppm)
GROUND SURFACE	99.12	0.0				
GRAVEL SURFACE FILL - loose silt and clay with some sand, occ. gravels, occ. roots, occ. organic stains, brown to grey, moist to very moist			AS0	-	9.7	3.1
		1.0	SS1	15	11.9	7.9
Layers of dark brown to black Peat in wet condition below 2±m depth		2.0	SS2	9	17.0	3.2
			SS3	10	14.2	16.4
	96.1	3.0				
			SS4	20	11.0	1.9
	95.3					
SILTY SAND - some gravel, some clay, very dense, occ. shale fragments, brown to grey, moist		4.0	SS5	60	7.1	50.6
END OF BOREHOLE	94.2	5.0	SS6	50/6"	7.8	1.1
		6.0				
		7.0				
		8.0				
		9.0				
		10.0				
		11.0				
		12.0				
		13.0				
		14.0				
		15.0				

Strength and Penetration Resistance
C kPa
N (Standard Penetration Value) Blows/300mm
20 40 60 80

NOTES:
1. Elevation datum, referenced to local datum, top of the Hydrant at the east side of the Liverpool Road and south side of entrance of the subject site, El. 100.00±m (assumed local datum) for the purposes of this report only.
2. Borehole open to 4.9±m depth and water rose to 3±m below existing grade upon completion.

HADDAD GEOTECHNICAL INC.

Engineering Data Sheet For Borehole No. 14

Project No. 16-11612
Drawing No. 11

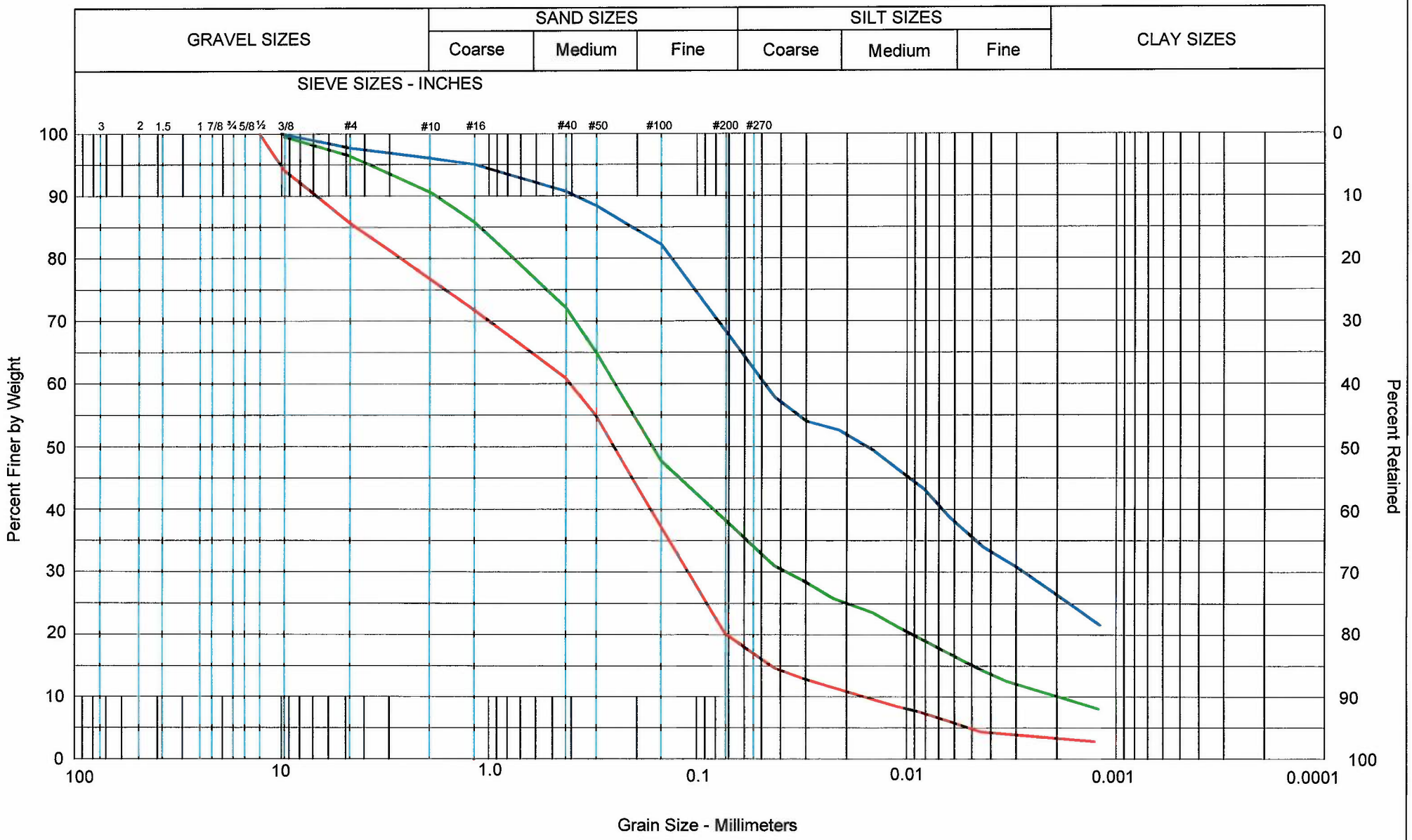
Project: Proposed Mixed-Use Development
Location: 591 Liverpool Road, Pickering
Hole Location: see Drawing No. 1
Hole Elevation & Datum: 99.29 ±m, see Note 1
Start Date: 13/02/2017 | End Date: 13/02/2017 | Field Supervision: SR

Split Spoon
Auger Sample
Shelby Tube
Core Sample
51mm dia Cone
Pocket Penetrometer
Unconfined Compression
Water Level
Vane Test, Sensitivity
51mm dia Split Spoon
Gradation Analysis Completed M

Description	Elev. ±m	Depth ±m	Sample No.	"N"	Moisture Content %	Vapour Reading (ppm)
GROUND SURFACE	99.29	0.0				
GRANULAR MATERIALS FILL - loose to medium compact gravely sand with some silt, occ. organic stains, brown, very moist to wet			AS0	-	9.8	2.7
		1.0	SS1	12	15.2	1.3
		2.0	SS2	8	13.4	2.6
FILL - loose silt and clay with some sand, occ. gravels, occ. roots, occ. oxidized seams, brown to grey, very moist Layers of dark brown to black Peat in wet condition below 3±m depth		3.0	SS3	6	30.4	2.4
			SS4	7	38.9	2.8
	95.3	4.0	SS5	31	8.8	4.2
SILTY SAND - some gravel, some clay, medium dense to very dense, brown to grey, moist	94.9					
END OF BOREHOLE	94.3	5.0	SS6	50/6"	8.1	0
		6.0				
		7.0				
		8.0				
		9.0				
		10.0				
		11.0				
		12.0				
		13.0				
		14.0				
		15.0				

Strength and Penetration Resistance
C kPa
N (Standard Penetration Value) Blows/300mm
20 40 60 80

NOTES:
1. Elevation datum, referenced to local datum, top of the Hydrant at the east side of the Liverpool Road and south side of entrance of the subject site, El. 100.00±m (assumed local datum) for the purposes of this report only.
2. Borehole open to 5±m depth and water rose to 4.4±m below existing grade upon completion.



BH1 SS4 - (3±m to 3.6±m) (4% Gravel, 30% Sand, 39% Silt, 27% Clay)

BH1 SS7 - (6.1±m to 6.7±m) (9% Gravel, 54% Sand, 27% Silt, 10% Clay)

BH2 SS7 - (6.1±m to 6.7±m) (23% Gravel, 58% Sand, 16% Silt, 3% Clay)

HADDAD GEOTECHNICAL INC.
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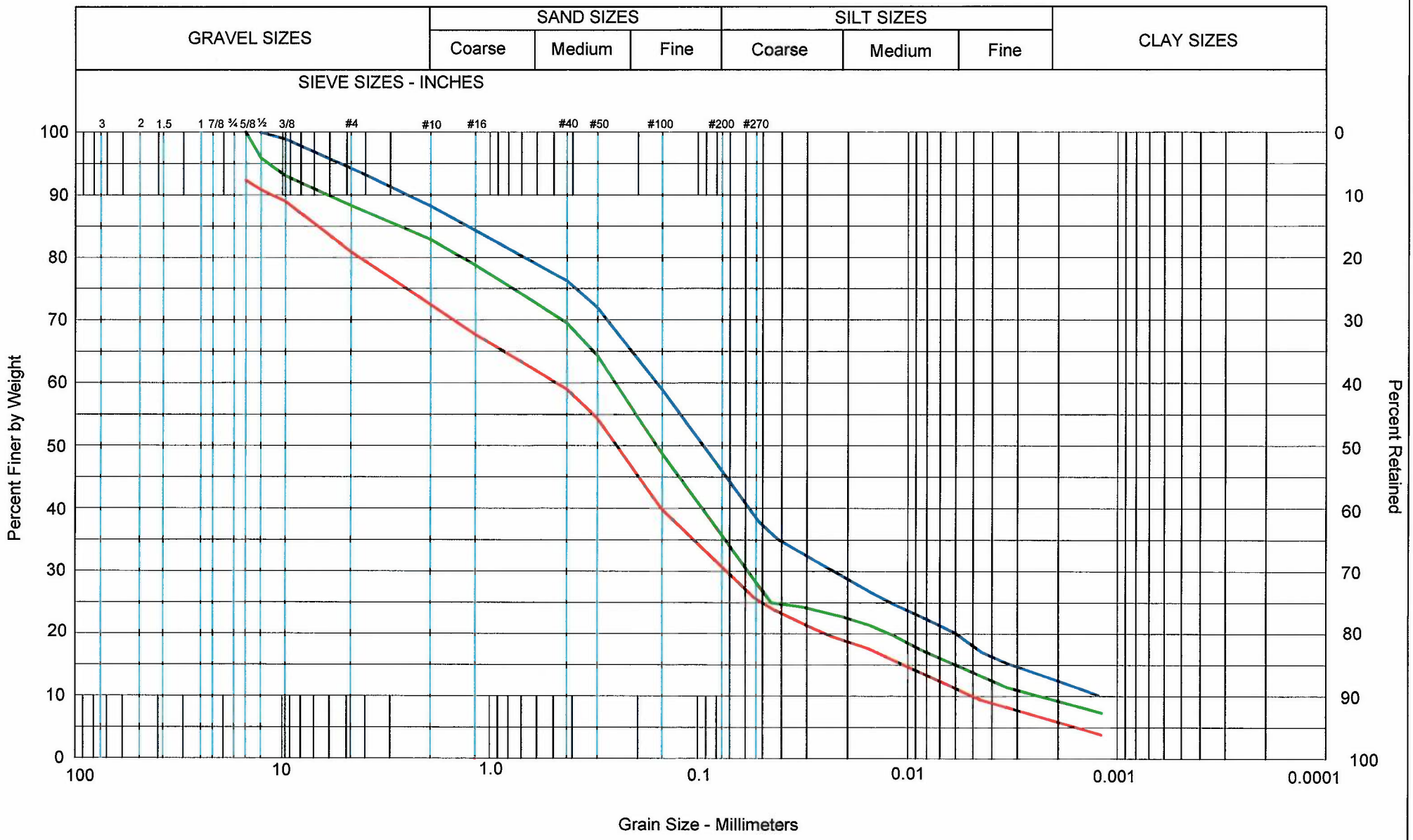
phone: 905-475-0951, fax: 905-475-8338
info@haddadgeo.com

591 LIVERPOOL ROAD, PICKERING

GRADATION ANALYSES A.S.T.M. D422
NATIVE SUBSOILS

SCALE: AS INDICATED
DRAWN BY: CF

PROJECT: 16-11612
DRAWING No. 12
DATE: MARCH 22, 2017



BH5 SS3 - (2.3±m to 2.9±m) (12% Gravel, 42% Sand, 33% Silt, 13% Clay)

BH6 SS4 - (3±m to 3.6±m) (17% Gravel, 47% Sand, 27% Silt, 9% Clay)

BH7 SS7 - (6±m to 6.6±m) (27% Gravel, 43% Sand, 24% Silt, 6% Clay)

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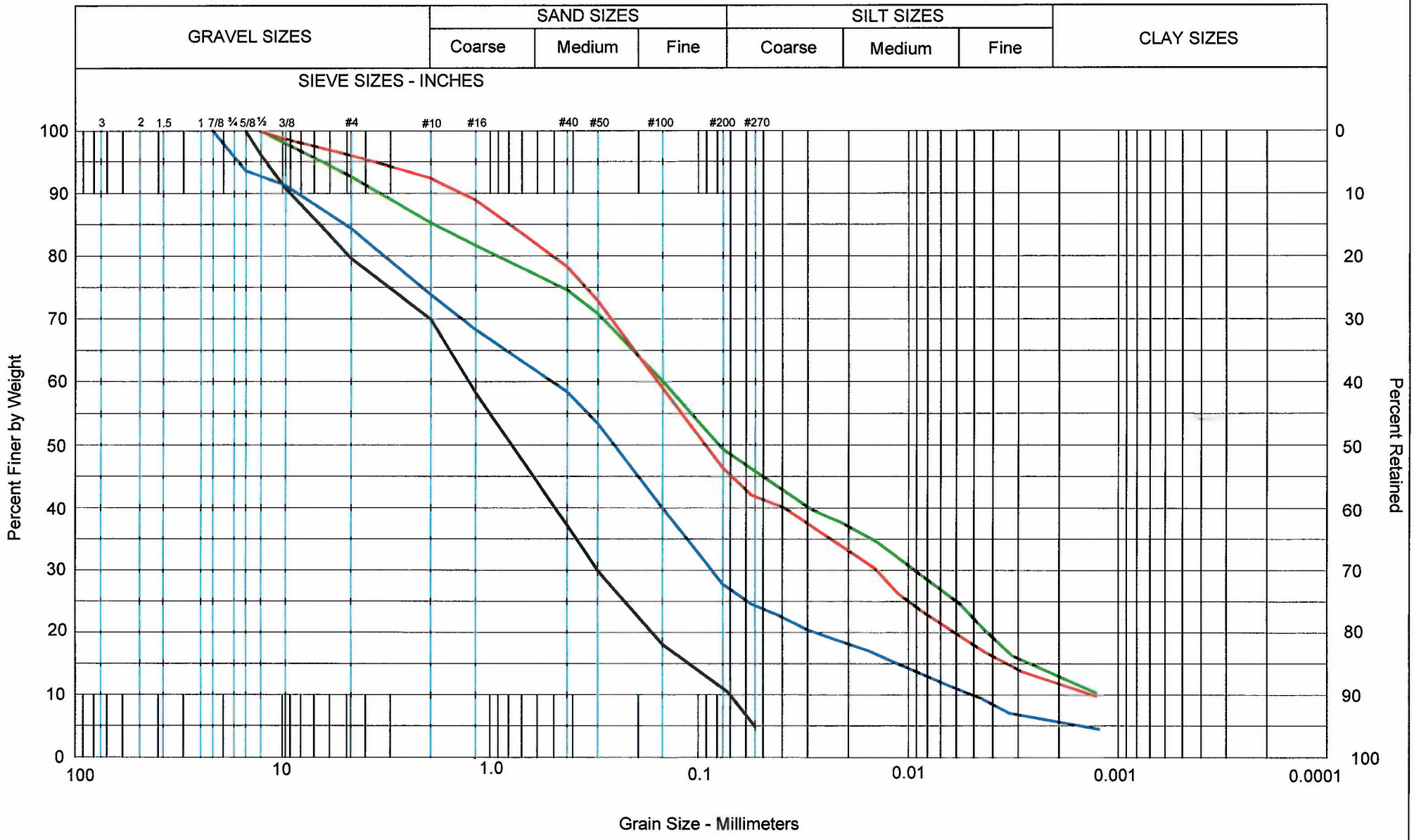
591 LIVERPOOL ROAD, PICKERING

GRADATION ANALYSES A.S.T.M. D422
NATIVE SUBSOILS

SCALE: AS INDICATED
DRAWN BY: CF

PROJECT: 16-11612
DRAWING No. 13
DATE: MARCH 29, 2017



BH9 SS6 - (4.5±m to 5.1±m) (26% Gravel, 47% Sand, 21% Silt, 6% Clay)

BH9 SS8 - (7.5±m to 8±m) (15% Gravel, 36% Sand, 36% Silt, 13% Clay)

BH10 SS1 - (0.8±m to 1.4±m) (8% Gravel, 46% Sand, 34% Silt, 12% Clay)

BH14 SS1 - (0.8±m to 1.4±m) (30% Gravel, 60% Sand, 10% Silt)

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591 LIVERPOOL ROAD, PICKERING

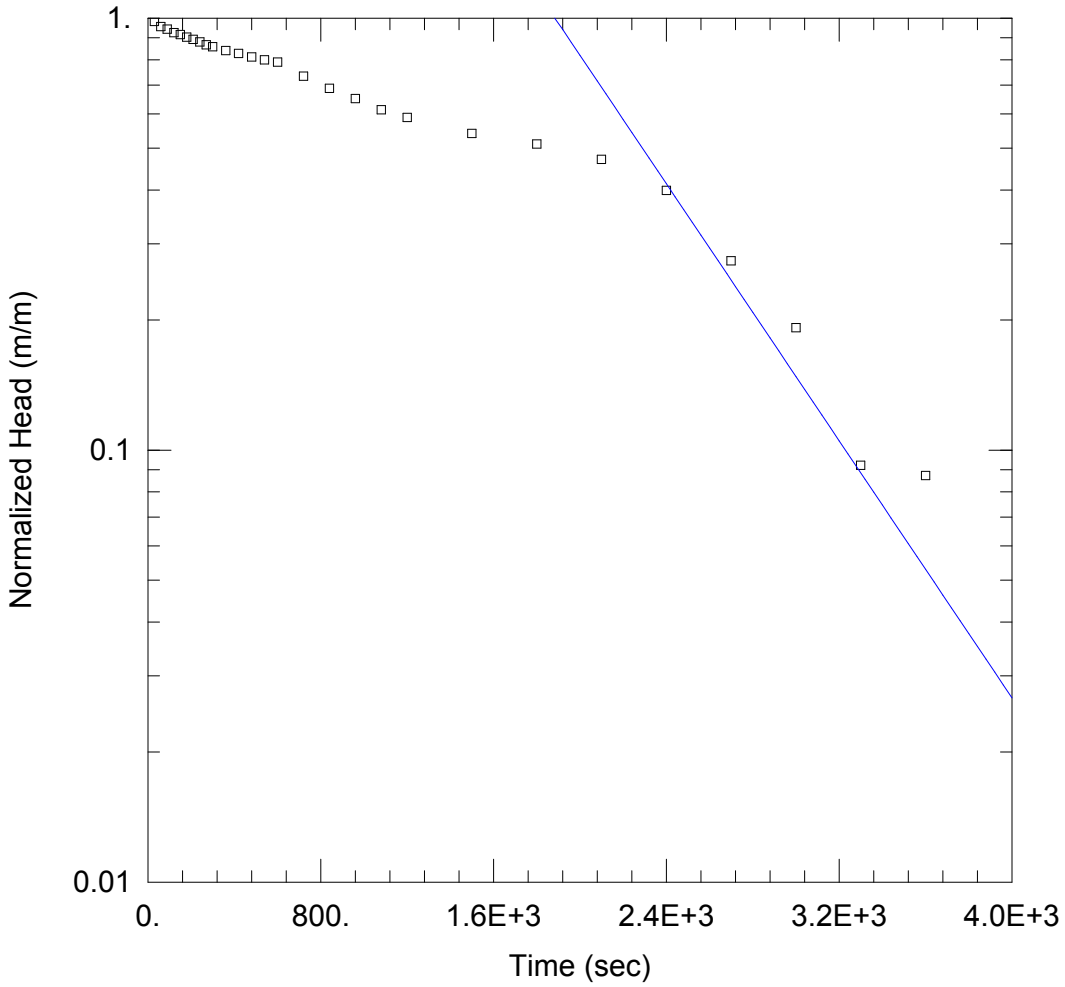
GRADATION ANALYSES A.S.T.M. D422
NATIVE SUBSOILS

SCALE: AS INDICATED
DRAWN BY: CF

PROJECT: 16-11612
DRAWING No. 14
DATE: MARCH 29, 2017

ATTACHMENT C

Single Well Response Test Analysis



RISING HEAD TEST

Data Set: C:\Users\cpons\Desktop\MW1.aqt
Date: 06/08/17 Time: 10:17:21

PROJECT INFORMATION

Company: Golder Associates Ltd.
Client: The Biglieri Group
Project: 1771738
Location: 591 Liverpool Road, Pickering
Test Well: MW1
Test Date: 3-Mar-17

AQUIFER DATA

Saturated Thickness: 7.635 m Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW1)

Initial Displacement: -4.01 m
Total Well Penetration Depth: 4.765 m
Casing Radius: 0.0254 m
Static Water Column Height: 4.765 m
Screen Length: 3.05 m
Well Radius: 0.105 m
Gravel Pack Porosity: 0.3

SOLUTION

Aquifer Model: Unconfined Solution Method: Bouwer-Rice

K = 2.536E-6 m/sec y0 = -101. m

Data Set: C:\Users\cpons\Desktop\MW1.aqt
Title: Rising Head Test
Date: 06/08/17
Time: 10:17:48

PROJECT INFORMATION

Company: Golder Associates Ltd.
Client: The Biglieri Group
Project: 1771738
Location: 591 Liverpool Road, Pickering
Test Date: 3-Mar-17
Test Well: MW1

AQUIFER DATA

Saturated Thickness: 7.635 m
Anisotropy Ratio (Kz/Kr): 1.

SLUG TEST WELL DATA

Test Well: MW1

X Location: 0. m
Y Location: 0. m

Initial Displacement: -4.01 m
Static Water Column Height: 4.765 m
Casing Radius: 0.0254 m
Well Radius: 0.105 m
Well Skin Radius: 0.105 m
Screen Length: 3.05 m
Total Well Penetration Depth: 4.765 m
Corrected Casing Radius (Bouwer-Rice Method): 0.06131 m
Gravel Pack Porosity: 0.3

No. of Observations: 28

Observation Data

Time (sec)	Displacement (m)	Time (sec)	Displacement (m)
30.	-3.94	600.	-3.17
60.	-3.83	720.	-2.94
90.	-3.78	840.	-2.76
120.	-3.71	960.	-2.61
150.	-3.67	1080.	-2.46
180.	-3.62	1200.	-2.36
210.	-3.58	1500.	-2.17
240.	-3.53	1800.	-2.05
270.	-3.48	2100.	-1.89
300.	-3.44	2400.	-1.6
360.	-3.37	2700.	-1.1
420.	-3.32	3000.	-0.77
480.	-3.26	3300.	-0.37
540.	-3.21	3600.	-0.35

SOLUTION

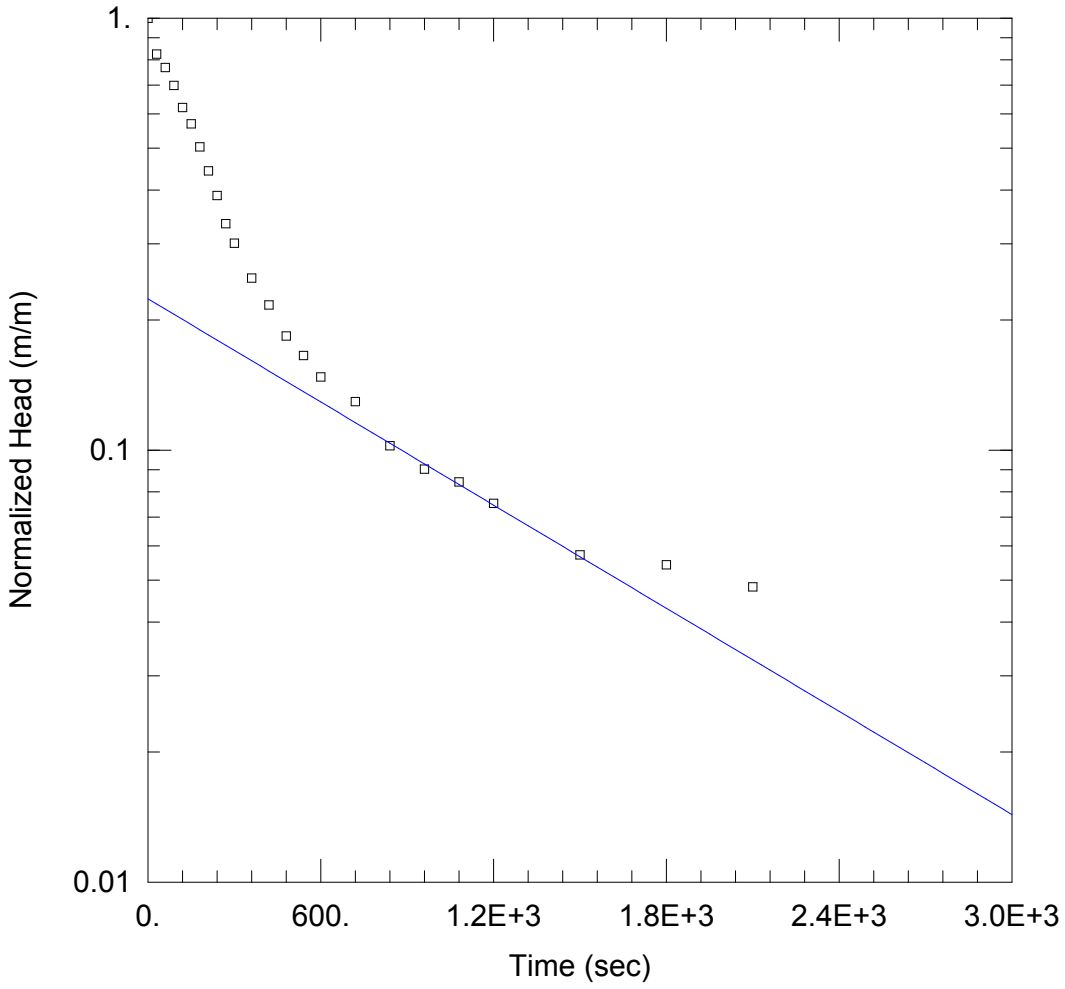
Slug Test
Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
ln(Re/rw): 2.403

VISUAL ESTIMATION RESULTS

Estimated Parameters

Parameter	Estimate	
K	2.536E-6	m/sec
y0	-101.	m

K = 0.0002536 cm/sec
T = K*b = 1.936E-5 m²/sec (0.1936 sq. cm/sec)



RISING HEAD TEST

Data Set: C:\Users\cpons\AppData\Local\Temp\Temp1_OneDrive_1_6-5-2017.zip\MW2.aqt
Date: 06/06/17 Time: 20:06:28

PROJECT INFORMATION

Company: Golder Associates Ltd.
Client: The Biglieri Group
Project: 1771738
Location: 591 Liverpool Road, Pickering
Test Well: MW2
Test Date: 3-Mar-17

AQUIFER DATA

Saturated Thickness: 4.478 m
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW2)

Initial Displacement: -3.32 m
Total Well Penetration Depth: 4.443 m
Casing Radius: 0.0254 m
Static Water Column Height: 4.443 m
Screen Length: 3.05 m
Well Radius: 0.105 m
Gravel Pack Porosity: 0.3

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 1.56E-6 m/sec
y0 = -0.7434 m

Data Set: C:\Users\cpons\AppData\Local\Temp\Temp1_OneDrive_1_6-5-2017.zip\MW2.aqt
Title: Rising Head Test
Date: 06/06/17
Time: 20:06:42

PROJECT INFORMATION

Company: Golder Associates Ltd.
Client: The Biglieri Group
Project: 1771738
Location: 591 Liverpool Road, Pickering
Test Date: 3-Mar-17
Test Well: MW2

AQUIFER DATA

Saturated Thickness: 4.478 m
Anisotropy Ratio (Kz/Kr): 1.

SLUG TEST WELL DATA

Test Well: MW2

X Location: 0. m
Y Location: 0. m

Initial Displacement: -3.32 m
Static Water Column Height: 4.443 m
Casing Radius: 0.0254 m
Well Radius: 0.105 m
Well Skin Radius: 0.105 m
Screen Length: 3.05 m
Total Well Penetration Depth: 4.443 m
Corrected Casing Radius (Bouwer-Rice Method): 0.06131 m
Gravel Pack Porosity: 0.3

No. of Observations: 24

Observation Data

Time (sec)	Displacement (m)	Time (sec)	Displacement (m)
0.	-3.32	420.	-0.72
30.	-2.74	480.	-0.61
60.	-2.55	540.	-0.55
90.	-2.32	600.	-0.49
120.	-2.06	720.	-0.43
150.	-1.89	840.	-0.34
180.	-1.67	960.	-0.3
210.	-1.47	1080.	-0.28
240.	-1.29	1200.	-0.25
270.	-1.11	1500.	-0.19
300.	-1.	1800.	-0.18
360.	-0.83	2100.	-0.16

SOLUTION

Slug Test
Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
ln(Re/rw): 2.762

VISUAL ESTIMATION RESULTS

Estimated Parameters

Parameter	Estimate	
K	1.56E-6	m/sec
y0	-0.7434	m

K = 0.000156 cm/sec
T = K*b = 6.984E-6 m²/sec (0.06984 sq. cm/sec)

ATTACHMENT D

Laboratory Certificate of Analysis

Maxxam
A Bureau Veritas Group Company

Your Project #: 1771738
Your C.O.C. #: 600318-01-01

Attention:Chris Pons

Golder Associates Ltd
140 Renfrew Dr
Suite 200
Markham, ON
L3R 6B3

Report Date: 2017/03/15
Report #: R4393289
Version: 2 - Revision

CERTIFICATE OF ANALYSIS – REVISED REPORT

MAXXAM JOB #: B743930
Received: 2017/03/03, 15:49

Sample Matrix: Water
Samples Received: 1

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Reference
ABN Compounds in Water by GC/MS	1	2017/03/06	2017/03/06	CAM SOP-00301	EPA 8270 m
Biochemical Oxygen Demand (BOD)	1	2017/03/03	2017/03/08	CAM SOP-00427	SM 22 5210B m
Total Cyanide	1	2017/03/06	2017/03/06	CAM SOP-00457	OMOE E3015 5 m
Mercury in Water by CVAA	1	2017/03/07	2017/03/08	CAM SOP-00453	EPA 7470A m
Total Metals Analysis by ICPMS	1	N/A	2017/03/06	CAM SOP-00447	EPA 6020B m
E.coli, (CFU/100mL)	1	N/A	2017/03/03	CAM SOP-00552	MOE LSB E3371
Polychlorinated Biphenyl in Water	1	2017/03/06	2017/03/07	CAM SOP-00309	EPA 8082A m
pH	1	N/A	2017/03/07	CAM SOP-00413	SM 4500H+ B m
Phenols (4AAP)	1	N/A	2017/03/07	CAM SOP-00444	OMOE E3179 m
Total Kjeldahl Nitrogen in Water	1	2017/03/07	2017/03/07	CAM SOP-00938	OMOE E3516 m
Total Suspended Solids	1	2017/03/06	2017/03/06	CAM SOP-00428	SM 22 2540D m
Volatile Organic Compounds in Water	1	N/A	2017/03/07	CAM SOP-00226	EPA 8260C m

Remarks:

Maxxam Analytics' laboratories are accredited to ISO/IEC 17025:2005 for specific parameters on scopes of accreditation. Unless otherwise noted, procedures used by Maxxam are based upon recognized Provincial, Federal or US method compendia such as CCME, MDDELCC, EPA, APHA.

All work recorded herein has been done in accordance with procedures and practices ordinarily exercised by professionals in Maxxam's profession using accepted testing methodologies, quality assurance and quality control procedures (except where otherwise agreed by the client and Maxxam in writing). All data is in statistical control and has met quality control and method performance criteria unless otherwise noted. All method blanks are reported: unless indicated otherwise, associated sample data are not blank corrected.

Maxxam Analytics' liability is limited to the actual cost of the requested analyses, unless otherwise agreed in writing. There is no other warranty expressed or implied. Maxxam has been retained to provide analysis of samples provided by the Client using the testing methodology referenced in this report. Interpretation and use of test results are the sole responsibility of the Client and are not within the scope of services provided by Maxxam, unless otherwise agreed in writing.

Solid sample results, except biota, are based on dry weight unless otherwise indicated. Organic analyses are not recovery corrected except for isotope dilution methods.
Results relate to samples tested.

Reference Method suffix "m" indicates test methods incorporate validated modifications from specific reference methods to improve performance.

Maxxam Analytics International Corporation o/a Maxxam Analytics 6740 Campobello Road, Mississauga, Ontario, L5N 2L8 Tel: (905) 817-5700 Toll-Free: 800-563-6266 Fax: (905) 817-5777 www.maxxam.ca

Your Project #: 1771738
Your C.O.C. #: 600318-01-01

Attention:Chris Pons

Golder Associates Ltd
140 Renfrew Dr
Suite 200
Markham, ON
L3R 6B3

Report Date: 2017/03/15
Report #: R4393289
Version: 2 - Revision

CERTIFICATE OF ANALYSIS – REVISED REPORT

MAXXAM JOB #: B743930
Received: 2017/03/03, 15:49

* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Ema Gitej, Senior Project Manager
Email: EGitej@maxxam.ca
Phone# (905)817-5829

==========

Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

Maxxam Job #: B743930
Report Date: 2017/03/15

Golder Associates Ltd
Client Project #: 1771738
Sampler Initials: GC

DURHAM STORM SEWER USE BYLAW 55-2013 (WATER)

Maxxam ID		DZR780		
Sampling Date		2017/03/03 11:00		
COC Number		600318-01-01		
	UNITS	MW2	RDL	QC Batch
Inorganics				
Total BOD	mg/L	5.0	2.0	4885005
Total Kjeldahl Nitrogen (TKN)	mg/L	1.3	0.10	4888722
pH	pH	6.69		4888219
Phenols-4AAP	mg/L	<0.0010	0.0010	4889091
Total Suspended Solids	mg/L	120	10	4888412
Total Cyanide (CN)	mg/L	<0.0050	0.0050	4887259
Metals				
Mercury (Hg)	mg/L	<0.0001	0.0001	4889099
Total Arsenic (As)	ug/L	3.7	1.0	4887182
Total Cadmium (Cd)	ug/L	<0.10	0.10	4887182
Total Chromium (Cr)	ug/L	<5.0	5.0	4887182
Total Copper (Cu)	ug/L	3.9	1.0	4887182
Total Lead (Pb)	ug/L	1.3	0.50	4887182
Total Manganese (Mn)	ug/L	6000	2.0	4887182
Total Nickel (Ni)	ug/L	7.0	2.0	4887182
Total Phosphorus (P)	ug/L	<100	100	4887182
Total Selenium (Se)	ug/L	<2.0	2.0	4887182
Total Silver (Ag)	ug/L	<0.10	0.10	4887182
Total Zinc (Zn)	ug/L	6.7	5.0	4887182
Semivolatile Organics				
Bis(2-ethylhexyl)phthalate	ug/L	<2.0	2.0	4887233
Di-N-butyl phthalate	ug/L	<2.0	2.0	4887233
Volatile Organics				
Benzene	ug/L	<0.25	0.25	4887396
Chloroform	ug/L	<0.25	0.25	4887396
1,2-Dichlorobenzene	ug/L	<0.50	0.50	4887396
1,4-Dichlorobenzene	ug/L	<0.50	0.50	4887396
cis-1,2-Dichloroethylene	ug/L	<0.25	0.25	4887396
trans-1,3-Dichloropropene	ug/L	<0.50	0.50	4887396
Ethylbenzene	ug/L	<0.25	0.25	4887396
Methylene Chloride(Dichloromethane)	ug/L	<1.3	1.3	4887396

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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Maxxam Job #: B743930
Report Date: 2017/03/15

Golder Associates Ltd
Client Project #: 1771738
Sampler Initials: GC

DURHAM STORM SEWER USE BYLAW 55-2013 (WATER)

Maxxam ID		DZR780		
Sampling Date		2017/03/03 11:00		
COC Number		600318-01-01		
	UNITS	**MW2**	**RDL**	**QC Batch**
1,1,2,2-Tetrachloroethane	ug/L	<0.50	0.50	4887396
Tetrachloroethylene	ug/L	<0.25	0.25	4887396
Toluene	ug/L	<0.50	0.50	4887396
Trichloroethylene	ug/L	<0.25	0.25	4887396
p+m-Xylene	ug/L	<0.25	0.25	4887396
o-Xylene	ug/L	<0.25	0.25	4887396
Total Xylenes	ug/L	<0.25	0.25	4887396
PCBs				
Total PCB	ug/L	<0.05	0.05	4888465
Microbiological				
Escherichia coli	CFU/100mL	<10	10	4886448
Surrogate Recovery (%)				
2,4,6-Tribromophenol	%	82		4887233
2-Fluorobiphenyl	%	46		4887233
2-Fluorophenol	%	25		4887233
D14-Terphenyl	%	100		4887233
D5-Nitrobenzene	%	46		4887233
D5-Phenol	%	21		4887233
Decachlorobiphenyl	%	82		4888465
4-Bromofluorobenzene	%	97		4887396
D4-1,2-Dichloroethane	%	100		4887396
D8-Toluene	%	98		4887396

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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Maxxam Job #: B743930
Report Date: 2017/03/15

Golder Associates Ltd
Client Project #: 1771738
Sampler Initials: GC

TEST SUMMARY

Maxxam ID: DZR780
Sample ID: MW2
Matrix: Water

Collected: 2017/03/03
Shipped:
Received: 2017/03/03

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
ABN Compounds in Water by GC/MS	GC/MS	4887233	2017/03/06	2017/03/06	Daniel Kim
Biochemical Oxygen Demand (BOD)	DO	4885005	2017/03/03	2017/03/08	Prakash Piya
Total Cyanide	SKAL/CN	4887259	2017/03/06	2017/03/06	Lantian Jin
Mercury in Water by CVAA	CV/AA	4889099	2017/03/07	2017/03/08	Ron Morrison
Total Metals Analysis by ICPMS	ICP/MS	4887182	N/A	2017/03/06	Arefa Dabhad
E.coli, (CFU/100mL)	PL	4886448	N/A	2017/03/03	Riddhi Bayal
Polychlorinated Biphenyl in Water	GC/ECD	4888465	2017/03/06	2017/03/07	Sarah Huang
pH	AT	4888219	N/A	2017/03/07	Neil Dassanayake
Phenols (4AAP)	TECH/PHEN	4889091	N/A	2017/03/07	Zahid Soikot
Total Kjeldahl Nitrogen in Water	SKAL	4888722	2017/03/07	2017/03/07	Louise Harding
Total Suspended Solids	BAL	4888412	2017/03/06	2017/03/06	Arpan Shah
Volatile Organic Compounds in Water	P&T/MS	4887396	N/A	2017/03/07	Blair Gannon

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Maxxam Job #: B743930
Report Date: 2017/03/15

Golder Associates Ltd
Client Project #: 1771738
Sampler Initials: GC

GENERAL COMMENTS

Each temperature is the average of up to three cooler temperatures taken at receipt

Package 1	3.7°C

Revised report (2016/03/15): VOC detection limits for sample DZR780 adjusted for dilution, data not impacted.

Sample DZR780 [MW2] : VOC Water Analysis: Due to foaming, sample required dilution. The detection limits were adjusted accordingly.

Results relate only to the items tested.

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Maxxam Job #: B743930
Report Date: 2017/03/15

Golder Associates Ltd
Client Project #: 1771738
Sampler Initials: GC

QUALITY ASSURANCE REPORT

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
4885005	PRP	QC Standard	Total BOD	2017/03/08		101	%	80 - 120
4885005	PRP	Method Blank	Total BOD	2017/03/08	<2.0		mg/L	
4885005	PRP	RPD	Total BOD	2017/03/08	22		%	25
4887182	ADA	Matrix Spike	Total Arsenic (As)	2017/03/06		104	%	80 - 120
			Total Cadmium (Cd)	2017/03/06		107	%	80 - 120
			Total Chromium (Cr)	2017/03/06		103	%	80 - 120
			Total Copper (Cu)	2017/03/06		110	%	80 - 120
			Total Lead (Pb)	2017/03/06		98	%	80 - 120
			Total Manganese (Mn)	2017/03/06		101	%	80 - 120
			Total Nickel (Ni)	2017/03/06		92	%	80 - 120
			Total Phosphorus (P)	2017/03/06		117	%	80 - 120
			Total Selenium (Se)	2017/03/06		100	%	80 - 120
			Total Silver (Ag)	2017/03/06		99	%	80 - 120
			Total Zinc (Zn)	2017/03/06		NC	%	80 - 120
4887182	ADA	Spiked Blank	Total Arsenic (As)	2017/03/06		101	%	80 - 120
			Total Cadmium (Cd)	2017/03/06		103	%	80 - 120
			Total Chromium (Cr)	2017/03/06		99	%	80 - 120
			Total Copper (Cu)	2017/03/06		103	%	80 - 120
			Total Lead (Pb)	2017/03/06		103	%	80 - 120
			Total Manganese (Mn)	2017/03/06		96	%	80 - 120
			Total Nickel (Ni)	2017/03/06		97	%	80 - 120
			Total Phosphorus (P)	2017/03/06		95	%	80 - 120
			Total Selenium (Se)	2017/03/06		105	%	80 - 120
			Total Silver (Ag)	2017/03/06		101	%	80 - 120
			Total Zinc (Zn)	2017/03/06		102	%	80 - 120
4887182	ADA	Method Blank	Total Arsenic (As)	2017/03/06	<1.0		ug/L	
			Total Cadmium (Cd)	2017/03/06	<0.10		ug/L	
			Total Chromium (Cr)	2017/03/06	<5.0		ug/L	
			Total Copper (Cu)	2017/03/06	<1.0		ug/L	
			Total Lead (Pb)	2017/03/06	<0.50		ug/L	
			Total Manganese (Mn)	2017/03/06	<2.0		ug/L	
			Total Nickel (Ni)	2017/03/06	<1.0		ug/L	
			Total Phosphorus (P)	2017/03/06	<100		ug/L	
			Total Selenium (Se)	2017/03/06	<2.0		ug/L	
			Total Silver (Ag)	2017/03/06	<0.10		ug/L	
			Total Zinc (Zn)	2017/03/06	<5.0		ug/L	
4887182	ADA	RPD	Total Cadmium (Cd)	2017/03/06	NC		%	20
			Total Chromium (Cr)	2017/03/06	0.34		%	20
			Total Copper (Cu)	2017/03/06	2.5		%	20
			Total Lead (Pb)	2017/03/06	NC		%	20
			Total Nickel (Ni)	2017/03/06	5.2		%	20
			Total Zinc (Zn)	2017/03/06	1.1		%	20
4887233	DKI	Matrix Spike	2,4,6-Tribromophenol	2017/03/06		98	%	10 - 130
			2-Fluorobiphenyl	2017/03/06		80	%	30 - 130
			2-Fluorophenol	2017/03/06		44	%	10 - 130
			D14-Terphenyl	2017/03/06		103	%	30 - 130
			D5-Nitrobenzene	2017/03/06		88	%	30 - 130
			D5-Phenol	2017/03/06		29	%	10 - 130
			Bis(2-ethylhexyl)phthalate	2017/03/06		95	%	30 - 130
			Di-N-butyl phthalate	2017/03/06		114	%	30 - 130
4887233	DKI	Spiked Blank	2,4,6-Tribromophenol	2017/03/07		78	%	10 - 130
			2-Fluorobiphenyl	2017/03/07		62	%	30 - 130
			2-Fluorophenol	2017/03/07		45	%	10 - 130

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QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			D14-Terphenyl	2017/03/07		98	%	30 - 130
			D5-Nitrobenzene	2017/03/07		74	%	30 - 130
			D5-Phenol	2017/03/07		31	%	10 - 130
			Bis(2-ethylhexyl)phthalate	2017/03/07		105	%	30 - 130
			Di-N-butyl phthalate	2017/03/07		107	%	30 - 130
4887233	DKI	Method Blank	2,4,6-Tribromophenol	2017/03/07		66	%	10 - 130
			2-Fluorobiphenyl	2017/03/07		74	%	30 - 130
			2-Fluorophenol	2017/03/07		41	%	10 - 130
			D14-Terphenyl	2017/03/07		94	%	30 - 130
			D5-Nitrobenzene	2017/03/07		74	%	30 - 130
			D5-Phenol	2017/03/07		31	%	10 - 130
			Bis(2-ethylhexyl)phthalate	2017/03/07	<2.0		ug/L	
			Di-N-butyl phthalate	2017/03/07	<2.0		ug/L	
4887259	LJN	Matrix Spike	Total Cyanide (CN)	2017/03/06		101	%	80 - 120
4887259	LJN	Spiked Blank	Total Cyanide (CN)	2017/03/06		97	%	80 - 120
4887259	LJN	Method Blank	Total Cyanide (CN)	2017/03/06	<0.0050		mg/L	
4887259	LJN	RPD	Total Cyanide (CN)	2017/03/06	NC		%	20
4887396	BG1	Matrix Spike	4-Bromofluorobenzene	2017/03/07		99	%	70 - 130
			D4-1,2-Dichloroethane	2017/03/07		94	%	70 - 130
			D8-Toluene	2017/03/07		100	%	70 - 130
			Benzene	2017/03/07		100	%	70 - 130
			Chloroform	2017/03/07		96	%	70 - 130
			1,2-Dichlorobenzene	2017/03/07		100	%	70 - 130
			1,4-Dichlorobenzene	2017/03/07		101	%	70 - 130
			cis-1,2-Dichloroethylene	2017/03/07		103	%	70 - 130
			trans-1,3-Dichloropropene	2017/03/07		98	%	70 - 130
			Ethylbenzene	2017/03/07		103	%	70 - 130
			Methylene Chloride(Dichloromethane)	2017/03/07		93	%	70 - 130
			1,1,2,2-Tetrachloroethane	2017/03/07		105	%	70 - 130
			Tetrachloroethylene	2017/03/07		NC	%	70 - 130
			Toluene	2017/03/07		101	%	70 - 130
			Trichloroethylene	2017/03/07		98	%	70 - 130
			p+m-Xylene	2017/03/07		100	%	70 - 130
			o-Xylene	2017/03/07		102	%	70 - 130
4887396	BG1	Spiked Blank	4-Bromofluorobenzene	2017/03/07		98	%	70 - 130
			D4-1,2-Dichloroethane	2017/03/07		94	%	70 - 130
			D8-Toluene	2017/03/07		100	%	70 - 130
			Benzene	2017/03/07		100	%	70 - 130
			Chloroform	2017/03/07		96	%	70 - 130
			1,2-Dichlorobenzene	2017/03/07		102	%	70 - 130
			1,4-Dichlorobenzene	2017/03/07		103	%	70 - 130
			cis-1,2-Dichloroethylene	2017/03/07		103	%	70 - 130
			trans-1,3-Dichloropropene	2017/03/07		94	%	70 - 130
			Ethylbenzene	2017/03/07		102	%	70 - 130
			Methylene Chloride(Dichloromethane)	2017/03/07		93	%	70 - 130
			1,1,2,2-Tetrachloroethane	2017/03/07		101	%	70 - 130
			Tetrachloroethylene	2017/03/07		97	%	70 - 130
			Toluene	2017/03/07		100	%	70 - 130
			Trichloroethylene	2017/03/07		99	%	70 - 130
			p+m-Xylene	2017/03/07		100	%	70 - 130
			o-Xylene	2017/03/07		100	%	70 - 130
4887396	BG1	Method Blank	4-Bromofluorobenzene	2017/03/07		96	%	70 - 130
			D4-1,2-Dichloroethane	2017/03/07		94	%	70 - 130

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QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			D8-Toluene	2017/03/07		99	%	70 - 130
			Benzene	2017/03/07	<0.10		ug/L	
			Chloroform	2017/03/07	<0.10		ug/L	
			1,2-Dichlorobenzene	2017/03/07	<0.20		ug/L	
			1,4-Dichlorobenzene	2017/03/07	<0.20		ug/L	
			cis-1,2-Dichloroethylene	2017/03/07	<0.10		ug/L	
			trans-1,3-Dichloropropene	2017/03/07	<0.20		ug/L	
			Ethylbenzene	2017/03/07	<0.10		ug/L	
			Methylene Chloride(Dichloromethane)	2017/03/07	<0.50		ug/L	
			1,1,2,2-Tetrachloroethane	2017/03/07	<0.20		ug/L	
			Tetrachloroethylene	2017/03/07	<0.10		ug/L	
			Toluene	2017/03/07	<0.20		ug/L	
			Trichloroethylene	2017/03/07	<0.10		ug/L	
			p+m-Xylene	2017/03/07	<0.10		ug/L	
			o-Xylene	2017/03/07	<0.10		ug/L	
			Total Xylenes	2017/03/07	<0.10		ug/L	
4887396	BG1	RPD	Benzene	2017/03/07	NC		%	30
			Chloroform	2017/03/07	0.063		%	30
			1,2-Dichlorobenzene	2017/03/07	NC		%	30
			1,4-Dichlorobenzene	2017/03/07	1.9		%	30
			cis-1,2-Dichloroethylene	2017/03/07	NC		%	30
			trans-1,3-Dichloropropene	2017/03/07	NC		%	30
			Ethylbenzene	2017/03/07	NC		%	30
			Methylene Chloride(Dichloromethane)	2017/03/07	NC		%	30
			1,1,2,2-Tetrachloroethane	2017/03/07	NC		%	30
			Tetrachloroethylene	2017/03/07	NC		%	30
			Toluene	2017/03/07	NC		%	30
			Trichloroethylene	2017/03/07	NC		%	30
			p+m-Xylene	2017/03/07	NC		%	30
			o-Xylene	2017/03/07	NC		%	30
			Total Xylenes	2017/03/07	NC		%	30
4888219	NYS	Spiked Blank	pH	2017/03/07		102	%	98 - 103
4888219	NYS	RPD	pH	2017/03/07	0.23		%	N/A
4888412	AS6	QC Standard	Total Suspended Solids	2017/03/06		96	%	85 - 115
4888412	AS6	Method Blank	Total Suspended Solids	2017/03/06	<10		mg/L	
4888412	AS6	RPD	Total Suspended Solids	2017/03/06	5.4		%	25
4888465	SHG	Matrix Spike	Decachlorobiphenyl	2017/03/07		83	%	60 - 130
			Total PCB	2017/03/07		90	%	60 - 130
4888465	SHG	Spiked Blank	Decachlorobiphenyl	2017/03/07		81	%	60 - 130
			Total PCB	2017/03/07		99	%	60 - 130
4888465	SHG	Method Blank	Decachlorobiphenyl	2017/03/07		87	%	60 - 130
			Total PCB	2017/03/07	<0.05		ug/L	
4888465	SHG	RPD	Total PCB	2017/03/07	NC		%	40
4888722	LHA	Matrix Spike	Total Kjeldahl Nitrogen (TKN)	2017/03/07		106	%	80 - 120
4888722	LHA	QC Standard	Total Kjeldahl Nitrogen (TKN)	2017/03/07		104	%	80 - 120
4888722	LHA	Spiked Blank	Total Kjeldahl Nitrogen (TKN)	2017/03/07		99	%	80 - 120
4888722	LHA	Method Blank	Total Kjeldahl Nitrogen (TKN)	2017/03/07	<0.10		mg/L	
4888722	LHA	RPD	Total Kjeldahl Nitrogen (TKN)	2017/03/07	3.4		%	20
4889091	ZSK	Matrix Spike	Phenols-4AAP	2017/03/07		100	%	80 - 120
4889091	ZSK	Spiked Blank	Phenols-4AAP	2017/03/07		101	%	85 - 115
4889091	ZSK	Method Blank	Phenols-4AAP	2017/03/07	<0.0010		mg/L	
4889091	ZSK	RPD	Phenols-4AAP	2017/03/07	NC		%	20
4889099	RON	Matrix Spike	Mercury (Hg)	2017/03/08		104	%	75 - 125

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Maxxam Job #: B743930
Report Date: 2017/03/15

Golder Associates Ltd
Client Project #: 1771738
Sampler Initials: GC

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
4889099	RON	Spiked Blank	Mercury (Hg)	2017/03/08		103	%	80 - 120
4889099	RON	Method Blank	Mercury (Hg)	2017/03/08	<0.0001		mg/L	
4889099	RON	RPD	Mercury (Hg)	2017/03/08	NC		%	20

N/A = Not Applicable

Duplicate: Paired analysis of a separate portion of the same sample. Used to evaluate the variance in the measurement.

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

QC Standard: A sample of known concentration prepared by an external agency under stringent conditions. Used as an independent check of method accuracy.

Spiked Blank: A blank matrix sample to which a known amount of the analyte, usually from a second source, has been added. Used to evaluate method accuracy.

Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.

Surrogate: A pure or isotopically labeled compound whose behavior mirrors the analytes of interest. Used to evaluate extraction efficiency.

NC (Matrix Spike): The recovery in the matrix spike was not calculated. The relative difference between the concentration in the parent sample and the spike amount was too small to permit a reliable recovery calculation (matrix spike concentration was less than the native sample concentration)

NC (Duplicate RPD): The duplicate RPD was not calculated. The concentration in the sample and/or duplicate was too low to permit a reliable RPD calculation (absolute difference <= 2x RDL).

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VALIDATION SIGNATURE PAGE

The analytical data and all QC contained in this report were reviewed and validated by the following individual(s).

Brad Newman, Scientific Specialist

Cristina Carriere, Scientific Services

Riddhi Bayal

Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

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