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PROJECT No. 1773927-3000

TO City of Ottawa and Minto Communities - Canada

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DESKTOP HYDROGEOLOGICAL ASSESSMENT PROPOSED RESIDENTIAL SUBDIVISION 3311 GREENBANK ROAD, OTTAWA, ONTARIO

This report presents the results of a desktop hydrogeological assessment carried out for the proposed residential subdivision development site at 3311 Greenbank Road, in Ottawa, Ontario. The hydrogeological assessment is required for draft plan approval.

The purpose of this hydrogeological assessment was to determine the general soil and groundwater conditions across this site, by means of existing on-site borehole information and data from nearby sites, and to address possible construction-related impacts to private water supply wells. The on-site information was enhanced with published mapping and publicly available information. The water well records in the Ministry of the Environment and Climate Change (MOECC) Water Well Information System (WWIS) for nearby water wells were used to provide further information regarding hydrogeological conditions in the area and identify where nearby water well users are taking their water.

1.0 DESCRIPTION OF PROJECT AND SITE

Plans are being prepared for a proposed residential development to be located at 3311 Greenbank Road in Ottawa, Ontario (see Key Plan inset on Figure 1).

The following information is known about the site and the proposed development:

- The property is roughly rectangular in shape with a maximum length and width of approximately 400 and 120 metres, respectively.
- The site is bounded to the west by Greenbank Road, to the north by an existing high school, to the east by Jockvale Road, and to the south by undeveloped lands.
- The site has a relatively flat to gently sloping topography from about elevation 97 to 91 metres, decreasing in elevation towards the Jock River.
- The site primarily consists of undeveloped vacant and/or agricultural land, with some rows of trees.
- The property is to be developed as a residential subdivision consisting of townhomes.



2.0 GEOLOGY AND HYDROGEOLOGY

The following sections describe the published local geology and hydrogeology in the vicinity of the site.

2.1 Surficial Geology

Based on published mapping (Figure 2), the surficial geology at the site is interpreted to predominantly consist of a thick deposit of glacial till. Published mapping indicates the bedrock surface to be at depths in the range of 5 to 15 metres below the ground surface in the vicinity of the site (Figure 3).

2.2 Bedrock Geology

The Ontario Geological Survey bedrock geology mapping indicates that the site is underlain by interbedded dolostone, shale and sandstone of the Oxford Formation (Figure 4).

2.3 Hydrogeology

2.3.1 Overburden Aquifer

The clay and glacial till deposits in the area are generally not capable of supplying sufficient quantities of groundwater to be considered an aquifer. As a result, the principal aquifer within the vicinity of the site is considered to be the underlying bedrock formations.

2.3.2 Bedrock Aquifers

The Oxford formation is considered to be a highly transmissive aquifer, and well yields in this formation have been reported between 45 and 115 L/min. Generally, the Oxford Formation provides an adequate resource for domestic water supplies. Groundwater flow in the Oxford formation is controlled predominately by fractures, as the primary porosity has been reduced by cementation.

2.3.3 Local Water Supply Wells

There are a total of 6 water wells identified in the MOECC Water Well Information System (WWIS), with a location accuracy of 300 metres or less, located within 100 metres of the site. The WWIS indicates that all of the wells were constructed to be used as water supply (domestic or livestock). The depths of the wells range from 20 to 72 metres, and the depth to the static water level water ranges from 2 to 3 metres (for wells where depth information is available in the WWIS).

3.0 SITE SPECIFIC GEOLOGY AND HYDROGEOLOGY

3.1 General

Golder Associates completed a geotechnical investigation at this site in 2017, which included eight boreholes advanced across the site.

Golder Associates also previously completed a geotechnical investigation for the South Nepean Collector sewer, which is being constructed to cross the site.

Based on a review of those previous studies and published geological mapping, the subsurface conditions at the site are interpreted to consist of topsoil and fill, overlying silty clay (within the eastern portion of the site), overlying bouldery glacial till, above bedrock. Available borehole logs are included in Attachment A, and borehole locations are indicated on Figure 1.



3.2 Site Specific Geology

Topsoil, Peat and Fill

Topsoil or peat exists at the ground surface at most of the borehole locations. Where encountered, the topsoil and peat ranges from about 80 to 600 millimetres in thickness. Fill was encountered at boreholes 17-01, 17-03, and 17-07. At these locations, the fill ranges from 1.1 to 2.8 metres thick. The fill consists of silty sand, sandy gravel, silty clay, and clayey silt.

Silty Clay

A deposit of silty clay exists below the topsoil in boreholes 17-04, 17-05, 15-3, 15-3A, and 15-4, towards the eastern portion of the site. The full thickness of the clay has been weathered to a grey brown crust and extends to depths ranging from about 1.5 to 2.3 metres below the existing ground surface.

Glacial Till and Interbedded Sand/Silt/Gravel

A deposit of glacial till, containing discontinuous interbedded sand, silt and gravel layers, exists below the topsoil, fill and silty clay (where present) in all of the boreholes from the previous investigations. The glacial till generally consists of a heterogeneous mixture of gravel, cobbles, and boulders in a matrix of silty sand, with variable amounts of silt, clay and gravel.

In boreholes 17-06, 15-2 and 15-4 to 15-7, the glacial till is interbedded with discontinuous layers of silt, sand, and gravel. The composition of the intermittently interbedded layers ranges from sandy silt, to silty sand, to sand, to gravelly sand, to sand and gravel. These layers would not typically be described as glacial till either due to the absence of fines (silt and clay) or gravel, cobbles and boulders.

The glacial till was proven to extend to depths varying from about 2.0 to 11.7 metres below the existing ground surface during the current investigation prior to the boreholes encountering practical refusal to augering or being terminated.

Auger Refusal and Bedrock

Practical refusal to augering was encountered at boreholes 15-1, 15-17A, 15-101, 17-01 through 17-04, 17-06, and 17-08, at depths varying between about 2.0 to 11.7 metres below the existing ground surface. Refusal may indicate the bedrock surface; however, it could also represent boulders within the glacial till.

Bedrock was encountered at boreholes 15-2, 15-7, 16-301 and 16-302. The boreholes were extended into the bedrock to depths of about 3.0 to 3.2 metres below the top of bedrock using rotary diamond drilling techniques while retrieving NQ sized core.

Borehole/ Test Pit Number	Ground Surface Elevation (masl)	Depth to Bedrock (m)	Bedrock Surface Elevation (masl)
15-2	91.59	11.58	80.01
15-7	92.84	6.20	86.64
16-301	93.16	9.80	83.36
16-302	93.06	8.02	85.04

The following table summarizes the bedrock surface depths and elevations encountered at the borehole locations.

The bedrock encountered in the boreholes consists of slightly weathered to fresh, thinly to thickly bedded, grey dolomite.



3.3 Hydrogeology

Monitoring wells were sealed into selected boreholes during previous investigations to allow for hydraulic response testing and measurements of the groundwater level. Estimates of hydraulic conductivity in monitoring wells where testing was completed as well as measured groundwater levels are provided in the following table.

Well	Geologic Unit of	Groundwa	ater Level	Date of	Estimated Hydraulic	
ID	Screened Interval	Depth (m)	Elevation (m)	Measurement	Conductivity (m/s)	
17-01	Glacial Till	4.31	90.44	April 5, 2017	-	
17-06	Glacial till and interbedded sand	1.57	91.71	April 5, 2017	-	
15-2 screen 'A'	Bedrock	4.10	87.49	August 24, 2015	4x10 ⁻⁷	
15-2 screen 'B'	Sand and gravel (interbedded within glacial till)	3.17 2.18	88.42 89.41	August 24, 2015 April 7, 2016	3x10⁻⁵	
15-3A	Glacial till	2.98	88.36	August 24, 2015	-	
15-5	Glacial till and interbedded sandy silt	3.19	89.60	August 24, 2015	5x10 ⁻⁸	
15-7	Bedrock	2.17 1.91	90.67 90.93	August 24, 2015 April 7, 2016	5x10 ⁻⁷	
15-101	Glacial till	3.57	88.86	August 24, 2015	-	

Water levels across the area surrounding the site range from 1.57 to 4.31 metres depth. It should be noted that groundwater levels are expected to fluctuate seasonally. Higher groundwater levels are expected during wet periods of the year, such as spring.

4.0 POTENTIAL IMPACTS TO EXISTING GROUNDWATER USERS

There are a total of 6 wells in the WWIS database that were constructed as water supply wells, located within 100 metres of the site. Details regarding the water supply wells are presented in the following table. Refer to Figure 1 for the well locations.

Well ID	Depth of Well (m)	Depth to Static Water Level (m)	Depth to Water Found (m)	Available Drawdown (m)	Type of Well
1506043	20.7	3.0	15.8	17.7	Bedrock
1509672	28.7	2.4	28.0	26.3	Bedrock
1509673	32.3	2.4	32.0	29.9	Bedrock
1516112	71.6	2.4	71.6	69.2	Bedrock
1517629	15.2	2.4	13.7	12.8	Bedrock
7165137					



The well record associated with Well ID 7165137 is for an extension of the well casing (above ground). As such no details regarding the original construction of the well are available. The original well record for the well is not available. From the available well records, water supply wells in the area generally obtain water from the bedrock aquifer. As such it is likely that Well ID 7165137 is completed in a similar fashion.

Based on aerial photographs, there do not appear to be residences or buildings in the vicinity of Well ID 1516112 and Well ID 1517629. The well location sketches on the associated well records suggest that the locations of these water wells may have been incorrectly plotted.

The available drawdown in the wells, calculated as the difference between the static water level and the depth of the well) ranges from 12.8 to 69.2 metres. Considering that the overburden thickness in the area is mapped between 5 and 15 metres in thickness, a temporary drawdown, due to construction dewatering for the installation of services, could temporarily reduce the available drawdown in the wells but not likely to the degree that could negatively impact water supply. It is understood that there are no structures or land uses planned for the site that would permanently lower the groundwater levels in the area surrounding the site (i.e., deep drained foundations).

Prior to construction at the site, it is recommended that a well survey be completed of the residences with wells located within approximately 100 metres of the property boundary. Information to be collected during the well survey could include the depth of the well, type of pump, and static water level. Water quality samples could be collected and analyzed for a typical suite of parameters (i.e. the 'subdivision package' as per MOECC Procedure D-5-5).

5.0 LIMITATIONS AND USE OF MEMORANDUM

This technical memorandum was prepared for the exclusive use of Minto Communities – Canada and the City of Ottawa. The technical memorandum, which specifically includes all tables, figures and appendices, is based on data gathered by Golder Associates Ltd., and information provided to Golder Associates Ltd. by others. The information provided by others has not been independently verified or otherwise examined by Golder Associates Ltd. to determine the accuracy or completeness. Golder Associates Ltd. has relied in good faith on this information and does not accept responsibility for any deficiency, misstatements, or inaccuracies contained in the information as a result of omissions, misinterpretation or fraudulent acts.

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Any use which a third party makes of this technical memorandum, or any reliance on, or decisions to be made based on it, are the responsibilities of such third parties. Golder Associates Ltd. accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made, or actions taken based on this technical memorandum.



6.0 **CLOSURE**

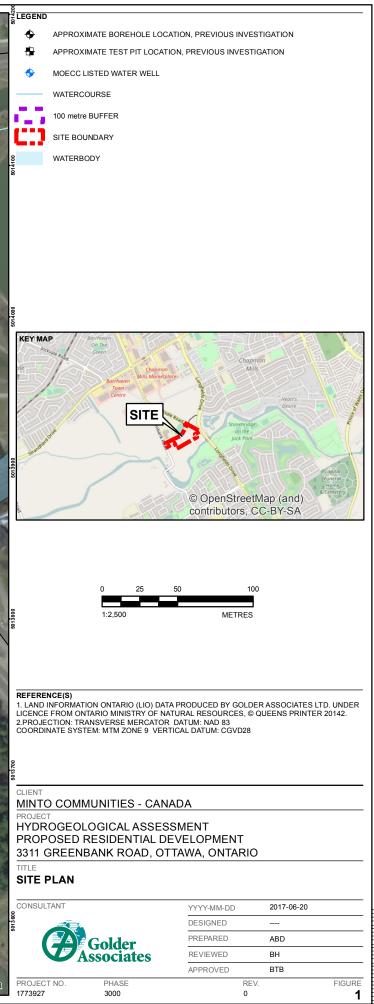
We trust this submission satisfies the requirements for a desktop hydrogeological assessment of the proposed residential subdivision development at 3311 Greenbank Road, in Ottawa, Ontario. If you have any questions regarding this report, please contact the undersigned.

Sup PROFESSIONAL SUP SUP JUN 21/17 nen 100162667 Loren Bekeris, M.Sc., P.Eng Brian Byerley, M.Sc., P.Eng. BOLINCE OF OMTANIO Senior Hydrogeologist/Principal **Environmental Engineer** LEB/BTB/hw n:\active\2017\3 proj\1773927 minto barrhaven town center\05_report\hydrogeology\hydrogeology assessment.dec Attachments:

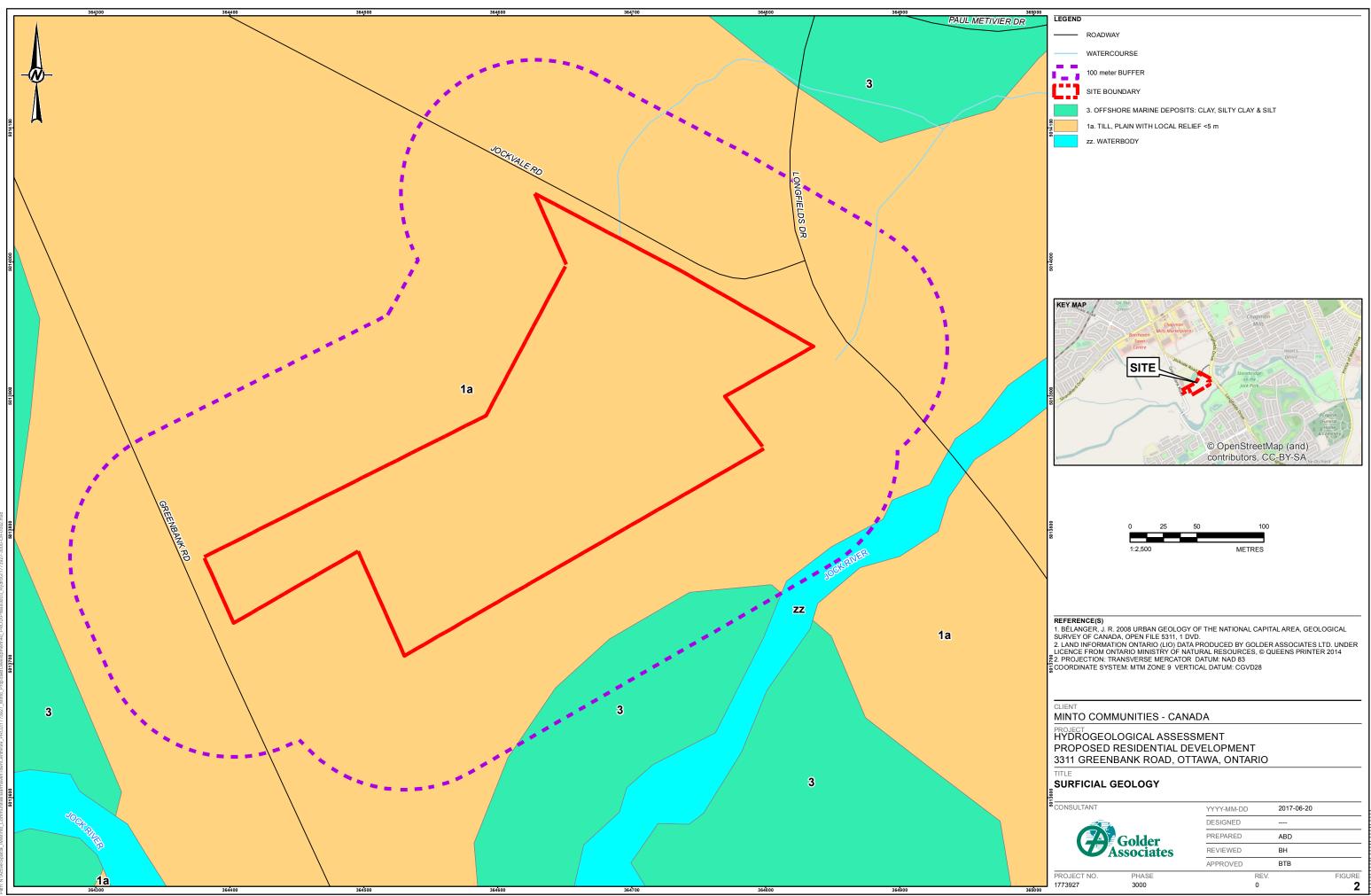
Figures 1 to 4 Attachment A – Borehole Logs

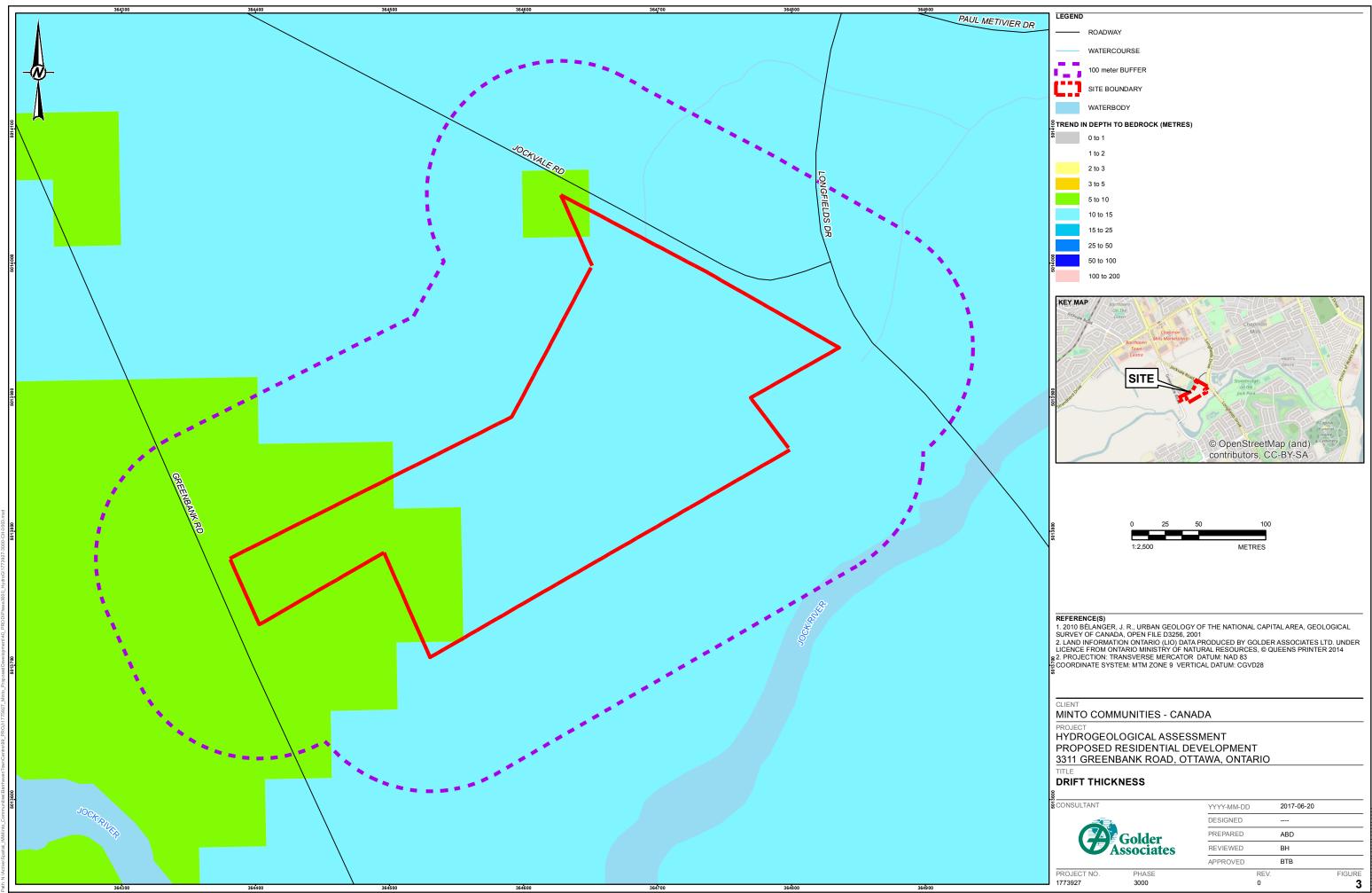


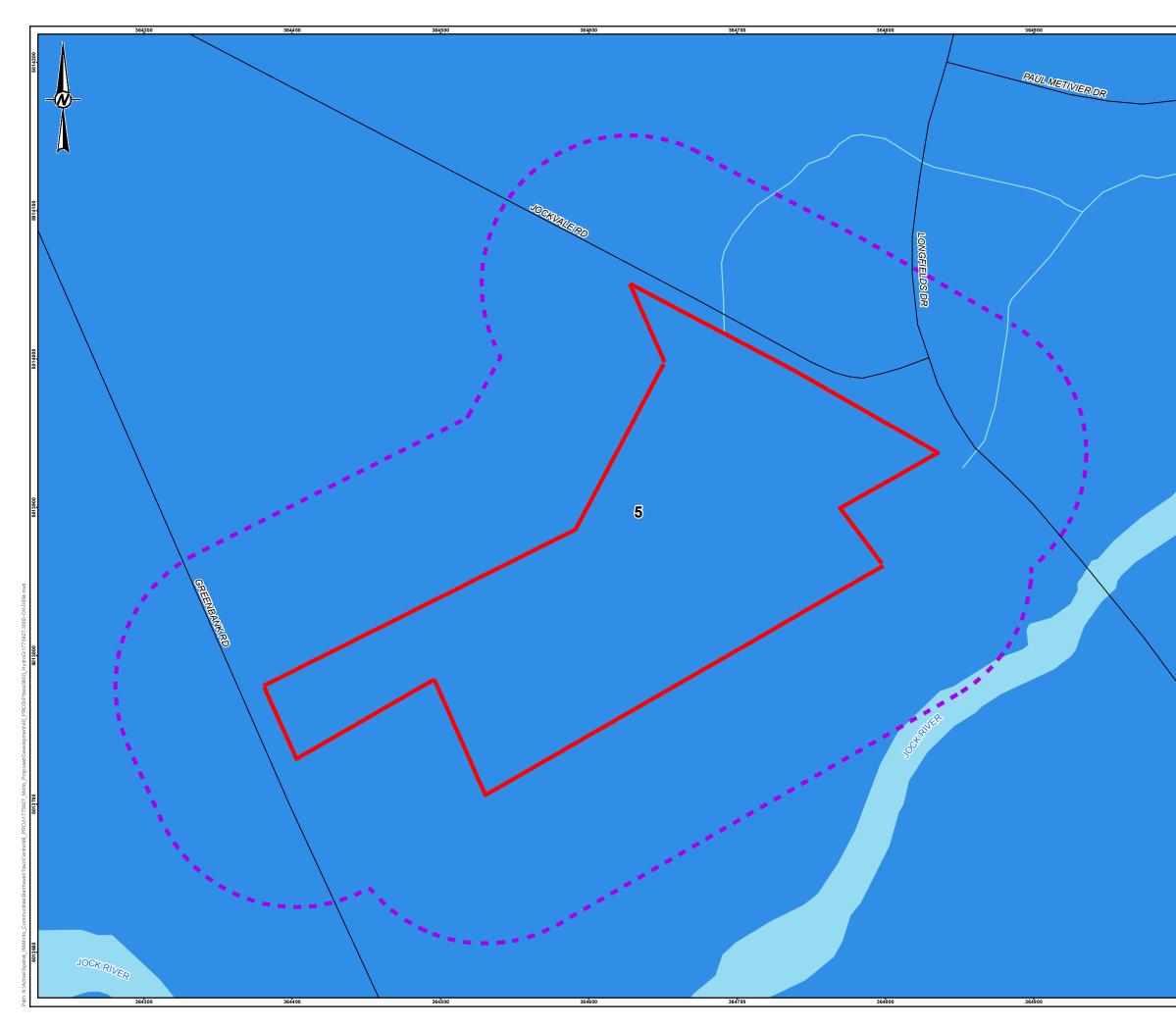




THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN









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ATTACHMENT A

Borehole Logs





METHOD OF SOIL CLASSIFICATION

Organic or Inorganic	Soil Group	Type of	f Soil	Gradation or Plasticity	Cu	$=\frac{D_{60}}{D_{10}}$		$Cc = \frac{(D)}{D_{10}}$	$(xD_{60})^2$	Organic Content	USCS Group Symbol	Group Name					
	_	nm) is	Gravels with ≤12%	Poorly Graded		<4		≤1 or 3	≥3		GP	GRAVEL					
(ss	COARSE-GRAINED SOILS (>50% by mass is larger than 0.075 mm)	VELS / mass action 14.75 I	fines (by mass)	Well Graded		≥4		1 to 3	3		GW	GRAVEL					
INORGANIC (Organic Content ≤30% by mass)		GRAVELS (>50% by mass of coarse fraction is larger than 4.75 mm)	Gravels with >12%	Below A Line			n/a				GM	SILTY GRAVEL					
SANIC t ≤30%	AINED rger th		fines (by mass)	Above A Line			n/a			<20%	GC	CLAYEY GRAVEL					
INORG	SE-GR/ ss is la	of is mm)	Sands with ≤12%	Poorly Graded		<6		≤1 or i	≥3	≤30%	SP	SAND					
ganic (COARS by mai	SANDS 6 by mass se fraction than 4.75	fines (by mass)	Well Graded		≥6		1 to 3	3		SW	SAND					
(Or	(>50%	SANDS (≥50% by mass of coarse fraction is smaller than 4.75 mm)	Sands with	Below A Line			n/a				SM	SILTY SAND					
		smal	>12% fines (by mass)	Above A Line			n/a				SC	CLAYEY SAND					
Organic						I	Field Indica	tors									
or Inorganic	Group	Type of	f Soil	Laboratory Tests	Dilatancy	Dry Strength	Shine Test	Thread Diameter	Toughness (of 3 mm thread)	Organic Content	USCS Group Symbol	Primary Name					
	FINE-GRAINED SOILS	plot		I founded to be to	Rapid	None	None	>6 mm	N/A (can't roll 3 mm thread)	<5%	ML	SILT					
(ss		55 mm	ss) 75 mm	75 mm	75 mm	75 mm	SILTS SILTS (Non-Plastic or PI and LL plot below A-Line on Plasticity Chart below)	and L sity ow)	Liquid Limit <50	Slow	None to Low	Dull	3mm to 6 mm	None to low	<5%	ML	CLAYEY SIL
by ma		SILTS SILTS astic or PI and below A-Line on Plasticity Chart below)		Slow to very slow	Low to medium	Dull to slight	3mm to 6 mm	Low	5% to 30%	OL	ORGANIC SILT						
ANIC ≤30%		VED So	VED Solution	NED S	NED S Ialler th	-Plasti bel Cha		Liquid Limit	Slow to very slow	Low to medium	Slight	3mm to 6 mm	Low to medium	<5%	МН	CLAYEY SIL	
INORGANIC Content ≤30%		(Non		≥50	None	Medium to high	Dull to slight	1 mm to 3 mm	Medium to high	5% to 30%	ОН	ORGANIC SILT					
INORGANIC (Organic Content ≤30% by mass)	FINE	FINE by mas	FINE by mas	FINE by mas	olot	ant art	Liquid Limit <30	None	Low to medium	Slight to shiny	~ 3 mm	Low to medium	0%	CL	SILTY CLAY		
D.		CLAYS and LL p	above A-Line on Plasticity Chart below)	Liquid Limit 30 to 50	None	Medium to high	Slight to shiny	1 mm to 3 mm	Medium	to 30%	CI	SILTY CLAY					
		(Pla	Plast	Liquid Limit ≥50	None	High	Shiny	<1 mm	High	(see Note 2)	СН	CLAY					
		Peat and mi mixtu									SILTY PEAT SANDY PEA						
HIGHLY ORGANIC SOILS	by mai	Predominar may conta mineral soil, amorphou	in some fibrous or						75% to 100%	PT	PEAT						
40 30 ((d) X4	Low	Plasticity		SILTY CLAY	CLAY CH CLAYEY S ORGANIC			a hyphen, For non-co the soil h transitiona gravel.	for example, bhesive soils, as between Il material b	GP-GM, S the dual s 5% and etween "c	two symbols SW-SC and C ymbols must b 12% fines (i.e lean" and "di pol must be us	ML. e used whe e. to identif rty" sand c					
Plasticity Index (PI) 05 -				Aline				liquid limit	and plasticity	y index val	ues plot in the ty Chart at lef	CL-ML are					

Borderline Symbol — A borderline symbol is two symbols separated by a slash, for example, CL/CI, GM/SM, CL/ML. A borderline symbol should be used to indicate that the soil has been identified as having properties that are on the transition between similar materials. In addition, a borderline symbol may be used to indicate a range of similar soil types within a stratum.

Liquid Limit (LL) Note 1 - Fine grained materials with PI and LL that plot in this area are named (ML) SILT with slight plasticity. Fine-grained materials which are non-plastic (i.e. a PL cannot be measured) are named SILT.

CLAYEY SILT ML ORGANIC SILT OL

SILTY CLAY

20 25.5

SILTY CLAY-CLAYEY SILT, CL-MI

10

SILT ML (See Note 1)

Note 2 – For soils with <5% organic content, include the descriptor "trace organics" for soils with between 5% and 30% organic content include the prefix "organic" before the Primary name.



10

70



ABBREVIATIONS AND TERMS USED ON RECORDS OF BOREHOLES AND TEST PITS

PARTICLE SIZES OF CONSTITUENTS

Soil Constituent	Particle Size Description	Millimetres	Inches (US Std. Sieve Size)		
BOULDERS	Not Applicable	>300	>12		
COBBLES	Not Applicable	75 to 300	3 to 12		
GRAVEL	Coarse Fine	19 to 75 4.75 to 19	0.75 to 3 (4) to 0.75		
SAND	Coarse Medium Fine	2.00 to 4.75 0.425 to 2.00 0.075 to 0.425	(10) to (4) (40) to (10) (200) to (40)		
SILT/CLAY	Classified by plasticity	<0.075	< (200)		

MODIFIERS FOR SECONDARY AND MINOR CONSTITUENTS

Percentage by Mass	Modifier	
>35	Use 'and' to combine major constituents (<i>i.e.</i> , SAND and GRAVEL, SAND and CLAY)	
> 12 to 35	Primary soil name prefixed with "gravelly, sandy, SILTY, CLAYEY" as applicable	
> 5 to 12	some	
≤ 5	trace	

PENETRATION RESISTANCE

Standard Penetration Resistance (SPT), N:

The number of blows by a 63.5 kg (140 lb) hammer dropped 760 mm (30 in.) required to drive a 50 mm (2 in.) split-spoon sampler for a distance of 300 mm (12 in.).

Cone Penetration Test (CPT)

An electronic cone penetrometer with a 60° conical tip and a project end area of 10 cm² pushed through ground at a penetration rate of 2 cm/s. Measurements of tip resistance (q_t), porewater pressure (u) and sleeve frictions are recorded electronically at 25 mm penetration intervals.

Dynamic Cone Penetration Resistance (DCPT); Nd:

The number of blows by a 63.5 kg (140 lb) hammer dropped 760 mm (30 in.) to drive uncased a 50 mm (2 in.) diameter, 60° cone attached to "A" size drill rods for a distance of 300 mm (12 in.).

- PH: Sampler advanced by hydraulic pressure
- PM: Sampler advanced by manual pressure
- WH: Sampler advanced by static weight of hammer
- WR: Sampler advanced by weight of sampler and rod

NON-COHESIVE (COHESIONLESS) SOILS

Compactness ²					
	Term SPT 'N' (blows/0.3m) ¹				
,	Very Loose	0 - 4			
	Loose	4 to 10			
	Compact	10 to 30			
	Dense	30 to 50			
١	/ery Dense	>50			
	Field Meint	ure Condition			
Term					
Term	L	Description			
Dry	Soil flows freely thre	Soil flows freely through fingers.			
	Soils are darker than in the dry condition and may feel cool.				
Moist		an in the dry condition and			
Moist Wet	may feel cool.	an in the dry condition and ree water forming on hands			

S V	MPI	ES
SA		LES

SAMPLES	
AS	Auger sample
BS	Block sample
CS	Chunk sample
DO or DP	Seamless open ended, driven or pushed tube sampler – note size
DS	Denison type sample
FS	Foil sample
GS	Grab Sample
RC	Rock core
SC	Soil core
SS	Split spoon sampler – note size
ST	Slotted tube
ТО	Thin-walled, open – note size
TP	Thin-walled, piston – note size
WS	Wash sample

SOIL TESTS

SUIL TESTS	
w	water content
PL, w _p	plastic limit
LL, wL	liquid limit
С	consolidation (oedometer) test
CHEM	chemical analysis (refer to text)
CID	consolidated isotropically drained triaxial test ¹
CIU	consolidated isotropically undrained triaxial test with porewater pressure measurement ¹
D _R	relative density (specific gravity, Gs)
DS	direct shear test
GS	specific gravity
М	sieve analysis for particle size
МН	combined sieve and hydrometer (H) analysis
MPC	Modified Proctor compaction test
SPC	Standard Proctor compaction test
OC	organic content test
SO ₄	concentration of water-soluble sulphates
UC	unconfined compression test
UU	unconsolidated undrained triaxial test
V (FV)	field vane (LV-laboratory vane test)
γ	unit weight
1. Tests whi	ch are anisotropically consolidated prior to shear are show

Tests which are anisotropically consolidated prior to shear are shown as CAD, CAU. COHESIVE SOILS

CONLOIVE C

Consistency				
Term	Undrained Shear Strength (kPa)	SPT 'N' ^{1,2} (blows/0.3m)		
Very Soft	<12	0 to 2		
Soft	12 to 25	2 to 4		
Firm	25 to 50	4 to 8		
Stiff	50 to 100	8 to 15		
Very Stiff	100 to 200	15 to 30		
Hard	>200	>30		

 SPT 'N' in accordance with ASTM D1586, uncorrected for overburden pressure effects; approximate only.

effects; approximate only.

 SPT 'N' values should be considered ONLY an approximate guide to consistency; for sensitive clays (e.g., Champlain Sea clays), the N-value approximation for consistency terms does NOT apply. Rely on direct measurement of undrained shear strength or other manual observations.

	Water Content
Term	Description
w < PL	Material is estimated to be drier than the Plastic Limit.
w ~ PL	Material is estimated to be close to the Plastic Limit.
w > PL	Material is estimated to be wetter than the Plastic Limit.





Unless otherwise stated, the symbols employed in the report are as follows:

I.	GENERAL	(a) w	Index Properties (continued) water content
π In x Iog ₁₀ g t	3.1416 natural logarithm of x x or log x, logarithm of x to base 10 acceleration due to gravity time	w _I or LL w _p or PL I _p or PI Ws I _L IC emax emin	liquid limit plastic limit plasticity index = $(w_l - w_p)$ shrinkage limit liquidity index = $(w - w_p) / I_p$ consistency index = $(w_l - w) / I_p$ void ratio in loosest state void ratio in densest state
II.	STRESS AND STRAIN	ID	density index = $(e_{max} - e) / (e_{max} - e_{min})$ (formerly relative density)
$\gamma \Delta$	shear strain change in, e.g. in stress: $\Delta \sigma$	(b) h	Hydraulic Properties hydraulic head or potential
E Ev	linear strain volumetric strain coefficient of viscosity	q v i	rate of flow velocity of flow hydraulic gradient
η υ σ	Poisson's ratio total stress	k	hydraulic conductivity (coefficient of permeability)
σ΄ σ΄ _{νο}	effective stress ($\sigma' = \sigma - u$) initial effective overburden stress principal stress (major, intermediate,	j	seepage force per unit volume
01, 02, 03	minor)	(c) C _c	Consolidation (one-dimensional) compression index
σ_{oct}	mean stress or octahedral stress = $(\sigma_1 + \sigma_2 + \sigma_3)/3$	Cr	(normally consolidated range) recompression index
τ u	shear stress porewater pressure	Cs	(over-consolidated range) swelling index
E G	modulus of deformation shear modulus of deformation	Cα mv	secondary compression index coefficient of volume change
ĸ	bulk modulus of compressibility	Cv	coefficient of consolidation (vertical direction)
		Ch T	coefficient of consolidation (horizontal direction)
III.	SOIL PROPERTIES	Tv U	time factor (vertical direction) degree of consolidation
(a) ρ(γ)	Index Properties bulk density (bulk unit weight)*	σ΄ _Ρ OCR	pre-consolidation stress over-consolidation ratio = $\sigma'_{P} / \sigma'_{vo}$
ρ(γ) ρ _d (γ _d)	dry density (dry unit weight)	(d)	Shear Strength
ρw(γw) ρs(γs) γ΄	density (unit weight) of water density (unit weight) of solid particles unit weight of submerged soil	τ _ρ , τ _r φ΄ δ	peak and residual shear strength effective angle of internal friction angle of interface friction coefficient of friction = tan δ
DR	$(\gamma' = \gamma - \gamma_w)$ relative density (specific gravity) of solid particles (D _R = ρ_s / ρ_w) (formerly G _s)	μ C΄ Cu, Su	effective cohesion undrained shear strength ($\phi = 0$ analysis)
e n S	void ratio porosity degree of saturation	p p' q q _u St	mean total stress $(\sigma_1 + \sigma_3)/2$ mean effective stress $(\sigma'_1 + \sigma'_3)/2$ $(\sigma_1 - \sigma_3)/2$ or $(\sigma'_1 - \sigma'_3)/2$ compressive strength $(\sigma_1 - \sigma_3)$ sensitivity
where	ty symbol is ρ . Unit weight symbol is $\gamma = \rho g$ (i.e. mass density multiplied by eration due to gravity)	Notes: 1 2	τ = c' + σ' tan φ' shear strength = (compressive strength)/2





WEATHERINGS STATE

Fresh: no visible sign of rock material weathering.

Faintly weathered: weathering limited to the surface of major discontinuities.

Slightly weathered: penetrative weathering developed on open discontinuity surfaces but only slight weathering of rock material.

Moderately weathered: weathering extends throughout the rock mass but the rock material is not friable.

Highly weathered: weathering extends throughout rock mass and the rock material is partly friable.

Completely weathered: rock is wholly decomposed and in a friable condition but the rock and structure are preserved.

BEDDING THICKNESS

Bedding Plane Spacing
Greater than 2 m
0.6 m to 2 m
0.2 m to 0.6 m
60 mm to 0.2 m
20 mm to 60 mm
6 mm to 20 mm
Less than 6 mm

JOINT OR FOLIATION SPACING

Description	Spacing
Very wide	Greater than 3 m
Wide	1 m to 3 m
Moderately close	0.3 m to 1 m
Close	50 mm to 300 mm
Very close	Less than 50 mm

GRAIN SIZE

<u>Size*</u>
Greater than 60 mm
2 mm to 60 mm
60 microns to 2 mm
2 microns to 60 microns
Less than 2 microns

Note: * Grains greater than 60 microns diameter are visible to the naked eye.

CORE CONDITION

Total Core Recovery (TCR)

The percentage of solid drill core recovered regardless of quality or length, measured relative to the length of the total core run.

Solid Core Recovery (SCR)

The percentage of solid drill core, regardless of length, recovered at full diameter, measured relative to the length of the total core run.

Rock Quality Designation (RQD)

The percentage of solid drill core, greater than 100 mm length, as measured along the centerline axis of the core, relative to the length of the total core run. RQD varies from 0% for completely broken core to 100% for core in solid segments.

DISCONTINUITY DATA

Fracture Index

A count of the number of naturally occuring discontinuities (physical separations) in the rock core. Mechanically induced breaks caused by drilling are not included.

Dip with Respect to Core Axis

The angle of the discontinuity relative to the axis (length) of the core. In a vertical borehole a discontinuity with a 90° angle is horizontal.

Description and Notes

MB Mechanical Break

An abbreviation description of the discontinuities, whether naturally occurring separations such as fractures, bedding planes and foliation planes and mechanically separated bedding or foliation surfaces. Additional information concerning the nature of fracture surfaces and infillings are also noted.

Abbreviations		
JN Joint	PL	Planar
FLT Fault	CU	Curved
SH Shear	UN	Undulating
VN Vein	IR	Irregular
FR Fracture	К	Slickensided
SY Stylolite	PO	Polished
BD Bedding	SM	Smooth
FO Foliation	SR	Slightly Rough
CO Contact	RO	Rough
AXJ Axial Joint	VR	Very Rough
KV Karstic Void		

Golder

LOCATION: See Site Plan

SAMPLER HAMMER, 64kg; DROP, 760mm

RECORD OF BOREHOLE: 17-01

SHEET 1 OF 1 DATUM: Geodetic

BORING DATE: March 14, 2017

	P		SOIL PROFILE			SA	MPL		DYNAMIC PENETRA RESISTANCE, BLOW	TION /S/0.3m		HYDRAULIC k, crr		UCTIVI	ΙY,	ęĻ	PIEZOMETER
METRES	BORING METHOD			STRATA PLOT		Ř		BLOWS/0.30m	20 40	60 80		10 ⁻⁶	10 ⁻⁵	10-4	10 ⁻³	ADDITIONAL LAB. TESTING	OR
MET	DNG		DESCRIPTION	TAP	ELEV. DEPTH	NUMBER	ТҮРЕ	VS/0.	SHEAR STRENGTH Cu, kPa	nat V. + Q - ● rem V ⊕ U - ○	sT	WATER				B. TE	STANDPIPE INSTALLATIO
1	BOR			TRA:	(m)	R		3LOV				Wp —			- WI	LAR	
	\vdash	_	GROUND SURFACE	S				ш	20 40	60 80	+	20	40	60	80		
0	\vdash		FILL - (SM) SILTY SAND: dark brown.	***	94.75 0.00		\vdash				+						Destanti O i
			contains rootlets; non-cohesive, moist, compact			1	SS	12									Bentonite Seal
			FILL - (GP) sandy GRAVEL; brown; non-cohesive, moist, dense		94.14 0.61	2	SS	>50									
1			(SM) SILTY SAND, some gravel; grey brown, contains cobbles and boulders (GLACIAL TILL); non-cohesive, moist, compact to very dense		93.65 1.10	2		-50									Native Backfill and Bentonite
2						3	ss	39				0					
	Iger	ollow Stem				4	ss	>50									
3	Power Auger	200 mm Diam. (Hollow Stem)															
3		200 m				5	ss	>50									Bentonite Seal
																	Silica Sand
4						6	SS	28			C						∑
																	32 mm Diam. PVC #10 Slot Screen
5						7	SS	36									
			End of Borehole Auger Refusal	22766	89.39 5.36												
6																	WL in Screen at Elev. 90.44 m on April 5, 2017
7																	
8																	
9																	
10																	
DF	PTF		CALE														DGGED: DG
DE 1 :		I SC	CALE						Gold	er							DGGED: DG ECKED: TMS

LOCATION: See Site Plan

SAMPLER HAMMER, 64kg; DROP, 760mm

RECORD OF BOREHOLE: 17-02

BORING DATE: March 13, 2017

SHEET 1 OF 1

DATUM: Geodetic

Ш Д.,,			SOIL PROFILE	L	1	S/	AMPL		DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m	HYDRAULIC CONDUCTIVITY, k, cm/s	RGAL	PIEZOMETER
METRES		ME		STRATA PLOT		ШШ		BLOWS/0.30m	20 40 60 80	10 ⁻⁶ 10 ⁻⁵ 10 ⁻⁴ 10 ⁻³	ADDITIONAL LAB. TESTING	OR STANDPIPE
Ξ		S	DESCRIPTION	ATA I	ELEV. DEPTH (m)	IMBI	TYPE	WS/C	SHEAR STRENGTH Cu, kPanat V. + Q - ● rem V. ⊕ U - ○		ADDI AB. T	INSTALLATION
ē		<u>Š</u>		STR/	(m)	Ĭ		BLO	20 40 60 80	Wp		
	t		GROUND SURFACE		97.94		1					
0	F	Π	TOPSOIL - (SM) SILTY SAND; dark		0.00		1					
			brown; moist			1	SS	12				
					97.33							
			(SM) SILTY SAND, some gravel; brown, contains cobbles and boulders		0.61							
1			(GLACIAL TILL); non-cohesive, moist, dense			2	SS	>50				
			dense									
						3	SS	32				
2												
		Ê										
		w Stem)										
	Auger	(Hollo				4	SS	30				
3	, Jawe	Jiam.			Ŕ	\vdash						
э	ď	200 mm Diam. (Hollow					1					
		200				5	SS	39				
					1							
			(SM) SILTY SAND, some gravel: grev		94.13 3.81		-					
4			(SM) SILTY SAND, some gravel; grey brown, contains cobbles and boulders (GLACIAL TILL); non-cohesive, moist,			6	SS	>50				
			(GLACIAL TILL); non-conesive, moist, very dense		1	\vdash	-					
						L						
							1					
5						7	SS	50				
Ũ						<u> </u>	1					
			End of Doroholo		92.30 5.64		ss	>50				
			End of Borehole Auger Refusal		0.04							
6											Op	en borehole dry on completion of ing
											drill	ing
7												
8												
9												
10												
DF	PT	нs	CALE								LOG	GED: DG
	50								Golder			KED: TMS

MIS-BHS 001 1773927.GPJ GAL-MIS.GDT 06/09/17 JM

LOCATION: See Site Plan

SAMPLER HAMMER, 64kg; DROP, 760mm

RECORD OF BOREHOLE: 17-03

SHEET 1 OF 1 DATUM: Geodetic

BORING DATE: March 14, 2017

	-								DYNAMIC PENE	трати		<u> </u>	HYDRAULIC		עדועודי			
DEPTH SCALE METRES			SOIL PROFILE			SA	MPL		RESISTANCE, E	BLOWS	0.3m	Ľ,	k, cm	/s			NG	PIEZOMETER
H SC/				STRATA PLOT	ELEV.	ER		BLOWS/0.30m	20 4			0		1		0-3	ADDITIONAL LAB. TESTING	OR STANDPIPE
ME.H			DESCRIPTION	ATA	DEPTH	NUMBER	TYPE	WS/0	SHEAR STREN Cu, kPa	GTH r	at V. + em V.⊕	Q - ● U - ○	WATER Wp —		IT PERCE		ABDI AB. T	INSTALLATION
ā		ŝ		STR	(m)	z		BLO	20 4) 6	0 8	0	20	40		WI 30	<u>د</u> ~	
0			GROUND SURFACE		97.75													
- 0			FILL/TOPSOIL - (SM) SILTY SAND; \dark brown; moist /	***	0.00 0.08													-
_			FILL - (SM) SILTY SAND, some gravel;			1	SS	37										-
_			FILL - (SM) SILTY SAND, some gravel; brown, contains cobbles and boulders; non-cohesive, moist, dense to very loose															-
-																		-
- 1						2	SS	9										_
-						-												-
																		-
_		2																-
_		v Sten				3	SS	28										-
_ 2	Power Auger	Pllow																
_	wer A	am. (F																-
-	Po	Ē																-
-		200 n			94.92	4	SS	3										-
- 3		ł	(SM) SILTY SAND, some gravel; brown,		2.83													-
- 3			(SM) SILTY SAND, some gravel; brown, contains cobbles and boulders (GLACIAL TILL); non-cohesive, moist,				1											-
_			compact			5	SS	11										
_																		-
-																		-
- 4																		-
						6	SS	28										-
_		_	End of Borehole	ARX	93.31 4.44													-
-			Auger Refusal		4.44													-
-																		Open borehole dry – upon completion of –
- 5																		drilling -
-																		-
-																		-
																		-
- 6																		-
_																		-
_																		-
-																		-
-																		-
- 7																		
_																		-
_																		-
_																		-
-																		-
- 8																		-
																		-
_																		-
_																		-
- 9																		-
F																		-
_																		-
E																		-
L																		
- 10																		-
	L			<u> </u>														
DE	PT	ЧS	CALE							13-							L	DGGED: DG
1:									GOASS	ndei ncia	r tes							ECKED: TMS

LOCATION: See Site Plan

SAMPLER HAMMER, 64kg; DROP, 760mm

RECORD OF BOREHOLE: 17-04

SHEET 1 OF 1 DATUM: Geodetic

BORING DATE: March 14, 2017

Щ	Ģ		SOIL PROFILE			SA	MPLI		DYNAMIC PENETRATION	HYDRAULIC CONDUCTIVITY, k, cm/s	ξĻ	PIEZOMETER
DEPTH SCALE METRES	BOPING METHOD			STRATA PLOT		Ř		BLOWS/0.30m	20 40 60 80	10 ⁻⁶ 10 ⁻⁵ 10 ⁻⁴ 10 ⁻³	ADDITIONAL LAB. TESTING	OR
MET	U N		DESCRIPTION	TAF	ELEV. DEPTH	NUMBER	TYPE	VS/0.	SHEAR STRENGTH Cu, kPanat V. + Q - ● rem V. ⊕ U - ○	WATER CONTENT PERCENT	DDIT B. TE	STANDPIPE INSTALLATION
DE				TRA	(m)	Ŋ		LOV			LA	
	\vdash	·	GROUND SURFACE	S			\vdash	ш	20 40 60 80	20 40 60 80		
0		\square	(PT) Fibrous PEAT; dark brown;	EEE	92.21 0.00 92.01			_				
			non-cohesive	T	92.01	1	SS	6		0		
			(CI/CH) SILTY CLAY; grey brown (WEATHERED CRUST); cohesive,				33	0				
			w>PL, very stiff									
1						2	ss	8		0		
		2										
		Sterr			90.69							
	ger	ollo	(SM) SILTY SAND, some gravel; brown, contains cobbles and boulders		1.52							
	er Au	E.	(GLACIAL TILL); non-cohesive, moist,			3	SS	15			MH	
2	Ром	n Dia	compact									
	Power Auger	1 0 0										
		2										
						4	SS	13				
					1							
3			(SM) SILTY SAND, some gravel; grey,		89.16 3.05							$\overline{\Delta}$
			contains cobbles and boulders (GLACIAL TILL); non-cohesive, wet,			5	SS	15				<u> </u>
			compact									
	\vdash	Ч	End of Borehole	112	88.52 3.69							14/1 in an
4			Auger Refusal									WL in open borehole at 3.20 m depth below
												depth below ground surface upon completion of drilling
												drilling
5												
6												
7												
'												
8												
9												
10												
				<u> </u>								
DE	PTI	нs	CALE								LC	DGGED: DG
	50								Golder			ECKED: TMS

LOCATION: See Site Plan

RECORD OF BOREHOLE: 17-05

SHEET 1 OF 1

DATUM: Geodetic

SAMPLER HAMMER, 64kg; DROP, 760mm

BORING DATE: March 14, 2017

Ľ	ğ		SOIL PROFILE			SA	MPL		DYNAMIC PENETRA RESISTANCE, BLOW	/S/0.3m	1"	k,	cm/s	NDUC	IVITY,		μĥ	PIEZOMETER
DEP IN SUALE METRES	BORING METHOD			LOT		н.		BLOWS/0.30m	20 40	60 80		10 ⁻⁶	10	-5 1	0-4	10 ⁻³	ADDITIONAL LAB. TESTING	OR
MET	SNG		DESCRIPTION	STRATA PLOT	ELEV. DEPTH	NUMBER	ТҮРЕ	NS/0.	SHEAR STRENGTH Cu, kPa	nat V. + Q - rem V. ⊕ U - (8				PERC	ENT	B. TE	STANDPIPE INSTALLATION
រ	BOR			STR≜	(m)	٦ ۲		BLO/	20 40	60 80		Wp ⊢ 20	4		60	WI 80		
		1	GROUND SURFACE		91.44			_	20 40			20) (00		
0			TOPSOIL - (SM) SILTY SAND; dark		0.00													
		ſ	brown; moist (CI/CH) SILTY CLAY; grey brown (WEATHERED CRUST); cohesive,		0.15	1	SS	5										
			(WEATHERED CRUST); cohesive, w>PL, very stiff															
1																		
						2	SS	5										$\overline{\Delta}$
							-											
						3	SS	3					0					
2																		
		╞	(SM) SILTY SAND some gravel: brown		89.15 2.29													
		(jing)	(SM) SILTY SAND, some gravel; brown, contains cobbles and boulders (GLACIAL TILL); non-cohesive, moist,			4	SS	7				0						
	Ļ	ow Ste	loose				33	'				Ĭ						
3	Auge	(Holk																
	Power Auger	200 mm Diam. (Hollow Stem)			1													
		m b b b b b b b b b b b b b b b b b b b	(SM) SILTY SAND, some gravel; grey, contains cobbles and boulders		88.09 3.35	5	SS	7										
		20	(GLACIAL TILL); non-cohesive, wet,															
			very loose to very dense															
4						6	SS	3										
						7	SS	50										
5						ĺ	55	53										
						8	SS	54										
6						°	55	54										
Ŭ		+	End of Borehole	///X	85.34 6.10													
																		WL in open borehole at 1.22 m
																		denth helow
																		ground surface upon completion of drilling
7																		
8																		
_																		
9																		
10																		
חרי	ידם	101															1.4	DGGED: DG
		1.30	CALE						Gold	er							Ľ	JUGLD. DG

LOCATION: See Site Plan

SAMPLER HAMMER, 64kg; DROP, 760mm

RECORD OF BOREHOLE: 17-06

BORING DATE: March 13, 2017

SHEET 1 OF 1

DATUM: Geodetic

Щ	Ş	ĮĮ	SOIL PROFILE			SA	MPL	ES	DYNAMIC PENETRA RESISTANCE, BLOV	/S/0.3m		k, cn	1/s	CTIVITY,	ں ب	PIEZOMETER
DEP IN SUALE METRES	DODING METHOD			LOT		~		30m	20 40	60 80		10 ⁻⁶	10 ⁻⁵	10 ⁻⁴ 10 ⁻³	ADDITIONAL LAB. TESTING	OR
METF		ב ב	DESCRIPTION	STRATA PLOT	ELEV.	NUMBER	TYPE	BLOWS/0.30m	SHEAR STRENGTH Cu, kPa	nat V. + Q - ● rem V. ⊕ U - ○		WATER	CONTEN	IT PERCENT	EDIT.	STANDPIPE INSTALLATION
				TRA	DEPTH (m)	2		LOV							LAE	
		-+	GROUND SURFACE	S			$\left - \right $	ш	20 40	60 80		20	40	60 80		
0		\square	TOPSOIL - (SM) SILTY SAND; dark	EEE	93.28 0.00								-			
			brown; non-cohesive, moist			1	SS	5								Bentonite Seal
					92.67											
			(SM) SILTY SAND, some gravel; brown, contains cobbles and boulders	ĪŪ	0.61											
1			(GLACIAL TILL); non-cohesive, moist,													
			compact to very dense			2	SS	11								
								. 50								Native Backfill and
						3	SS	>50								Bentonite
2																
		Ê														
		w Ster				4	SS	17			0					
	Auger	(Hollo				Ĺ					ľ					Native Backfill and Bentonite
3	Power Auger	200 mm Diam. (Hollow Stem)			1											
	4	mm				5	SS	>50								
		20														Bentonite Seal
					89.47											
4		[(SM) SILTY SAND, some gravel; grey, contains cobbles and boulders		3.81											Silica Sand
-			(GLACIAL TILL); non-cohesive, wet, compact			6	SS	27								
			(SP) SAND, fine, trace to some	410	88.71 4.57											
			non-plastic fines; grey; non-cohesive, wet, compact			7	ss	17				0				32 mm Diam. PVC #10 Slot Screen
5				61354P	88.13											
			(SM) SILTY SAND, some gravel; grey, contains cobbles and boulders		5.15											
			(GLACIAL TILL); non-cohesive, wet, very dense			8	ss	>50								
		\square	End of Borehole	6152	87.54 5.74	<u> </u>										
6			Auger Refusal													WL in Screen at
																Elev. 91.71 m on April 5, 2017
7																
8																
o																
9																
10																
DE	۲T	нS	CALE						Gold	7k					L	OGGED: DG

LOCATION: See Site Plan

SAMPLER HAMMER, 64kg; DROP, 760mm

RECORD OF BOREHOLE: 17-07

BORING DATE: March 13, 2017

SHEET 1 OF 1 DATUM: Geodetic

4	P	SOIL PROFILE			SP	MPL		DYNAMIC PENETRA RESISTANCE, BLO	/S/0.3m	$\overline{\langle}$	k,	cm/s	UCTIVIT	.,	μŞ	PIEZOMETER
METRES	BORING METHOD		STRATA PLOT		н К		BLOWS/0.30m	20 40		80	10-6	10 ⁻⁵	10-4	10 ⁻³	ADDITIONAL LAB. TESTING	OR
WEI	SING	DESCRIPTION	ιTA F	ELEV. DEPTH	NUMBER	TYPE	VS/0	SHEAR STRENGTH Cu, kPa	nat V. H	- Q - O		ER CONT			DDIT B. TE	INSTALLATION
5	BOR		STRA	(m)	z		3LOV	-			Wp H			- WI	LAA	
		GROUND SURFACE	0)	93.66				20 40	60	80	20	40	60	80		<u> </u>
0		FILL/TOPSOIL - (CL/ML) SILTY CLAY to		0.00												
		CLAYEY SILT; dark brown; cohesive, moist		ŝ	1	ss	4									
				×.												
				Š												
1																
				92.44	2	SS	6									
		(SM) SILTY SAND, some gravel; brown, contains cobbles and boulders (GLACIAL TILL); non-cohesive, moist,		1.22												
		(GLACIAL TILL); non-cohesive, moist, compact to dense														
					3	ss	32									
2				×												
						1										
				\$												
	Stem				4	SS	15									
	lollow				<u> </u>											
3	Power Auger 200 mm Diam. (Hollow Stem)	(SM) SILTY SAND, some gravel; grey,		90.61 3.05												
	al di mu	(SM) SILTY SAND, some gravel; grey, contains cobbles and boulders (GLACIAL TILL); non-cohesive, wet,		X X	5	SS	12									
	200 n	compact to dense														
				\$		1										
4																
					6	SS	10									
						$\left \right $										
						1										
					7	ss	40									$\overline{\Sigma}$
5																
				Ś												
				Ś	8	ss	13									
6				87.56												
	1	End of Borehole		6.10		1										
																WL in open borehole at 4.88 m
																depth below ground surface
																ground surface upon completion of drilling
7																
8																
9																
10																
				•												
DEI	PTH	SCALE						Gold							LC	DGGED: DG

LOCATION: See Site Plan

RECORD OF BOREHOLE: 17-08

BORING DATE: March 13, 2017

SHEET 1 OF 1

DATUM: Geodetic

SAMPLER HAMMER, 64kg; DROP, 760mm

PENETRATION TEST HAMMER, 64kg; DROP, 760mm

SALE	тнор	SOIL PROFILE	Ŀ	1	SA	MPLE		DYNAMIC PEN RESISTANCE,			``,		k, cm/s			- 2	AL ING	PIEZOMETER
METRES	BORING METHOD	DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	BLOWS/0.30m	20 SHEAR STREI Cu, kPa			80 - Q - ● 9 U - ○		TER CO		PERCE	IO ⁻³ INT WI	ADDITIONAL LAB. TESTING	OR STANDPIPE INSTALLATION
	В		S				B	20	10	60	80	20	4	06	0 8	80		
0		GROUND SURFACE TOPSOIL - (SM) SILTY SAND; dark	222	95.93 0.00		$\left \right $	+					├				-		
		brown; moist		95.62	1	GRAB	-											
	ger Mow Stem)	(SM) SILTY SAND, some gravel; brown, contains cobbles and boulders (GLACIAL TILL); non-cohesive, moist, dense to very dense		0.31														
1	Power Auger 200 mm Diam. (Hollow Stem)				2	SS	>50											
	200 m				3	ss	47										мн	
2		End of Borehole Auger Refusal		93.92 2.01		-												
																		Open borehole dry upon completion of drilling
3																		
4																		
5																		
6																		
7																		
8																		
9																		
10																		
DE		CALE					(G	olde	r ates								OGGED: DG IECKED: TMS

RECORD OF BOREHOLE: 15-1

BORING DATE: August 20, 2015

SHEET 1 OF 1 DATUM: CGVD28

LOCATION: N 5013950.9 ;E 364883.8

SAMPLER HAMMER, 64kg; DROP, 760mm

Ļ	НОВ	SOIL PROFILE		r	SA	MPL		DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m	HYDRAULIC CONDUCTIVITY, k, cm/s	2ºF	PIEZOMETER
METRES	BORING METHOD		STRATA PLOT		Ř		BLOWS/0.30m	20 40 60 80	10 ⁻⁸ 10 ⁻⁶ 10 ⁻⁴ 10 ⁻²	ADDITIONAL LAB. TESTING	OR
MET	SING	DESCRIPTION	VTA F	ELEV. DEPTH		TYPE	NS/0	SHEAR STRENGTH Cu, kPa nat V. + Q - ● rem V. ⊕ U - ○	WATER CONTENT PERCENT	B. TI	INSTALLATIO
5	BOR		STR	(m)	Z		BLOI	20 40 60 80	Wp	< \$	
		GROUND SURFACE		91.69			-			+	
0		FILL - (SM) SILTY SAND, some gravel;		0.00	1	AS	-				
		 brown, presence of organic matter; \non-cohesive, moist 	/	0.21							
		FILL - (SM) gravelly SILTY SAND; grey	. 📖								
1		brown to grey, presence of cobbles and boulders inferred from auger resistance (RE-WORKED GLACIAL TILL);			2	SS	31		0		
		non-cohesive, moist, dense to loose									
					3	SS	14				
2					3	33	14				
-											
					4	SS	9		0		
3											
				88.34	5	SS	6				
		FILL - (SC) gravelly CLAYEY SAND; grey brown (RE-WORKED GLACIAL TILL); cohesive, w~PL		3.30							
4		HLL); cohesive, w~PL									
				1	6	SS	4		0	мн	
5					7	SS	9		0		
	Stem										
	Power Auger mm Diam. (Hollow Stem)			86.05		SS	4				
6	Power Au Diam. (H	(SM/SC) gravelly SILTY SAND to gravelly CLAYEY SAND; grey, contains sand seams (GLACIAL TILL);		5.64							
U	Pov m Dia	sand seams (GLACIAL TILL); non-cohesive, wet, loose		1							
	200 m			1	9	SS	6		0		
7					-						
'					10	SS	6		0	мн	
		L		84.07							
		(SM) gravelly SILTY SAND; grey, contains sand layers up to 150 mm in		7.62		SS	17				
8		thickness, presence of cobbles and boulders inferred from auger resistance		1							
		(GLACIAL TILL); non-cohesive, wet, compact to very dense									
		Compact to very delise		1	12	SS	44		0	мн	
9				1							
					13	SS	53				
				1	-						
10											
				1							
11					14	SS	130		0	м	
				1							
		End of Borehole	166	79.98							
12		Auger Refusal									
13											
14		8									
15											
DE	PTH S	SCALE								LOG	GED: PAH
	75							Golder			CKED: SD

RECORD OF BOREHOLE: 15-2

BORING DATE: August 14-17, 2015

SHEET 1 OF 2 DATUM: CGVD28

LOCATION: N 5013925.3 ;E 364835.3

SAMPLER HAMMER, 64kg; DROP, 760mm

LE LE	НОВ	SOIL PROFILE	1.		SA	MPL		DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m	Ľ.	k, cm/s	ONDUCTIVITY,	2G NG	PIEZOMETER
DEPTH SCALE METRES	BORING METHOD	DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	BLOWS/0.30m	Cu, kPa rem V.	80 + Q-● ⊕ U-○	Wp I		ADDITIONAL LAB. TESTING	OR STANDPIPE INSTALLATION
		GROUND SURFACE	io	91.59			ā	20 40 60	80	20 40	0 60 80		
0		FILL - (SM) SILTY SAND, trace to some gravel, trace organic matter; dark brown; non-cohesive, moist TOPSOIL - (SM) SILTY SAND, trace gravel; dark brown; moist (SM) orgavelly SILTY SAND: orey brown.		0.10	1 2	AS AS SS							Native Backfill
2		with oxidation staining, presence of cobbles and boulders inferred from auger resistance (GLACIAL TILL); non-cohesive, moist to wet, dense to compact			4	ss	18						Native Backfill
3					5		25			0		мн	
4	Ctant)	(SW/GW and SM) SAND and GRAVEL and gravelly SILTY SAND; grey brown,		87.78 3.81	6 7	SS							Bentonite Seal Granitic Sand and Native Backfill
5	Power Auger	interbedded, presence of cobbles and builders inferred from observations in adjacent test pit excavations; non-cohesive, wet, compact			8	SS	25						32 mm Diam. PVC #10 Slot Screen 'B'
6	- 000	1007		85.49	9	SS	26			0		м	Granitic Sand
o		(SM and SP) gravelly SILTY SAND and gravelly SAND; grey brown to grey, interbedded, presence of cobbles and boulders inferred from auger resistance (GLACIAL TILL); non-cohesive, wet,		6.10	10	SS	38						Bentonite Seal
7		(GLACIAL TILL); non-conesive, wet, dense to very dense			11	SS	45						Granitic Sand
8					12	SS SS	114			0		МН	
9	_	-				SS							Native Backfill
10	Wash Boring	fuise A				SS							
11	Was	2 2			16 17	RC SS							
12		Borehole continued on RECORD OF DRILLHOLE 15-2	554	80.01 11.58									
13			1000 E										
14													
15													
DEI	РТН	SCALE						Golder				L	OGGED: PAH

		T: 1523645		RE	CO	RD																				IEET 2 OF 2	
		DN: N 5013925.3 ;E 364835.3 TION: -90° AZIMUTH:						DRI	LL R	G DA	ME	850				on Drilli	na								DA	TUM: CGVD28	в
ш	ORD		U			URN	JN FLT	- Joint - Fault		BI	D-B	eddin oliatio	g n	PI	L - Pla		PO- K	Polis	enside	ed		-	Broke For add				
DEPTH SCALE METRES	DRILLING RECORD	DESCRIPTION	SYMBOLIC LOG	ELEV.	RUN No.	4 COLOUR % RETURN	RE	- Shea - Vein - Conj	ugate RY	OI CI R.Q.D.	R- O L - C	ontac rthog leava ACT. DEX ER	onal ge		I - Ste t - Irre	Ded	SM- Ro - MB- Y DATA	Smo Roug Mech	oth h nanica	HY	a bak s DRAL	bbrevi f abbri ymbol: JLIC TVITY	ations re eviations s. Diame Point L	efer to l s & etral	list		
DE	DRILL	BEDROCK SURFACE	SYN	(m)		FLUSH	CORE 889	20 %		% 8888 1111	0.2	ER 25 m 2≨ R	B Angl		w.r.L DRE XIS RSS	DESCRI	SURFAC	EJcon	Jr Ja	K	, cm/s	ec	Inde (MP	ex -	MC Q' VG.		
- 12		Fresh, thinly to thickly bedded, grey DOLOMITE BEDROCK		80.01 11.58	1	100					1													-		Bentonite Seal	
	e Orill				2	100														10000				┢	_	Granitic Sand	
- 13	Rotary Drill NQ Core																									32 mm Diam. PVC #10 Slot Screen 'A'	
- 14		5			3	100																					
45		End of Drillhole	<u> </u>	77.06 14.53																					_	WL in Screen 'A' at	
- 15																									ľ	Elev. 87.49 m on Aug. 24, 2015 WL in Screen 'B' at Elev. 89.41 m on	t
- 16																									ľ	April 7, 2016	
- 17																											
18																											
- 19																										8	
- 20																											
20																											
- 21																											
- 22																											
- 23																											
- 24		5 6 7																									
- 25																											
- 26	10 B																										
DE 1 :		SCALE				(5		G	old	lei	r to	C													GGED: PAH ECKED: SD	

RECORD OF BOREHOLE: 15-3

BORING DATE: August 13, 2015

SHEET 1 OF 1

PENETRATION TEST HAMMER, 64kg; DROP, 760mm

DATUM: CGVD28

SAMPLER HAMMER, 64kg; DROP, 760mm

LOCATION: N 5013871.5 ;E 364762.7

DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m HYDRAULIC CONDUCTIVITY, k, cm/s TESTING PIEZOMETER OR STANDPIPE Log <thLog</th> <thLog</th> <thLog</th> 10⁻⁸ 10⁻⁶ 10⁻⁴ 10⁻² WATER CONTENT PE

0	THOD		SOIL PROFILE		1	SA	MPL	-	DYNAMIC PENE RESISTANCE, E			2		k, cm/s				AL ING	PIEZOMETER
METRES	BORING METHOD		DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	BLOWS/0.30m	20 40 SHEAR STRENG Cu, kPa	GTH I	nat V. + rem V. ⊕	Q - • U - O	Wp I	TER C		TPERC	ı wı	ADDITIONAL LAB. TESTING	OR STANDPIPE INSTALLATION
-+			OUND SURFACE	1 on			-	8	20 40) (50 i	30	20	4	10	60	80		
0	T		PSOIL - (SM) SILTY SAND; dark	EZE	91.39 0.00	1	AS												
1	Auger	(CI) with and	vn; moist sandy SILTY CLAY; grey brown, oxidation staining, contains rootlets sitly sand seams (WEATHERED JST); cohesive, w>PL, very stiff		0.25	2	ss												
2	Power				89.41 1.98	3	ss	3											
3	000	grav grav infer refus	/SC) gravelly SILTY SAND to relly CLAYEY SAND; grey brown to , presence of cobbles and boulders red from auger resistance and auger sal (GLACIAL TILL); non-cohesive, compact to very loose to dense		1.96	4	ss	21											
3		- Au	ger Refusal in Glacial Till at 2.97 m			5	ss	8											
4						6	ss	4											
						7	ss	20										м	
5	Wash Bonng	NW Casing				8	ss												
6	Wash	(SM) gravelly SILTY SAND; grey, ence of cobbles inferred from auger stance (GLACIAL TILL);		85.45 5.94			45 105											
		resis non-	stance (GLACIAL TILL); -cohesive, wet, very dense																
7						10	ss	90											
8		-	of Deschole		83.16	11	SS	62											
		End	of Borehole		8.23														
9																			
10																			
11																			
12																			
13																			
14																			
15																			
	тн	SCALE		<u> </u>															GGED: PAH
1:7									Go	Idei	r tes								CKED: SD

RECORD OF BOREHOLE: 15-3A

SHEET 1 OF 1

LOCATION: N 5013899.3 ;E 364793.3

SAMPLER HAMMER, 64kg; DROP, 760mm

BORING DATE: August 17, 2015

DATUM: CGVD28
PENETRATION TEST HAMMER, 64kg: DROP, 760mm

Щ	DD	SOIL PROFILE			SA	MPL	ES	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m	HYDRAULIC CONDUCTIVITY, k, cm/s	PIEZOMETER
RES	METH		LOT		ĸ		.30m	20 40 60 80	10 ⁻⁸ 10 ⁻⁶ 10 ⁻⁴ 10 ⁻²	OR
DEPTH SCALE METRES	BORING METHOD	DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	BLOWS/0.30m	SHEAR STRENGTH nat V. + Q - ● Cu, kPa rem V. ⊕ U - ○	k, cm/s	INSTALLATIO
- 0		GROUND SURFACE	io i	91.34			8	20 40 60 80	20 40 60 80	
·		FILL - (SM) SILTY SAND; dark brown, \ contains organic matter; non-cohesive, \moist	/	0.00	1	AS				Flush Mount Casing Bentonite Seal
1		FILL - (SM/GM) SILTY SAND and GRAVEL; red brown and grey brown, contains organic matter; non-cohesive, moist, compact		90.63 0.71 0.91	2	SS	11			Native Backfill
		TOPSOIL - (ML) CLAYEY SILT; dark brown; moist								8
2		(CI) sandy SILTY CLAY; grey brown, with oxidation staining, contains rootlets and silty sand seams (WEATHERED CRUST); cohesive, w>PL, very stiff		<u>89.51</u> 1.83	3	SS	5			Bentonite Seal Silica Sand
- 3		(SM/SC) gravelly SILTY SAND to gravelly CLAYEY SAND; grey brown to grey, presence of cobbles and boulders inferred from auger resistance (GLACIAL			4	SS	15			
	em)	TILL); non-cohesive, wet, compact to very loose			5	SS	2		МН	
4	Power Auger Diam (Hollow Str			86.77	6	SS	3			32 mm Diam. PVC #10 Slot Screen
- 5	Power Auger 200 mm Diam (Hollow Stem)	(SM/GM) SILTY SAND and GRAVEL; grey, presence of cobbles inferred from auger resistance (GLACIAL TILL); non-cohesive, wet, compact		4.57	7	SS	23			
					8	SS	15			Silica Sand
- 6				84.63	9	SS	31			Bentonite Seal
7		(SM/GM and SP) SILTY SAND and GRAVEL and gravelly SAND; grey, interbedded, presence of cobbles and boulders inferred from auger resistance (GLACLA TILL); non-cohesive, wet, very dense		6.71	10	SS	67			Cave
- 8					11	SS	306			
- 9		End of Borehole		82.35 8.99						WL in Screen at Elev. 88.36 m on
10										Aug. 24, 2015
11										
12										
13										
- 14										
15										
DE	PTH	SCALE	1			[Golder	L L L L	OGGED: PAH

RECORD OF BOREHOLE: 15-4

BORING DATE: August 18, 2015

SHEET 1 OF 1 DATUM: CGVD28

LOCATION: N 5013779.2 ;E 364691.4

SAMPLER HAMMER, 64kg; DROP, 760mm

Ļ	ПОН	SOIL PROFILE	-		SA	MPL		DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m	HYDRAULIC CONDUCTIVITY, k, cm/s	<u>Ś</u> Ę	PIEZOMETER
METRES	BORING METHOD	DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	BLOWS/0.30m	20 40 60 80 No SHEAR STRENGTH nat V. + Q - ● rem V. ⊕ U - ○ 20 40 60 80	$\begin{array}{cccccccccccccccccccccccccccccccccccc$	ADDITIONAL LAB. TESTING	OR STANDPIPE INSTALLATIO
0				92.00			\square				
		TOPSOIL - (ML) CLAYEY SILT; dark brown; moist		0.00 91.72 0.28	1	AS	-				
1		(CI) SILTY CLAY, some sand; grey brown (WEATHERED CRUST); cohesive, w>PL, very stiff			2	SS	9				
2		(SC) gravelly CLAYEY SAND; grey brown to grey, presence of cobbles and boulders inferred from auger resistance (GLACIAL TILL); non-cohesive, wet,		90.55	3	SS	2				
		loose to compact			4	SS	13				
3					5	SS	4				
4	v Stem)			87.43	6	SS	4				
5	Power Auger mm Diam. (Hollow	(SM/GM) SILTY SAND and GRAVEL; grey, presence of cobbles and boulders inferred from auger resistance and auger refusal (GLACIAL TILL); non-cohesive, wet, very dense		4.57	7	SS	65				
	200 mm	1000000 Non 00 10000 20 00				SS					
6		at 5.79 m		85.90 6.10		RC					
7		(ML/SM) sandy SILT to SILTY SAND, trace to some gravel; grey; non-cohesive, wet, dense to very dense			10	SS	42			м	
8					11	SS	60				
9		(SM) gravelly SILTY SAND; grey, contains sand layers, presence of cobbles and boulders inferred from auger resistance (GLACIAL TILL); non-cohesive, wet, very dense		83.31 8.69	12	SS	>50				
10		End of Borehole		81.94 10.06							
11											
12											
13											
14											
15											
DE	PTH :	SCALE					(Golder			GED: PAH CKED: SD

RECORD OF BOREHOLE: 15-5

SHEET 1 OF 1

LOCATION: N 5013703.6 ;E 364564.8

SAMPLER HAMMER, 64kg; DROP, 760mm

BORING DATE: August 18-19, 2015

DATUM: CGVD28 PENETRATION TEST HAMMER, 64kg; DROP, 760mm

y	DOH	SOIL PROFILE	1.		SA	MPLE		DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m	HYDRAULIC CONDUCTIVITY, k, cm/s	PIEZOMETER
METRES	BORING METHOD	DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	BLOWS/0.30m	20 40 60 80 ` SHEAR STRENGTH Cu, kPa nat V. + rem V. ⊕ Q - ⊕ Q - ⊕ 20 40 60 80	k, cm/s 10 ⁻⁶ 10 ⁻⁶ 10 ⁻⁴ 10 ⁻² WATER CONTENT PERCENT Wp I ← W 20 40 60 80	OR STANDPIPE INSTALLATION
0	-1-	GROUND SURFACE TOPSOIL - (SM) SILTY SAND; dark	===	92.79			\downarrow			
1		TOPSOLE - (SM/GM/SCL14 SAND, dark brown; moist (SM/GM/SC) SILTY SAND and GRAVEL to CLAYEY SAND, some gravel; grey brown, presence of cobbles inferred from auger resistance (GLACIAL TILL); non-cohesive, moist, compact (SM) gravelly SILTY SAND; grey brown, presence of cobbles and boulders		0.00 92.51 0.28 91.42 1.37	1	SS	20			Bentonite Seal
2		inferred from auger resistance (GLACIAL TILL); non-cohesive, moist to wet, compact			2	SS	21			Native Backfill
3										
4		(SC) gravelly CLAYEY SAND; grey brown to grey, presence of cobbles inferred from auger resistance (GLACIAL TILL); non-cohesive, wet, very loose to		88.98 3.81	5	SS	9			
5	Power Auger Diam. (Hollow Stem)	loose			6	SS	2			⊗ Bentonite Seal
6	200 mm Diam. (Hollow Stem)	(SM/GM and SP) SILTY SAND and GRAVEL and SAND; grey, interbedded, presence of cobbles inferred from auger resistance (GLACIAL TILL);		87.15 5.64	7	SS	11			Silica Sand
7		resistance (GLACIAL TILL); non-cohesive, wet, compact			8	SS	16			32 mm Diam. PVC
8		(ML) sandy SILT, trace gravel; grey, contains clayey silt seams; non-cohesive, wet, compact		85.17 7.62		SS SS			м	#10 Slot Screen
		(ML and SM) sandy SILT and SILTY SAND, some gravel; grey, interbedded (GLACIAL TILL); non-cohesive, wet,		84.41 8.38	11	SS	55			Silica Sand
9		very dense			12	SS	51			Bentonite Seal
10		End of Borehole		82.12 10.67	13	SS	76			Cave
11										WL in Screen at Elev. 89.60 m on Aug. 24, 2015
12										
13										
14										
15										
DEI	PTH (SCALE						Golder		LOGGED: PAH

RECORD OF BOREHOLE: 15-6A

SHEET 1 OF 1 DATUM: CGVD28

SAMPLER HAMMER, 64kg; DROP, 760mm

LOCATION: N 5013619.9 ;E 364467.1

BORING DATE: August 20, 2015

Bit State Descruption State		DD.	SOIL PROFILE			S	AMPL	ES	DYNAMIC PENETR RESISTANCE, BLO	ATION WS/0.3m		HYDRAULIC k, c		TIVITY,		ە ـ	PIEZOMETER
Image: Control State of S	SES	NETH		LOT		Ľ		30m			х			10-4 1	0-2	IONA	OR
Image: Control State of S	METR	NGN	DESCRIPTION	TA PI		MBE	YPE	/S/0.3	SHEAR STRENGTH	I nat V. + Q-						B. TE	
Image: Control State of S	-	BORI	Special de Lorenzo de Lorenzo de	TRA		Ĩ	1	NOT								AA	
0 II. Mathematic (SWGW) SAND and GRAVEL and (SIN LTY SAND and CRAVEL and (SIN LTY SAND and CRAVEL motified provide not rotter, no-scherken, motified provide not craves share, motified provide not craves share, provide not craves share, motified provide not crave share, motified provide not crave share, motified provide not craves share, motified provide not crave share, motified not share share, motified not share share, motified not share share, motified not share, traves share, motified not share share, motified not share, traves share, motified		-	GROUND SURFACE	0	04.00		+	-	20 40	60 80	-	20	40	000			
1 Impact of model model in conclusive. 100 2 5 2 1 Impact of conclusive. 100 2 5 2 1 Impact of conclusive. 100 3 5 3 2 Impact of conclusive. 100 3 5 3 2 Impact of conclusive. 100 3 5 3 3 1 1 1 1 1 1 1 1 Impact of conclusive. 1 1 1 1 1 1 1 2 Impact of conclusive. 1	0		FILL - Mixture of (SW/GW) SAND and		0.00		+	\vdash									
Image: Second and marks: non-chelleve. 100 2 5 20 Image: Second and marks: non-chelleve. 100 2 5 20 Image: Second and calculation in the second and calculation and calculation and calculation in the second and calculation and			GRAVEL and (SM) SILTY SAND; brown, contains organic matter and fragments of	1	8	1	AS	-									
Image: Second Control Control 10 2 30 10 2 30 10 <t< td=""><td></td><td></td><td>concrete and mortar; non-cohesive,</td><td></td><td>8</td><td>_</td><td>-</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></t<>			concrete and mortar; non-cohesive,		8	_	-										
Image: Strong or yet, we could on a general standy at large strong to get, we could on a general standy at large strong to yet, we	1				93.02	2	SS	22									
2 Image: State of colders and bolders image: State of colders image: State of colders 3 1 1 1 1 4 1 1 1 1 5 1 1 1 1 6 1 1 1 1 7 1 1 1 1 8 1 1 1 1 9 1 1 1 1 10 1 1 1 1 11 1 1 1 1 12 1 1 1 1 13 1 1 1 1 14 1 1 1 1 15 1 1 1 1			grey brown to grey, with oxidation				-										
2 ILL; non-checker, molitic twel, compact to wey denies 4 55 43 4 56 57 6 56 57 4 56 57 6 56 57 6 36 57 7 56 50 7 6 56 57 6 56 7 6 56 57 7 56 8 7 7 56 57 7 6 36 57 7 56 57 7 8 50 7 7 56 57 8 10 56 57 7 56 57 9 10 55 57 7 7 57 10 10 55 57 10 55 57 10 57 10 10 55 57 10 55 57 10 57 10 10 10 55 57 10 57 10 57 10 10			presence of cobbles and boulders		2	3	SS	39									
3 4 55 60 6 65 67 7 6 65 67 8 7 66 68 9 7 6 60 10 10 10 10 11 10 10 10 12 11 10 10 13 10 10 10 14 10 10 10 15 10 10 10 14 10 10 10 15 10 10 16 10 10 17 10 10 18 10 10 19 10 10 10 10 10 10 10 10 11 10 10 12 11 10 13 10 10 14 10 10 15 10 10 16 10 10 17 10 10 18 10 10 19 10 10 10 10 10 10 10 <t< td=""><td>2</td><td></td><td>TILL); non-cohesive, moist to wet,</td><td></td><td></td><td>-</td><td>1</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></t<>	2		TILL); non-cohesive, moist to wet,			-	1										
3 4 5 55 57 6 55 57 7 6 55 57 8 7 55 50 7 8 7 55 50 8 7 55 50 7 8 7 55 50 7 9 6 55 42 9 7 55 30 9 55 30 9 55 30 9 55 30 9 55 30 9 55 30 9 55 30 9 55 30 9 55 30 9 55 30 9 55 30 9 55 30 9 55 30 9 55 30 9 55 30 9 55 30 9 55 30 9 55 30 10 55 30 10 55 30 10 55 30 10 10 1			compact to very dense		8			40									
4 1 1 1 1 1 6 35 22 7 6 35 23 7 6 35 24 7 1 1 1 8 1 1 1 9 1 1 1 10 1 1 1 11 1 1 1 12 1 1 1 14 Nai: 1 1 15 1 1 1						4	55	43									
4 6 55 22 7 6 55 22 7 6 55 52 7 6 55 52 1 1 1 1	3					-	1										
9 30 4 5 5 23 7 1 1 1 1 1 7 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1						5	SS	57									
6 3 3 23 7 ML and SM gravely sandy SLT and SLT SAC trace gravel, gravel initiated, non-cohesive, wet, dense to compact 7 8 9 9 ML and SM gravely sandy SLT and SLT SAC trace gravel, gravel initiated, non-cohesive, wet, dense to compact 7 8 9 10 State Sandy State San							-										
0 0 0 55 42 7 (HL and SM) gravely sendy GLT and GL	4					6	SS	23									
0 0 <td></td>																	
0 0 0 55 42 7 (HL and SM) gravely sendy GLT and GL		(me)				7	SS	93									
0 0 0 55 42 7 (All, and SM) gravely sendy SIL Terd SLTY SAND, have gravely grav, laminated; non-cohesive, well, dense to compact. 0 55 35 8 (SW/GW) SAND and GRAVEL, medium to coarse, grav, presence of cobbiss and boddes inferred form auger residence; non-cohesive, well, dense to compact. 0 9 55 26 10 (SW/GW) SAND and GRAVEL, medium to coarse, grav, presence of cobbiss and boddes inferred form auger residence; non-cohesive, well, very dense 0 9 55 26 11 (GW/GW) SAND and GRAVEL, medium to coarse, grav, presence of cobbiss and boddes inferred form auger) 0 9 55 26 12 (GW/GW) SAND and GRAVEL, medium to coarse, grav, presence of cobbiss and boddes inferred form auger) 10 11 35 166 14 (GW/GW) SAND and GRAVEL, medium to coarse, grav, presence of cobbiss and boddes indire auger and cuting head (a 1.5 mice) bidgove term auger) becare discload duing extraction. The auger is likely located at the bottom of the hole 11.13 13 14 15 16 17.13 18 18 18 18 18 16 16 17.13 18 18 18 18 18 18 18 <td< td=""><td>5</td><td>jer Ilow S</td><td></td><td></td><td></td><td></td><td>-</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></td<>	5	jer Ilow S					-										
6 8 0 85 42 7 (ML and SM) gravely sandy SLT and Summade in the segment's grav, summade in the segment's gra		er Aug n. (Ho															
7 ML and SM) gravely sandy SLT and SLT Yes, lack of the set to compact 7 7 7 8 9 9 55 39 9 (SW/GW) SAND and GRAVEL, medium to comes (gev, presence of cobbies and to comes) 8 10 (ML) sandy SLT (gev; non-cobesive, the presence of cobbies and to comes (gev, presence of cobbies and to comes) 8 11 (ML) sandy SLT (gev; non-cobesive, the presence of cobbies and to comes (gev, presence of cobbies and to comes) 8 12 Note: 11.35 13 13 Note: 1 1 14 1 1 1 15 1 1 1	6	Powi															
7 ML and SM gravelly sandy SLT and SLT Yet, like gravel, grav, gravel, grav, gravel, grav	°	00 mr															
Image: Compact (in the image: Compact						8	SS	42									
SILTY SAND, Table gravel, grey, lambdate, non-cohesive, wet, dense to compact. 9 SS 39 Image: Silty SaND and GRAVEL, medium balance, non-cohesive, wet, very dense concohesive, very dense concohesive, very dense concohesive	7																
a a b ss 39 a a b ss 25 b a b a a b b a a a b b a a a b b a a a b b a a a b b a a a b b a a a c a a a a c a a a a c a a a a c a a a a c a a a a c a a a a c a a a a c a a a a c a a a a c a a a a c a a a a c a a a a c a a a a c b a			SILTY SAND, trace gravel; grey,		7.01	1											
8 10 SS 26 9 (SW/GW) SAND and GRAVEL, medium to coarse; grey, presence of cobbles and boulders inferred from suger resistance; non-cohesive, wet, very dense 975 11 (ML) sandy SILT; grey, non-cohesive, wet, very dense 11 55 12 The lead auger and cutting head (a 1.5 m long hollow-stem auger) became disloged during stratection. The auger is likely located at the bottom of the hole (about 11 m depth). 11 5					*	-	-										
10 10 5S 26 11 (SW/GW) SAND and GRAVEL, medium 9.75 11 0.812 11 11 0.812 11 11 0.812 11 11 0.812 11 11 0.812 11 11 0.812 11 11 0.812 11 12 The lead auger and cutting head (a 1.5 m long bolow-stem auger) became disloged during extraction. The auger is likely located at the bottom of the hole (about 11 m depth). 13 (about 11 m depth).	8					9	SS	39								м	
10 10 55 26 11 (SW/GW) SAND and GRAVEL, medium 9.75 11 to coarse; grey, presence of cobbles and boulders inferred from auger resistance; non-cohesive, wet, very dense 9.75 11 (ML) sandy SILT; grey; non-cohesive, wet, very dense 11.13 11 (ML) sandy SILT; grey; non-cohesive, wet, very dense 11.13 12 The lead auger and cutting head (a 1.5 m long hollow-stem auger) became discloged during extraction. The auger is likely located at the bottom of the hole (about 11 m depth). 11						-	1										
10 10 5S 26 11 (SW/GW) SAND and GRAVEL, medium 9.75 11 0.812 11 11 0.812 11 11 0.812 11 11 0.812 11 11 0.812 11 11 0.812 11 11 0.812 11 12 The lead auger and cutting head (a 1.5 m long bolow-stem auger) became disloged during extraction. The auger is likely located at the bottom of the hole (about 11 m depth). 13 (about 11 m depth).																	
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10 Image: state intervention of the state intervention. Image: State intervention of the state intervention. Image: State intervention of the state intervention of the state intervention of the state intervention. 14 Image: State intervention of the state intervention of the state intervention of the state intervention. Image: State intervention of the state intervention of the state intervention of the state intervention. 14 Image: State intervention of the state intervention of the state intervention of the state intervention. Image: State intervention of the state intervention of the state intervention of the state intervention of the state intervention. 14 Image: State intervention of the state intervention.						10	SS	26									
10 to coarse: grey, presence of cobbles and bolders inferred from auger resistance; non-cohesive, wet, very dense 11 11 (ML) sandy SILT; grey; non-cohesive, Wet, very dense 111 11 (ML) sandy SILT; grey; non-cohesive, Wet, very dense 111 11 (ML) sandy SILT; grey; non-cohesive, Wet, very dense 111 11 (ML) sandy SILT; grey; non-cohesive, Wet, very dense 11.13 12 End of Borehole 11.13 12 Note: 11.13 13 (about 11 m depth). 11.13 14 (about 11 m depth). 11.13			(CM/CM/) CAND and CRAVEL modium	11													
11 Important Important <td>10</td> <td></td> <td>to coarse; grey presence of cobbles and</td> <td>1. 1.</td> <td>•</td> <td>1</td> <td></td>	10		to coarse; grey presence of cobbles and	1. 1.	•	1											
11 (ML) sandy SILT; grey; non-cohesive, wet, very dense 11:13 12 Wet, very dense 11:13 12 Note: 11:13 12 The lead auger and cutting head (a 1.5 m long hollow-stem auger) became dislodged during extraction. The auger is likely located at the bottom of the hole (about 11 m depth). 11 13 14 11			non-cohesive, wet, very dense	80	•												
11 (ML) sandy SILT; grey; non-cohesive, wet, very dense 11.13 12 Wet, very dense 11.13 12 Note: 11.13 12 The lead auger and cutting head (a 1.5 m long hollow-stem auger) became dislodged during extraction. The auger is likely located at the bottom of the hole (about 11 m depth). 11 13 14 11 14 15 11				•	83.13		-	100									
12 The lead auger and cutting head (a 1.5 m long hollow-stem auger) became dislodged during extraction. The auger is likely located at the bottom of the hole (about 11 m depth). 13 14 15 15	11			T	10.97	7	- 00										
12 The lead auger and cutting head (a 1.5 m long hollow-stem auger) became dislodged during extraction. The auger is likely located at the bottom of the hole (about 11 m depth). Image: Comparison of the hole is likely located at the bottom of the hole is lis likely located at the bottom of the hole is likely loc				1		1											
The lead auger and cutting head (a 1.5 m long hollow-stem auger) became dislodged during extraction. The auger is likely located at the bottom of the hole (about 11 m depth). 13 14 15			Note:														
13 dislodged during extraction. The auger is likely located at the bottom of the hole (about 11 m depth). 14 14 15 14	12																
13 (about 11 m depth). 14 15			dislodged during extraction. The auger														
	13																
	14																
DEPTH SCALE LOGGED: PAH 1:75 LOGGED: PAH CHECKED: SD	15																
DEPTH SCALE LOGGED: PAH 1:75 CHECKED: SD																	
1:75 CHECKED: SD	DF	ртн (SCALE							•						Ľ	OGGED: PAH
								8	Gol	ler							

RECORD OF BOREHOLE: 15-6B

SHEET 1 OF 1 DATUM: CGVD28

LOCATION: N 5013655.3 ;E 364419.6

SAMPLER HAMMER, 64kg; DROP, 760mm

BORING DATE: August 21, 2015

Ļ	НОП	SOIL PROFILE	-		SA	MPL		DYNAMIC PENETRA RESISTANCE, BLOV	/S/0.3m	Ĺ	HYDRAU k	, cm/s	0001111		29 E	PIEZOMETER
DEPTH SCALE METRES	BORING METHOD	DESCRIPTION	STRATA PLOT	ELEV.		TYPE	BLOWS/0.30m	20 40 SHEAR STRENGTH	1	80 Q - •	10 ⁻⁸ WAT	10 ⁻⁶ ER CON		10 ⁻² RCENT	ADDITIONAL LAB. TESTING	OR STANDPIPE INSTALLATION
ΓΣ	BORIN	DESCRIPTION	TRAT	DEPTH (m)	NUM	۲	LOWS	SHEAR STRENGTH Cu, kPa			Wp H		⊖W	wi	AD(LAB.	INSTALLATIO
	ш	GROUND SURFACE	0 v		-		œ	20 40	60 1	80	20	40	60	80	+	
0		ASPHALTIC CONCRETE		94.06 0.00 0.15		AS									++	
		FILL - (GW) sandy GRAVEL, angular; grey (PAVEMENT STRUCTURE)	/ 🗱	0.33	2											
		FILL - (SP) gravelly SAND; brown (PAVEMENT STRUCTURE)		0.54 93.20	3	AS	-									
1		TOPSOIL - (SM/ML) SILTY SAND to	11	0.86	4	SS	7									
		sandy SILT, trace gravel; dark brown to black; wet														
		(ML) sandy SILT, trace gravel; brown, contains clayey silt seams;		92.23		SS	22									
2		\non-cohesive, moist, loose (SM) gravelly SILTY SAND; grey brown,														
		presence of cobbles and boulders inferred from auger resistance (GLACIAL	1 all													
		TILL); non-cohesive, moist to wet,														
3		compact to dense			_											
					6	SS	31									
4				1												
191				89.64												
		(SP) SAND, trace gravel; grey brown, contains silty sand layers; non-cohesive,	1	4.42												
5	Stem)	wet, dense			7	SS	34								м	
	Power Auger mm Diam. (Hollow Stem)															
	Power Au Diam. (H	(ML and SM) sandy SILT and SILTY	III	88.42												
6	Po nm Di	SAND; grey brown, interbedded; non-cohesive, wet, very dense	围													
	200 n				8	SS	67									
		(ML/SM) gravelly sandy SILT to gravelly		87.35												
7		SILTY SAND; grey, presence of cobbles inferred from auger resistance (GLACIAL	1228													
		TILL); non-cohesive, wet, very dense														
					9	SS	50								мн	
8																
9																
*										č.						
					10	SS	102									
10																
11				82.78	11	SS	162									
		End of Borehole		11.28												
12																
40																
13																
14																
15																
-	DT:	20415													1.0	
DE	PIHS	SCALE						Gold	~ P .						LOC	GED: PAH

RECORD OF BOREHOLE: 15-7

BORING DATE: August 12, 2015

SHEET 1 OF 2 DATUM: CGVD28

LOCATION: N 5013739.7 ;E 364291.3

SAMPLER HAMMER, 64kg; DROP, 760mm

1	UOH		SOIL PROFILE	1.		SA	MPL		DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m	HYDRAULIC CONDUCTIVITY, k, cm/s	NG	PIEZOMETER
METRES	RORING METHOD		DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	BLOWS/0.30m	20 40 60 80 SHEAR STRENGTH nat V. + Q. ● Cu, kPa rem V. ⊕ U. ○ 20 40 60 80	10 ⁴ 10 ⁴ 10 ² WATER CONTENT PERCENT Wp I → W I WI 20 40 60 80	ADDITIONAL LAB. TESTING	OR STANDPIPE INSTALLATION
0			GROUND SURFACE		92.84			_				Native Backfill
1			TOPSOIL - (ML/SM) sandy SILT to SILTY SAND; dark brown; moist (SM) gravelly SILTY SAND; grey brown, with oxidation staining, presence of cobbles and boulders inferred from auger resistance (GLACIAL TILL);		0.00 92.56 0.28	2	AS	- >50				Bentonite Seal
2			non-cohesive, moist to wet, compact to very dense			3	ss	17				Ţ
3	er Auger	n. (Hollow Stem)			89.64	4	ss	46				∑ Native Backfill
4	Power Auger	200 mm Diar	(SM) SILTY SAND, fine, trace gravel; brown; non-cohesive, wet, compact		3.20 88.72 4.12	5	SS SS	12 22			м	Native Backfill
5			(SM) gravelly SILTY SAND; grey, presence of cobbles and boulders inferred from auger resistance (GLACIAL TILL); non-cohesive, wet, compact (ML) gravelly sandy SILT; grey,		87.81 5.03	7	ss	21				
6			presence of cobbles and boulders inferred from auger resistance (GLACIAL TILL); non-cohesive, wet, compact		86.64	8		11				
7			Borehole continued on RECORD OF DRILLHOLE 15-7		6.2	9	SS	>50				
8												
9												
10												
11												
12												
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15			1 1000 - 1000 - 1000 - 1000 - 1000 - 1000 - 1000 - 1000 - 1000 - 1000 - 1000 - 1000 - 1000 - 1000 - 1000 - 1000									
DE 1 :		НS	CALE					(Golder			DGGED: PAH ECKED: SD

L	CATIO	CT: 1523645 DN: N 5013739.7 ;E 364291.3 TION: -90° AZIMUTH:		RE	C	ORD	C	DF	RILL	INC	G DA		A	ugu				7										HEET 2 OF 2 ATUM: CGVD28	
DEPTH SCALE METRES	DRILLING RECORD	DESCRIPTION	SYMBOLIC LOG	ELEV. DEPTH (m)	RUN No.	CO % RE	CJ RE	- Jo - Fa R- Sh - Ve - Co ECOV	int oult ear ein onjug /ERN	ate / I	-	BD-E FO-F CO-C CL-C CL-C	eddi oliati	ing ion ict gona age		L - P U- C N- U T - S R - Ir	lanar Curved Indulat tepped regula ONTIN	ing	PO-F K -S SM-S Ro-F MB-N	Slicke	nside th anical	HYE HYE CONE	N at of ak sy	ore: abbrevia mbols LIC VITY BC	For ac ations eviation s. Diarr	Load lex Pa)	l list		
- - - - - - - - - - - - - - - - - - -		BEDROCK SURFACE Fresh, thinly to thickly bedded, grey DOLOMITE BEDROCK		86.64 6.20	1	85-100													7									Peltonite Seal	2.2 2.2
	Rotary Drill NO Core				2	85			中 一 一 一 一 一																			32 mm Diam. PVC #10 Slot Screen	
9 11 11 11 10		End of Drillhole		<u>83.54</u> 9.30	3	85																						Cave WL in Screen at Elev. 90.93 m on April 7, 2016	
11																													
12																													
L 13			ŝ																										To second se
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D	EPTH	SCALE				(C			G	ol	de Cia	r	ድፍ														DGGED: PAH ECKED: SD	

RECORD OF BOREHOLE: 15-17

SHEET 1 OF 1 DATUM: CGVD28

LOCATION: N 5013731.1 ;E 364221.7

SAMPLER HAMMER, 64kg; DROP, 760mm

BORING DATE: August 11, 2015

Ļ	-	탈	SOIL PROFILE	1.		SA	MPL		DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m	HYDRAULIC CONDUCTIVITY, k, cm/s	₽ PIEZOMETER
METRES		BORING METHOD	DESCRIPTION	STRATA PLOT	ELEV. DEPTH	NUMBER	TYPE	BLOWS/0.30m	20 40 60 80 SHEAR STRENGTH nat V. + Q - € Cu, kPa rem V. ⊕ U - €	10 ⁻⁸ 10 ⁻⁶ 10 ⁻⁴ 10 ⁻² WATER CONTENT PERCENT Wp I → W III	PIEZOMETER OR STANDPIPE INSTALLATION
	-	ň		ST	(m)			BL	20 40 60 80	20 40 60 80	
0	_		GROUND SURFACE FILL - (ML) gravelly sandy SILT; dark	×××	93.79 0.00	-					
			brown and red brown, contains organic matter; non-cohesive, moist, compact			1	SS	15			
1			FILL - (ML) CLAYEY SILT, some gravel;	-	92.57 1.22	2	SS				
2		w Stem)	dark grey; cohesive, w>PL		91.75	-	SS				
	Auge	(Holk	TOPSOIL - (OL) ORGANIC SILT; black; moist		2.04	4	SS	11			
3	Power	200 mm Diam. (Hollow S	(ML) gravelly sandy SILT; grey brown, presence of cobbles and boulders inferred from auger resistance (GLACIAL TILL); non-cohesive, wet, compact			5	ss	24			
		20(90.13 3.66	6	ss	29			
4			(SM) gravelly SILTY SAND; grey, presence of cobbles and boulders inferred from auger resistance (GLACIAL TILL); non-cohesive, wet, compact		0.00	7	ss	20			
5			End of Borehole		88.91 4.88	8	ss	13			
6											
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				<u> </u>							
DE	PT 75		CALE						Golder		LOGGED: PAH CHECKED: SD

RECORD OF PROBEHOLE: 15-17A

SHEET 1 OF 1

LOCATION: N 5013728.8 ;E 364221.0

BORING DATE: August 12, 2015

DATUM: CGVD28

Solution Solut			8	SOIL PROFILE			SA	MPL	ES	DYNAMI		TRAT	10N S/0.3m)	HYDR	AULIC C	CONDUCT	rivity,			2
OPCIDE SUPPORT Image of the second of the seco	SCALE	SES	AETHO		Ь		r.		30m					80	1			0-4 1	10-2	STING	
OPCOME Mark Base Description Description<	PTH S	METF	NG N	DESCRIPTION	TA PI		MBEF	YPE	VS/0.3	SHEAR S	STRENG	GTH	nat V. +	Q- 0	w					B. TE	
OID-NO-SURVACII 32.0 O	BE		BOR		STRA	(m)	R	F	BLOV						VV					IAI	
- - <td></td> <td></td> <td></td> <td>GROUND SURFACE</td> <td></td> <td>93.62</td> <td></td> <td></td> <td></td> <td>20</td> <td>40</td> <td>,</td> <td>00</td> <td>00</td> <td></td> <td></td> <td><u>+0 (</u></td> <td></td> <td></td> <td></td> <td></td>				GROUND SURFACE		93.62				20	40	,	00	00			<u>+0 (</u>				
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4 MAA 5 Probable Glacial Till 6 Aab 6 Aba 7 Baa 8 Find of Probehole Auger Refusal 5.5 9 Baa 9 Baa 11 Baa 12 Baa 13 Baa 14 Baa	Ē	3	Pow Dia																		-
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Auger Refusal Image: Constraint of the second	Ē																				
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a Line Colder CHECKED: SD	42 00	DE	тн	SCALE								_								10	DGGED: PAH
	AIS-BI									5	GO	olde	ates								

LOCATION: N 5013821.4 ;E 364747.3 SAMPLER HAMMER, 64kg; DROP, 760mm

RECORD OF BOREHOLE: 15-101

BORING DATE: August 19, 2015

SHEET 1 OF 1

DATUM: CGVD28

-	ПОН	SOIL PROFILE			SA	MPL		DYNAMIC F	PENETRA	TION VS/0.3m	2	HYDRAUL k,	IC CONE cm/s	UCTIVI	ΓY,	-19	PIEZOMETE
METRES	BORING METHOD		PLOT	EL EL	E.		BLOWS/0.30m	20	40	60	80	10 ⁻⁸	10-6	10 ⁻⁴	10 ⁻²	ADDITIONAL LAB. TESTING	OR
۳	RING	DESCRIPTION	STRATA PLOT	ELEV.		TYPE	WS/0	SHEAR STI Cu, kPa	RENGTH	nat V. rem V.	+ Q-● ⊕ U-○	039300000	ER CONT	ENT PE		AB. TI	INSTALLATIC
	BO		STR	(m)	z		BLO	20	40	60	80	Wp ⊢ 20	40	60	WI 80		
0		GROUND SURFACE		92.43													
		FILL - (SM/GM) SILTY SAND and GRAVEL; red brown and brown, contains organic matter, presence of cobbles and boulders inferred from auger resistance; non-cohesive, moist		0.00													Bentonite Seal
1		TOPSOIL - (SM) SILTY SAND; black; moist		91.36 1.07 1.22	'	SS	12										Native Backfill
2		(SM) gravelly SILTY SAND; grey brown, presence of cobbles and boulders inferred from auger resistance (GLACIAL TILL); non-cohesive, moist to wet,			2	ss	20										Native Backfill
		compact to dense			3	ss	36										Bentonite Seal
3																	Granitic Sand
					4	SS	12										₽
4		(SM/GM) gravelly SILTY SAND to SILTY SAND and GRAVEL; grey, contains sand layers, presence of cobbles		88.62 3.81		SS	10										
	v Stem)	inferred from auger resistance (GLACIAL				33	12										38 mm Diam. PVC
5	Power Auger 200 mm Diam. (Hollow	TILL); wet, loose to dense			6	SS	12										#10 Slot Screen
	Powe m Diam																
	200 m				7	SS	8										
6					8	SS	24										Granitic Sand
7					-		2.1										Bentonite Seal
8					9	ss	43										Silica Sand
9		(ML) sandy SILT, some gravel; grey, contains clayey silt seams (GLACIAL TILL); non-cohesive, wet, compact		83.74 8.69	10	SS	22										Native Backfill
10		End of Borehole	SE SE	82.42 10.01	11	SS	>50										R R R R R R R R R R R R R R R R R R R
11		Sampler Refusal															WL in Screen at Elev. 88.86 m on Aug. 24, 2015
"																	
12																	
13																	
14																	
15																	
			1	L													
DEP 1 : 7:		CALE					(Gold	er							DGGED: PAH ECKED: SD

RECORD OF BOREHOLE: 16-301

LOCATION: N 5013712.6 ;E 364379.1

BORING DATE: March 4-7, 2016

SHEET 1 OF 2

DATUM: CGVD28

ц	Ц	SOIL PROFILE			SA	MPL		DYNAMIC PENETRA RESISTANCE, BLOV	VS/0.3m	HYDRAULIC CONDUCTIVITY, k, cm/s	- <u>9</u>	PIEZOMETER
METRES	BORING METHOD	DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	BLOWS/0.30m	20 40 J J SHEAR STRENGTH Cu, kPa	60 80 nat V. + Q - ● rem V. ⊕ U - ○		ADDITIONAL LAB. TESTING	OR STANDPIPE INSTALLATION
_	8	GROUND SURFACE	LS				BI	20 40	60 80	20 40 60 80		
0		Probable Sand		93.16 0.00	_		+					needed consideration of the state
1		Probable Glacial Till	222	<u>92.25</u> 0.91								Ā
2 3												
4 5	Wash Boring NW Casing											
6 7												
8 9												WL in open borehole at 0.78 m depth below ground surface upon completion of drilling
10		Borehole continued on RECORD OF DRILLHOLE 16-301	8144	83.36 9.8								
11												
12												
13												
14												
15												
DEF	PTH S	CALE					(Gold			L	DGGED: DWM

PR	OJEC	T: 1523645		REC	co	RD	OF	= C	DR	IL	Lŀ	10	LE	:	3	16	-301	I								SI	HEET 2 OF 2
		DN: N 5013712.6 ;E 364379.1 FION: -90° AZIMUTH:						DF	RILL	RIG	: Cl	E: N ME 8: NTRA	50				5									D	ATUM: CGVD28
DEPTH SCALE METRES	DRILLING RECORD	DESCRIPTION	SYMBOLIC LOG	ELEV. DEPTH (m)	RUN No.	FLUSH <u>COLOUR</u>	CJ	- Jo T - Fa R- Sh - Ve - Co ECOV	int ult iear in onjuga	R.	BD FC OF CL	- Bedd - Folia - Cont - Clea FRAC INDE PER 0.25 r	ding ation tact ogor vage T.	Angle		L - PI U- Ci N- Ui T - St R - In	anar urved ndulating epped egular DNTINUIT TYPE AND DESCR	K - SM- Ro - MB- Y DATA	-	ensid	HYI HYI CONI	DRAI	NOTE: abbrev af abbr symbo JLIC TIVIT sec	For a liation reviati	ken F addition s refer ons & metra at Loa idex MPa)		
- 10	JG	BEDROCK SURFACE Fresh, thinly to thickly bedded, grey DQLOMITE BEDROCK		83.36 9.80			89	500	8999	08	398	1202	2 2	180	00	888	DESCR				10 %	99			4 8		
		DOLOMITE BEDROCK			1	100																					
- 11	Rotary Drill NQ Core				2	100																					
12					3	100																					
13		End of Drillhole	23	80.16 13.00																							WL in open borehole at 0.78 m depth below ground surface upon completion of
- 14																											drilling
15																											
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- 22 - 23 - 24 DE																											
DE 1:		SCALE		I			Ć			GC		ler					L										I OGGED: DWM IECKED:

RECORD OF BOREHOLE: 16-302

LOCATION: N 5013746.6 ;E 364217.4

BORING DATE: March 4, 2016

SHEET 1 OF 2

DATUM: CGVD28

TE			SOIL PROFILE		1	SA	MPL		DYNAMIC PENETRA RESISTANCE, BLO	ATION NS/0.3m	2	HYDRAULIC k, c	C CONDUCT m/s	TVITY,	AL NG	PIEZOMETER
DEPTH SCALE METRES	RORING METHOD		DESCRIPTION	STRATA PLOT	ELEV. DEPTH	NUMBER	TYPE	BLOWS/0.30m	20 40 I SHEAR STRENGTH Cu, kPa		B0 Q-● U-○	1			1001	OR STANDPIPE INSTALLATION
	BC	_		STE	(m)	-		BLG	20 40	60 8	80	20		0 80		
_ 0	H		OUND SURFACE	- 25 - 5	93.06		-	-		_						
				- ANA	92.15 0.91											
2		Pro	bbable Glacial Till		0.91											
- 3																
4	Wash Boring	IW Casing														
- 5		2														
- 6																
- 7																
- 8		Bor DR	rehole continued on RECORD OF IILLHOLE 16-302		85.04											
9		5														
- 10																
- 11																
- 12																
- 13																
- 13				5												
14														Ξ		
13 14 15 DE																
DE 1 :	EPTI 75	H SCAL	E						Gold	er iates						DGGED: DWM ECKED:

		JECT: 1523645		REG	co	RD	OF											30	2											EET		00	
		ation: N 5013746.6 ;E 364217.4 Ination: -90° Azimuth:						DF	RILL	RIC	9: C	TE: ME NTF	850															L	JA	TUM:	5002	20	
DEPTH SCALE METRES		DESCRIPTION	SYMBOLIC LOG	ELEV. DEPTH (m)	RUN No.	FLUSH COLOUR	CJ RE TOT COR	- Joi - Fa R- Sh - Ve - Co ECOV	ear in njuga 'ERY SOLII CORE	D %	0.D %	P 0.2	ava act. DEX ER	t	gle	ST- IR -	CON E TY	ulating	K SM Ro MI	T	cken	nical	Brea	Ak sy RAU UCT cm/s	ote: bbrevi abbre mbol: LIC IVITY ec	For a lation eviation s. Dian Poin In (N	additio s refer ons &	Rock mal r to lis al ACRM -Q AVC	st.				
	╞	BEDROCK SURFACE Fresh, thinly to thickly bedded, grey DOLOMITE BEDROCK		85.04 8.02																+	+		+				\parallel	+	╎				
- 9	Rotary Drill				2	0																											
- 10				81.86		0																											
- 12		End of Drillhole		11.20																													
- 13																																	
- 14																																	
- 15 - 16																																	
- 17																																	
- 18																																	
- 19 - 20																																	
- 21 - 22 D																																	
- 22																																	
D	EP	PTH SCALE								G		de	III T																	DGGE	DWI	И	

RECORD OF TEST PIT

<u>Test Pit Number</u> (Elevation)	<u>Depth</u> (metres)	Description
TP 16-401 (~91.6)	0.0 - 0.3	TOPSOIL/FILL - (ML) Clayey sandy SILT; brown to black, non-cohesive, moist
(01.0)	0.3 – 1.0	FILL - (SM) SILTY SAND, some gravel to gravelly; dark brown, with organics, metal, plastic, glass, rubber, wood, cobbles and boulders up to 600 mm; non-cohesive, moist
	1.0 – 3.7	(SM) Gravelly SILTY SAND; brown to grey brown, with cobbles and boulders up to 1400 mm (GLACIAL TILL); non-cohesive, moist
	3.7 – 4.7	(SM) Gravelly SILTY SAND; grey, with cobbles and boulders up to 400 mm (GLACIAL TILL); non-cohesive, moist to wet
	4.7 - 6.0	(SP-GP) SAND and GRAVEL, some non-plastic fines; grey brown, with cobbles and boulders up to 500 mm; non- cohesive, wet
	6.0 - 8.2	(SM) Gravelly SILTY SAND; grey, with cobbles and boulders (GLACIAL TILL); non-cohesive, wet
	8.2	END OF TEST PIT
		Notes:
		 Water seepage noted at about 4.0 m below ground surface.
		 Significant groundwater inflow observed between about 4.7 and 6.0 m below ground surface (from sand and gravel layer).
		 Test pit walls sloughing within sand and gravel layer (between about 4.7 and 6.0 m below ground surface).

Sample

<u>Depth (m)</u> 5.0

1

May 2016