TECHNICAL MEMORANDUM

DATE August 9, 2012 **PROJECT No.** 11-1111-0068

TO Mr. Mirko A. Favit
Sernas Associates Ltd.

FROM Alan Mohammad/Steve Keenan **EMAIL** amohammad@golder.com/
skeenan@golder.com

ONTARIO REALTY CORPORATION LANDS
MONITORING WELL INSTALLATIONS AT SEATON NEIGHBOURHOODS 17 TO 21
PICKERING, ONTARIO

This technical memorandum presents a brief summary of our field work carried out at the Seaton Community within Neighbourhoods 17 to 21, in the City of Pickering. Our scope of work on this project was to determine the subsurface soil and shallow groundwater conditions and install monitoring wells at the proposed borehole locations within these five (5) neighbourhoods. The field work was carried out in general accordance with our proposal P1-1111-0068, dated April 25, 2011.

Field Work

The field work for this investigation was carried out between May 26 and June 23, 2011, during which time 105 boreholes were advanced and 105 monitoring wells were installed at the locations shown on the Borehole Location Plan, Figure 1. The boreholes were drilled using a track-mounted drillrig supplied and operated by a specialist drilling contractor, under Golder's supervision. Standard penetration testing and sampling were carried out at regular intervals of depth in each of the boreholes using conventional 35 mm internal diameter, split spoon sampling equipment. The shallow groundwater conditions were noted in the boreholes during drilling.

The monitoring wells consist of 50 mm PVC slotted screen and un-slotted riser pipe. The screen portions of the monitoring wells were surrounded by a sand pack, and the annular between the pipe and the borehole was backfilled with sand and topped with bentonite seal to the surface. An above ground protective casing was installed for each monitoring well.

The soil samples obtained during this field work were brought to our Whitby laboratory for further examination and storage. The soil samples will be stored at no cost for three months. After this period they will be disposed of unless we are asked to store them or ORC would like to take possession of them. Should Golder be asked to store the samples beyond the three month period a storage charge of $300/month will apply.

The field work for this investigation was directed by a member of our engineering staff who also logged the boreholes and cared for the samples obtained. The proposed borehole locations, along with their corresponding GPS coordinates and elevations were provided by Sernas Associates Ltd. (Sernas). The borehole location stake-outs in the field were also carried out by Sernas.

Golder Associates Ltd.
100, Scotia Court, Whitby, Ontario, Canada L1N 8Y6
Tel: +1 (905) 723 2727 Fax: +1 (905) 723 2182 www.golder.com

The subsurface soil and groundwater conditions along with the monitoring well installation details are shown on the attached Record of Borehole sheets. If you have any questions regarding the installations of the monitoring wells or require additional information, please do not hesitate to contact this office.

Yours truly,

GOLDER ASSOCIATES LTD.

Alan Mohammad, B.E.Sc., E.I.T.
Engineer In Training

Steven D. Keenan, C.E.T.
Principal – Ground Engineering

AM/SDK/am/sv/jh

Attachments: Lists and Abbreviations and Symbols
Record of Boreholes
Figure 1 – Borehole Location Plan
Appendix A – Important Information and Limitations of This Report

https://capws.golder.com/sites/capws2/P111110068seatonProperties/Reports/11-1111-0068 MEM 2012'08'09 Monitoring Well Installation (FINAL).docx

LIST OF ABBREVIATIONS

The abbreviations commonly employed on Records of Boreholes, on figures and in the text of the report are as follows:

I SAMPLE TYPE

AS	Auger sample
BS	Block sample
CS	Chunk sample
DO	Drive open
DS	Denison type sample
FS	Foil sample
RC	Rock core
SC	Soil core
ST	Slotted tube
TO	Thin-walled, open
TP	Thin-walled, piston
WS	Wash sample

II. 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.) drive open sampler for a distance of 300 mm (12 in.).

Dynamic Penetration Resistance; N_d:
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

Piezo-Cone Penetration Test (CPT):
An electronic cone penetrometer with a 60° conical tip and a projected end area of 10 cm^2 pushed through ground at a penetration rate of 2 cm/s. Measurements of tip resistance (Q_t), porewater pressure (PWP) and friction along a sleeve are recorded electronically at 25 mm penetration intervals.

III. SOIL DESCRIPTION

(a) Cohesionless Soils

Density Index (Relative Density)	N Blows/300 mm or Blows/ft.
Very loose	0 to 4
Loose	4 to 10
Compact	10 to 30
Dense	30 to 50
Very dense	over 50

(b) Cohesive Soils

Consistency	c_u, s_u kPa	c_u, s_u psf
Very soft	0 to 12	0 to 250
Soft	12 to 25	250 to 500
Firm	25 to 50	500 to 1,000
Stiff	50 to 100	1,000 to 2,000
Very stiff	100 to 200	2,000 to 4,000
Hard	over 200	over 4,000

IV. SOIL TESTS

w	water content
w_p	plastic limit
w_l	liquid limit
C	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, G_S)
DS	direct shear test
M	sieve analysis for particle size
MH	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	field vane test (LV-laboratory vane test)
γ	unit weight

Note:
1. Tests which are anisotropically consolidated prior to shear are shown as CAD, CAU.

LIST OF SYMBOLS

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

I. GENERAL

π = 3.1416
ln x, natural logarithm of x
$\log_{10}$ x or log x, logarithm of x to base 10
g acceleration due to gravity
t time
F factor of safety
V volume
W weight

II. STRESS AND STRAIN

γ shear strain
Δ change in, e.g. in stress: $\Delta \sigma$
ε linear strain
ε_v volumetric strain
η coefficient of viscosity
ν Poisson's ratio
σ total stress
σ' effective stress ($\sigma' = \sigma - u$)
σ'_{vo} initial effective overburden stress
$\sigma_1, \sigma_2, \sigma_3$ principal stresses (major, intermediate, minor)
σ_{oct} mean stress or octahedral stress $= (\sigma_1 + \sigma_2 + \sigma_3)/3$
τ shear stress
u porewater pressure
E modulus of deformation
G shear modulus of deformation
K bulk modulus of compressibility

III. SOIL PROPERTIES

(a) Index Properties

$\rho(\gamma)$ bulk density (bulk unit weight*)
$\rho_d(\gamma_d)$ dry density (dry unit weight)
$\rho_w(\gamma_w)$ density (unit weight) of water
$\rho_s(\gamma_s)$ density (unit weight) of solid particles
γ' unit weight of submerged soil ($\gamma' = \gamma - \gamma_w$)
D_R relative density (specific gravity)of solid particles ($D_R = \rho_s / \rho_w$) (formerly G_s)
e void ratio
n porosity
S degree of saturation

* Density symbol is ρ. Unit weight symbol is γ where $\gamma = \rho g$ (i.e. mass density x acceleration due to gravity)

(a) Index Properties (con't.)

w water content
w_l liquid limit
w_p plastic limit
I_P plasticity Index = $(w_l - w_p)$
w_S shrinkage limit
I_L liquidity index = $(w - w_p) / I_p$
I_C consistency index = $(w_l - w) / I_p$
e_{max} void ratio in loosest state
e_{min} void ratio in densest state
I_D density index = $(e_{max} - e) / (e_{max} - e_{min})$ (formerly relative density)

(c) Hydraulic Properties

h hydraulic head or potential
q rate of flow
v velocity of flow
i hydraulic gradient
k hydraulic conductivity (coefficient of permeability)
j seepage force per unit volume

(d) Consolidation (one-dimensional)

C_c compression index (normally consolidated range)
C_r recompression index (overconsolidated range)
C_S swelling index
C_α coefficient of secondary consolidation
m_v coefficient of volume change
c_v coefficient of consolidation
T_v time factor (vertical direction)
U degree of consolidation
σ'_p pre-consolidation pressure
OCR Overconsolidation ratio $= \sigma'_p / \sigma'_{vo}$

(e) Shear Strength

τ_p, τ_r peak and residual shear strength
ϕ' effective angle of internal friction
δ angle of interface friction
μ coefficient of friction = tan δ
c' effective cohesion
c_u, s_u undrained shear strength ($\phi = 0$ analysis)
p mean total stress $(\sigma_1 + \sigma_3)/2$
p' mean effective stress $(\sigma'_1 + \sigma'_3)/2$
q $(\sigma_1 - \sigma_3)/2$ or $(\sigma'_1 - \sigma'_3)/2$
q_u compressive strength $(\sigma_1 - \sigma_3)$
S_t sensitivity

Notes: 1. $\tau = c' + \sigma' \tan \phi'$
2. Shear strength = (Compressive strength)/2

PROJECT: 11-1111-0068

RECORD OF BOREHOLE BH1C-1

SHEET 2 OF 2

LOCATION: SEE FIGURE 2

BORING DATE: June 1, 2011

DATUM: GEODETIC

SAMPLER HAMMER, 63.5kg; DROP, 760mm

PENETRATION TEST HAMMER, 63.5kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	ELEVATION	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (20 40 60 80) nat V. + Q - ⊖ rem V. ⊕ U - O	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT Wp W Wl (10 20 30 40)	ADDITIONAL LAB. TESTING	INSTALLATION AND GROUNDWATER OBSERVATIONS
		--- CONTINUED FROM PREVIOUS PAGE ---										
10	TRACK MOUNTED POWER AUGER 160 mm Dia. Augers			176.15				176				
		Very dense to dense wet grey SANDY SILT to SILTY SAND, trace clay, trace gravel		10.14	10	50 DO	50/ .13					Sand
11								175				
12					11	50 DO	33	174				
				173.64								
		END OF BOREHOLE		12.65								
13												Water encountered during drilling at a depth of 0.76 m below ground surface, June 1, 2011
14												Water level at a depth of 1.83 m below ground surface, upon completion of drilling, June 1, 2011
15												
16												
17												
18												
19												
20												

DEPTH SCALE
1 : 50

LOGGED: AM
CHECKED: OS

Golder Associates

LDN_BHS 11-1111-0068.GPJ GLDR_LDN.GDT 7/12/11 DATA INPUT: MK JUNE 2011

PROJECT: 11-1111-0068

RECORD OF BOREHOLE BH1C-2

SHEET 1 OF 2

LOCATION: SEE FIGURE 2

BORING DATE: June 2, 2011

DATUM: GEODETIC

SAMPLER HAMMER, 63.5kg; DROP, 760mm

PENETRATION TEST HAMMER, 63.5kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	ELEVATION	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80)	SHEAR STRENGTH Cu, kPa (nat V. +, rem V. ⊕, Q - ⊖, U - O) (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3})	WATER CONTENT PERCENT (Wp, W, Wl) (10 20 30 40)	ADDITIONAL LAB. TESTING	INSTALLATION AND GROUNDWATER OBSERVATIONS
0		GROUND SURFACE		184.76										
		TOPSOIL		0.00 / 184.53										
	TRACK MOUNTED POWER AUGER 160 mm Dia. Augers	Compact to dense moist brown SANDY SILT, some clay, trace gravel (TILL)		0.23	1	AS	-	184						50 mm Dia. Monitoring Well
1					2	50 DO	17							
				183.01	3	50 DO	31	183						
2		Dense moist brown SILTY FINE SAND		1.75 / 182.63										
		Dense moist brown SANDY SILT, trace clay, trace to some gravel (TILL)		2.13	4	50 DO	47	182						
				181.86										
3		Compact to very dense moist to wet brown to grey SILTY FINE SAND, zones of medium sand		2.90	5	50 DO	50/.13							
								181						Bentonite Seal
4														
					6	50 DO	50/.13	180						
5														
								179						
6					7	50 DO	44							
								178						
7														
					8	50 DO	23	177						
8														
								176						
9														Sand
					9	50 DO	50/.15							
								175						Caved
10		--- CONTINUED NEXT PAGE ---												

LDN_BHS 11-1111-0068.GPJ GLDR_LDN.GDT 7/12/11 DATA INPUT: MK JUNE 2011

DEPTH SCALE

1 : 50

Golder Associates

LOGGED: AZ

CHECKED: OS

PROJECT: 11-1111-0068

RECORD OF BOREHOLE BH7-1

SHEET 1 OF 1

LOCATION: SEE FIGURE 2

BORING DATE: May 27, 2011

DATUM: GEODETIC

SAMPLER HAMMER, 63.5kg; DROP, 760mm

PENETRATION TEST HAMMER, 63.5kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	ELEVATION	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80)	SHEAR STRENGTH Cu, kPa (nat V. +, rem V. ⊕; Q -, U -) (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3})	WATER CONTENT PERCENT Wp W Wl (10 20 30 40)	ADDITIONAL LAB. TESTING	INSTALLATION AND GROUNDWATER OBSERVATIONS
		GROUND SURFACE		163.05										
0		TOPSOIL		0.00				163						
				162.82										
	TRACK MOUNTED POWER AUGER 160 mm Dia. Augers	Dense to very dense moist to wet brown to grey SILTY SAND to SANDY SILT, trace to some clay, trace to some gravel, containing cobbles and boulders (TILL)		0.23	1	AS	-							50 mm Dia. Monitoring Well
1					2	50 DO	50/ .08	162						
					3	50 DO	42							
2								161						Bentonite Seal
					4	50 DO	50/ .15							
3					5	50 DO	50/ .18	160						
4								159						
					6	50 DO	50/ .18							
5								158						Silica Sand Filter
6				156.85	7	50 DO	50/ .1	157						
		END OF BOREHOLE		6.20										Water encountered at 4.57 m below ground surface, May 27, 2011
7														Water level at a depth of 4.57 m below ground surface upon completion of drilling, May 27, 2011
8														
9														
10														

DEPTH SCALE

1 : 50

Golder Associates

LOGGED: AZ

CHECKED: OS

LDN_BHS 11-1111-0068.GPJ GLDR_LDN.GDT 7/12/11 DATA INPUT: MK JUNE 2011

PROJECT: 11-1111-0068

RECORD OF BOREHOLE BH7-2

SHEET 1 OF 1

LOCATION: SEE FIGURE 2

BORING DATE: May 27, 2011

DATUM: GEODETIC

SAMPLER HAMMER, 63.5kg; DROP, 760mm

PENETRATION TEST HAMMER, 63.5kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	ELEVATION	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT (Wp, W, Wl; 10 20 30 40)	ADDITIONAL LAB. TESTING	INSTALLATION AND GROUNDWATER OBSERVATIONS
0		GROUND SURFACE		144.70							
		TOPSOIL		0.00 / 144.45							
		Wet brown CLAYEY SILT, some sand, trace gravel		0.25 / 143.94	1	AS	-	144			
1		Stiff to very stiff moist to wet brown to grey CLAYEY SILT, trace to some sand, trace to some gravel (TILL)		0.76	2	50 DO	15				
					3	50 DO	12	143			
2					4	50 DO	34				
								142			
3					5	50 DO	19				
								141			
4	TRACK MOUNTED POWER AUGER 160 mm Dia. Augers										
					6	50 DO	15	140			
5											
								139			
6					7	50 DO	15				
								138			
7											
								137			
8					8	50 DO	36				
								136			
9					9	50 DO	13				
				135.10							
		END OF BOREHOLE		9.60							
10											

INSTALLATION AND GROUNDWATER OBSERVATIONS

B A

50 mm Dia. Monitoring Well

Bentonite Seal

Sand

Water encountered at a depth of 3.05 m below ground surface, May 27, 2011

Water level at 3.05 m below ground surface upon completion of drilling, May 27, 2011

50 mm Dia. Monitoring Well

Bentonite Seal

Sand

DEPTH SCALE

1 : 50

Golder Associates

LOGGED: AZ

CHECKED: OS

LDN_ENV 11-1111-0068.GPJ GLDR_LDN.GDT 7/12/11 DATA INPUT: MK JUNE 2011

PROJECT: 11-1111-0068

RECORD OF BOREHOLE BH8-1

SHEET 1 OF 1

LOCATION: SEE FIGURE 2

BORING DATE: June 1, 2011

DATUM: GEODETIC

SAMPLER HAMMER, 63.5kg; DROP, 760mm

PENETRATION TEST HAMMER, 63.5kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	ELEVATION	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. +, rem V. ⊕, Q -, U -) (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT (Wp, W, Wl) (10 20 30 40)	ADDITIONAL LAB. TESTING	INSTALLATION AND GROUNDWATER OBSERVATIONS
		GROUND SURFACE		141.04								
0	TRACK MOUNTED POWER AUGER 160 mm Dia. Augers	TOPSOIL		0.00				141				
		Loose to compact light brown to brown moist to wet SILTY SAND to SANDY SILT, trace to some clay, zones of clayey silt		0.15	1	AS	-					50 mm Dia. Monitoring Well Bentonite Seal
1					2	50 DO	10	140				
					3	50 DO	18					
2				138.91				139				
		Very dense to dense grey wet SAND and GRAVEL, trace to some silt		2.13	4	50 DO	53					Sand
3					5	50 DO	51	138				
4								137				
					6	50 DO	38					Caved
5								136				
6								135				
					7	50 DO	40					
				134.49								
		END OF BOREHOLE		6.55								Water encountered during drilling at a depth of 1.52 m below ground surface, June 1, 2011
7												Water level in open portion of borehole at a depth of 0.91 m below ground surface upon completion of drilling, June 1, 2011
8												
9												
10												

DEPTH SCALE

1 : 50

Golder Associates

LOGGED: AZ

CHECKED: OS

LDN_BHS 11-1111-0068.GPJ GLDR_LDN.GDT 7/12/11 DATA INPUT: MK JUNE 2011

PROJECT: 11-1111-0068

RECORD OF BOREHOLE BH8-2

SHEET 1 OF 1

LOCATION: SEE FIGURE 2

BORING DATE: June 1, 2011

DATUM: GEODETIC

SAMPLER HAMMER, 63.5kg; DROP, 760mm

PENETRATION TEST HAMMER, 63.5kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	ELEVATION	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. +, rem V. ⊕, Q - ⊖, U - O) (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT Wp W Wl (10 20 30 40)	ADDITIONAL LAB. TESTING	INSTALLATION AND GROUNDWATER OBSERVATIONS
		GROUND SURFACE		152.42								
0	TRACK MOUNTED POWER AUGER 160 mm Dia. Augers	TOPSOIL		0.00 / 152.19				152				
		Hard brown moist CLAYEY SILT, some sand, trace to some gravel, containing cobbles and boulders (TILL)		0.23	1	AS	-					50 mm Dia. Monitoring Well
1					2	50 DO	42					
								151				
					3	50 DO	43					
2				150.29								Bentonite Seal
		Very dense brown to grey moist SANDY SILT to SILTY SAND, trace to some clay, trace to some gravel, containing cobbles and boulders (TILL)		2.13	4	50 DO	50/ .13	150				
3					5	50 DO	74					
								149				
4												
								148				
					6	50 DO	50/ .13					
5												
								147				Sand
6					7	50 DO	50/ .15					
		END OF BOREHOLE		146.04 / 6.38								Borehole dry upon completion of drilling, June 1, 2011
7												
8												
9												
10												

DEPTH SCALE
1 : 50

Golder Associates

LOGGED: AZ
CHECKED: OS

LDN_BHS 11-1111-0068.GPJ GLDR_LDN.GDT 7/12/11 DATA INPUT: MK JUNE 2011

PROJECT: 11-1111-0068

RECORD OF BOREHOLE BH9-1

SHEET 1 OF 1

LOCATION: SEE FIGURE 2

BORING DATE: May 31, 2011

DATUM: GEODETIC

SAMPLER HAMMER, 63.5kg; DROP, 760mm

PENETRATION TEST HAMMER, 63.5kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES BLOWS/0.3m	ELEVATION	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT (Wp, W, Wl; 10 20 30 40)	ADDITIONAL LAB. TESTING	INSTALLATION AND GROUNDWATER OBSERVATIONS
		GROUND SURFACE		161.13							
0	TRACK MOUNTED POWER AUGER 160 mm Dia. Augers	TOPSOIL		0.00 / 160.80				161			
		Moist brown CLAYEY SILT some sand, trace gravel		0.33 / 160.37	1	AS	-				50 mm Dia. Monitoring Well
1		Compact moist brown SILTY SAND to SANDY SILT, trace to some clay, trace to some gravel (TILL)		0.76	2	50 DO	27	160			Bentonite Seal
					3	50 DO	28				
2				159.00				159			
		Hard grey moist to wet CLAYEY SILT, trace to some sand, sand seams		2.13	4	50 DO	33				
3					5A			158			Bentonite Seal
				157.78	5B	50 DO	42				
		Compact to very dense moist grey SANDY SILT to SILTY SAND, trace to some clay, trace to some gravel, containing cobbles and boulders (TILL)		3.35							Sand
4								157			
					6	50 DO	24				
5								156			
6					7	50 DO	93/ .28	155			
7								154			Water encountered during drilling at a depth of 3.35 m below ground surface, May 31, 2011
					8	50 DO	50/ .13				Water level at a depth of 2.13 m upon completion of drilling, May 31, 2011
8								153			Sand
9					9	50 DO	85	152			
				151.53							
		END OF BOREHOLE		9.60							
10											

B A

DEPTH SCALE
1 : 50

Golder Associates

LOGGED: AM
CHECKED: OS

LDN_ENV 11-1111-0068.GPJ GLDR_LDN.GDT 7/12/11 DATA INPUT: MK JUNE 2011

PROJECT: 11-1111-0068

RECORD OF BOREHOLE BH10-1

SHEET 1 OF 1

LOCATION: SEE FIGURE 2

BORING DATE: May 27, 2011

DATUM: GEODETIC

SAMPLER HAMMER, 63.5kg; DROP, 760mm

PENETRATION TEST HAMMER, 63.5kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	ELEVATION	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT (Wp, W, Wl; 10 20 30 40)	ADDITIONAL LAB. TESTING	INSTALLATION AND GROUNDWATER OBSERVATIONS (B / A)
		GROUND SURFACE		154.87							
0	TRACK MOUNTED POWER AUGER 160 mm Dia. Augers	Moist brown SANDY SILT, some clay, trace gravel		0.00	1	AS	-	154			50 mm Dia. Monitoring Well (B) / 50 mm Dia. Monitoring Well (A)
				154.11							
1		Stiff to hard moist to wet brown to grey CLAYEY SILT, trace to some sand, trace to some gravel, containing cobbles and boulders (TILL)		0.76	2	50 DO	10				Bentonite Seal
					3	50 DO	75/ .25	153			
2					4	50 DO	89/ .2				
3					5	50 DO	50/ .12	152			Bentonite Seal
4								151			Sand
5					6	50 DO	41	150			
				149.31							
6		Very stiff to hard wet grey SILTY CLAY to CLAYEY SILT, trace to some sand, trace to some gravel, contains cobbles and boulders (TILL)		5.56	7	50 DO	20	149			
7								148			
8					8	50 DO	47	147			Water encountered at a depth of 4.57 m below ground surface, May 27, 2011 Water level at a depth of 0.61 m below ground surface upon completion of drilling, May 28, 2011
9					9	50 DO	36	146			Sand
				145.27							
10		END OF BOREHOLE		9.60							

DEPTH SCALE

1 : 50

LOGGED: AZ

CHECKED: OS

Golder Associates

LDN_ENV 11-1111-0068.GPJ GLDR_LDN.GDT 7/12/11 DATA INPUT: MK JUNE 2011

PROJECT: 11-1111-0068

RECORD OF BOREHOLE BH10-2

SHEET 1 OF 1

LOCATION: SEE FIGURE 2

BORING DATE: May 28, 2011

DATUM: GEODETIC

SAMPLER HAMMER, 63.5kg; DROP, 760mm

PENETRATION TEST HAMMER, 63.5kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	ELEVATION	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT (Wp, W, Wl; 10 20 30 40)	ADDITIONAL LAB. TESTING	INSTALLATION AND GROUNDWATER OBSERVATIONS
		GROUND SURFACE		169.54							
0		TOPSOIL		0.00 / 169.29							
	TRACK MOUNTED POWER AUGER, 160 mm Dia. Augers	Compact to very dense moist to wet brown to grey SANDY SILT to SILTY SAND, trace to some clay, trace to some gravel, zones of clayey silt (TILL)		0.25	1	AS	-	169			50 mm Dia. Monitoring Well
1					2	50 DO	24				Bentonite Seal
								168			
					3	50 DO	45				
2											
					4	50 DO	50/ .15	167			
3											
					5	50 DO	50/ .15				Bentonite Seal
								166			
4											Sand
					6	50 DO	50/ .1	165			
5											
								164			
6					7	50 DO	50/ .13				
								163			
7											
								162			Water encountered during drilling at a depth of 6.1 m below ground surface, May 28.2011
8					8	50 DO	83/ .28				Water level at 6.1 m below ground surface upon completion of drilling, May 28, 2011
				160.93				161			Sand
		Hard grey wet CLAYEY SILT, some sand, trace gravel, zones of silty sand (TILL)		8.61							
9				160.29	9	50 DO	50/ .1				
		END OF BOREHOLE		9.25							
10											

B A

DEPTH SCALE

1 : 50

LOGGED: AM

CHECKED: OS

Golder Associates

LDN_ENV 11-1111-0068.GPJ GLDR_LDN.GDT 7/12/11 DATA INPUT: MK JUNE 2011

PROJECT: 11-1111-0068

RECORD OF BOREHOLE BH10-3

SHEET 1 OF 2

LOCATION: SEE FIGURE 2

BORING DATE: May 28, 2011

DATUM: GEODETIC

SAMPLER HAMMER, 63.5kg; DROP, 760mm

PENETRATION TEST HAMMER, 63.5kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	ELEVATION	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. + Q - ⊖ / rem V. ⊕ U - O) (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT Wp W Wl (10 20 30 40)	ADDITIONAL LAB. TESTING	INSTALLATION AND GROUNDWATER OBSERVATIONS
		GROUND SURFACE		183.49								
0	TRACK MOUNTED POWER AUGER 160 mm Dia. Augers	TOPSOIL		0.00 / 183.13	1	AS	-	183				50 mm Dia. Monitoring Well
		Wet brown SANDY SILT, trace clay, trace to some gravel		0.36 / 182.73								
1		Compact to very dense moist to wet brown to grey SILTY SAND to SANDY SILT, trace to some clay, trace to some gravel, zones of sand, oxidization staining, containing cobbles and boulders (TILL)		0.76	2	50 DO	29	182				
2					3	50 DO	71					
					4	50 DO	83	181				
3					5	50 DO	86/ .28					
								180				
4												
					6	50 DO	50/ .1	179				Bentonite Seal
5												
								178				
6					7	50 DO	53					
								177				
7												
								176				
					8	50 DO	45					
8								175				
9					9	50 DO	69					
								174				
10		--- CONTINUED NEXT PAGE ---										

DEPTH SCALE

1 : 50

LOGGED: AM

CHECKED: OS

LDN_BHS 11-1111-0068.GPJ GLDR_LDN.GDT 7/12/11 DATA INPUT: MK JUNE 2011

PROJECT: 11-1111-0068

RECORD OF BOREHOLE BH10-3

SHEET 2 OF 2

LOCATION: SEE FIGURE 2

BORING DATE: May 28, 2011

DATUM: GEODETIC

SAMPLER HAMMER, 63.5kg; DROP, 760mm

PENETRATION TEST HAMMER, 63.5kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	ELEVATION	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. +, rem V. ⊕, Q - ⊖, U - O) (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT (Wp, W, Wl) (10 20 30 40)	ADDITIONAL LAB. TESTING	INSTALLATION AND GROUNDWATER OBSERVATIONS
		--- CONTINUED FROM PREVIOUS PAGE ---										
10	TRACK MOUNTED POWER AUGER 160 mm Dia. Augers	Compact to very dense moist to wet brown to grey SILTY SAND to SANDY SILT, trace to some clay, trace to some gravel, zones of sand, oxidization staining, containing cobbles and boulders (TILL)						173				
11					10	50 DO	93					Sand
12								172				
					11	50 DO	77	171				
				170.84								
		END OF BOREHOLE		12.65								Water encountered during drilling at a depth of 0.91 m below ground surface, May 28, 2011 Water level at 0.91 m below ground surface upon completion of drilling, May 28, 2011
13												
14												
15												
16												
17												
18												
19												
20												

DEPTH SCALE

1 : 50

Golder Associates

LOGGED: AM

CHECKED: OS

LDN_BHS 11-1111-0068.GPJ GLDR_LDN.GDT 7/12/11 DATA INPUT: MK JUNE 2011

PROJECT: 11-1111-0068

RECORD OF BOREHOLE BH10-4

SHEET 1 OF 1

LOCATION: SEE FIGURE 2

BORING DATE: May 28, 2011

DATUM: GEODETIC

SAMPLER HAMMER, 63.5kg; DROP, 760mm

PENETRATION TEST HAMMER, 63.5kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	ELEVATION	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. +, rem V. ⊕, Q -, U -)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT (Wp, W, Wl; 10 20 30 40)	ADDITIONAL LAB. TESTING	INSTALLATION AND GROUNDWATER OBSERVATIONS
0		GROUND SURFACE		184.11								
		TOPSOIL		0.00				184				
		Wet brown SILTY SAND, some gravel, trace clay		0.13	1	AS	-					50 mm Dia. Monitoring Well
1				183.35				183				
		Very stiff moist to wet brown CLAYEY SILT, some sand, trace to some gravel (TILL)		0.76	2	50 DO	16					
				182.74								
2	TRACK MOUNTED POWER AUGER 160 mm Dia. Augers	Very dense moist brown to grey SANDY SILT to SILTY SAND, trace to some clay, some gravel, containing cobbles and boulders (TILL)		1.37	3	50 DO	71/ .20	182				Bentonite Seal
					4	50 DO	50/ .13					
3					5	50 DO	50/ .1	181				
4								180				
					6	50 DO	50/ .1					
5								179				Sand
6				178.01	7	AS	-					
		END OF BOREHOLE		6.10								Water encountered during drilling at a depth of 0.76 m below ground surface, May 28, 2011 Borehole dry upon completion of drilling May 28, 2011
7												
8												
9												
10												

DEPTH SCALE

1 : 50

Golder Associates

LOGGED: AM

CHECKED: OS

LDN_BHS 11-1111-0068.GPJ GLDR_LDN.GDT 7/12/11 DATA INPUT: MK JUNE 2011

PROJECT: 11-1111-0068

RECORD OF BOREHOLE BH10-5

SHEET 1 OF 1

LOCATION: SEE FIGURE 2

BORING DATE: May 28, 2011

DATUM: GEODETIC

SAMPLER HAMMER, 63.5kg; DROP, 760mm

PENETRATION TEST HAMMER, 63.5kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	ELEVATION	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT (Wp, W, WI; 10 20 30 40)	ADDITIONAL LAB. TESTING	INSTALLATION AND GROUNDWATER OBSERVATIONS (B / A)
		GROUND SURFACE		174.18							
0		TOPSOIL		0.00				174			
		Compact to dense brown moist SANDY SILT, some clay, trace gravel		0.20	1	50 DO	-				50 mm Dia. Monitoring Well (B)
				173.42							50 mm Dia. Monitoring Well (A)
1		Compact to very dense moist to wet brown to grey SILTY SAND to SANDY SILT, trace to some clay, trace to some gravel, containing cobbles and boulders (TILL)		0.76	2	50 DO	17	173			Bentonite Seal
					3	50 DO	44				
2					4	50 DO	82	172			
3					5	50 DO	50/ .15	171			Bentonite Seal (A)
4	TRACK MOUNTED POWER AUGER 160 mm Dia. Augers							170			Silica Sand Filter
5					6	50 DO	32				
								169			
6					7	50 DO	50/ .05	168			
7				167.09							
		Hard grey wet CLAYEY SILT, trace to some sand, trace to some gravel (TILL)		7.09				167			Water encountered at a depth of 4.57 m below ground surface, May 28, 2011
8					8	50 DO	69	166			Water level at a depth of 3.66 m below ground surface upon completion of drilling, May 28, 2011
											Sand (A)
9					9	50 DO	86	165			
				164.58							
		END OF BOREHOLE		9.60							
10											

DEPTH SCALE

1 : 50

Golder Associates

LOGGED:

CHECKED: OS

LDN_ENV 11-1111-0068.GPJ GLDR_LDN.GDT 7/12/11 DATA INPUT: MK JUNE 2011

PROJECT: 11-1111-0068

RECORD OF BOREHOLE BH11-1

SHEET 1 OF 1

LOCATION: SEE FIGURE 2

BORING DATE: May 30, 2011

DATUM: GEODETIC

SAMPLER HAMMER, 63.5kg; DROP, 760mm

PENETRATION TEST HAMMER, 63.5kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	ELEVATION	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (20 40 60 80) nat V. + Q - ⊖ rem V. ⊕ U - O	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT Wp W Wl (10 20 30 40)	ADDITIONAL LAB. TESTING	INSTALLATION AND GROUNDWATER OBSERVATIONS
		GROUND SURFACE		188.52								
0	TRACK MOUNTED POWER AUGER 160 mm Dia. Augers	TOPSOIL		0.00 / 188.27				188				
		Brown moist CLAYEY SILT, some sand, trace to some gravel (TILL)		0.25 / 187.76	1	AS	-					50 mm Dia. Monitoring Well
1		Dense to very dense moist to wet brown SANDY SILT to SILTY SAND, trace to some clay, trace to some gravel, contains cobbles and boulders, oxidation staining (TILL)		0.76	2	50 DO	53	187				
2					3	50 DO	34					Bentonite Seal
					4	50 DO	50/ .13	186				
3					5	50 DO	50/ .15					
								185				
4												
								184				
5					6	50 DO	50/ .13					Sand
								183				
6				182.30	7	50 DO	50/ .13					
		END OF BOREHOLE		6.22								Water encountered at a depth of 5.79 m below ground surface, May 30, 2011
7												Water level measured at a depth of 5.49 m below ground surface upon completion of drilling, May 30, 2011
8												
9												
10												

DEPTH SCALE

1 : 50

Golder Associates

LOGGED: AM

CHECKED: OS

LDN_BHS 11-1111-0068.GPJ GLDR_LDN.GDT 7/12/11 DATA INPUT: MK JUNE 2011

PROJECT: 11-1111-0068

RECORD OF BOREHOLE BH10-6

SHEET 1 OF 1

LOCATION: SEE FIGURE 2

BORING DATE: May 30, 2011

DATUM: GEODETIC

SAMPLER HAMMER, 63.5kg; DROP, 760mm

PENETRATION TEST HAMMER, 63.5kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	ELEVATION	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT (Wp, W, Wl; 10 20 30 40)	ADDITIONAL LAB. TESTING	INSTALLATION AND GROUNDWATER OBSERVATIONS
		GROUND SURFACE		189.58							
0	TRACK MOUNTED POWER AUGER 160 mm Dia. Augers	TOPSOIL		0.00							
				189.20	1	AS	-				
		Dense to very dense moist brown SANDY SILT to SILTY SAND, some to trace clay, trace to some gravel, zones of sand, containing cobbles and boulders (TILL)		0.38				189			50 mm Dia. Monitoring Well
1					2	50 DO	30				Bentonite Seal
								188			
					3	50 DO	50				
2											
					4	50 DO	50/ .10	187			
3											Bentonite Seal
					5	50 DO	50/ .15				
								186			Sand
4				185.54							
		Very dense moist to wet SAND and GRAVEL, some silt		4.04							
				184.88	6A	50 DO	85	185			
		Very dense moist brown to grey SILTY SAND to SANDY SILT, trace to some clay, some gravel, containing cobbles and boulders (TILL)		4.70	6B						
5											
								184			
6					7	50 DO	60/ .10				
								183			
7											
					8	50 DO	50/ .05	182			Water encountered during drilling at a depth of 4.27 m below ground surface, May, 30, 2011
8											Water level at a depth of 1.83 m below ground surface upon completion of drilling, May 30,2011
								181			Sand
9				180.36	9	50 DO	50/ .08				
		END OF BOREHOLE		9.22							
10											

B A

DEPTH SCALE

1 : 50

Golder Associates

LOGGED: AM

CHECKED: OS

LDN_ENV 11-1111-0068.GPJ GLDR_LDN.GDT 7/12/11 DATA INPUT: MK JUNE 2011

PROJECT: 11-1111-0068

RECORD OF BOREHOLE BH10-7

SHEET 1 OF 1

LOCATION: SEE FIGURE 2

BORING DATE: May 28, 2011

DATUM: GEODETIC

SAMPLER HAMMER, 63.5kg; DROP, 760mm

PENETRATION TEST HAMMER, 63.5kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	ELEVATION	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. + Q - ; rem V. ⊕ U - O) (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT Wp W Wl (10 20 30 40)	ADDITIONAL LAB. TESTING	INSTALLATION AND GROUNDWATER OBSERVATIONS
		GROUND SURFACE		193.76								
0	TRACK MOUNTED POWER AUGER 160 mm Dia. Augers	TOPSOIL		0.00 / 193.51				193				
		Compact to dense moist brown SILTY SAND, trace to some gravel, trace to some clay, zones of sand		0.25	1	AS	-					50 mm Dia. Monitoring Well
1					2	50 DO	29					Bentonite Seal
					3	50 DO	38	192				
2				191.70								
		Very dense moist brown SAND, trace gravel, trace silt		2.06	4	50 DO	50/ .15					
				190.94				191				
3		Very dense wet brown SAND and GRAVEL, trace silt		2.82	5	50 DO	63					
								190				
4				189.72								
		Dense wet brown SANDY SILT		4.04								
					6A	50 DO	47	189				
5		Dense wet brown SILT, trace fine sand		4.88	6B							Sand
				188.20								
		Very dense moist to wet grey SILTY SAND, trace clay, trace gravel		5.56				188				
6				187.51	7	50 DO	50/ .15					
		END OF BOREHOLE		6.25								Water encountered during drilling at a depth of 3.05 m below ground surface, May 28, 2011
7												Water level at a depth of 3.35 m below ground surface upon completion of drilling, May 28, 2011
8												
9												
10												

DEPTH SCALE

1 : 50

LOGGED: AM

CHECKED: OS

Golder Associates

LDN_BHS 11-1111-0068.GPJ GLDR_LDN.GDT 7/12/11 DATA INPUT: MK JUNE 2011

PROJECT: 11-1111-0068

RECORD OF BOREHOLE BH10-8

SHEET 1 OF 1

LOCATION: SEE FIGURE 2

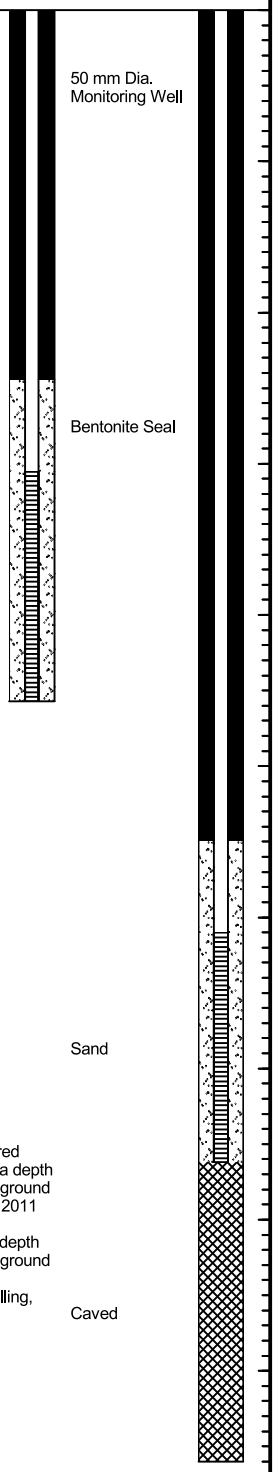
BORING DATE: June 2, 2011

DATUM: GEODETIC

SAMPLER HAMMER, 63.5kg; DROP, 760mm

PENETRATION TEST HAMMER, 63.5kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	ELEVATION	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT (Wp, W, Wl; 10 20 30 40)	ADDITIONAL LAB. TESTING	INSTALLATION AND GROUNDWATER OBSERVATIONS (B / A)
		GROUND SURFACE		191.20							
0	TRACK MOUNTED POWER AUGER 160 mm Dia. Augers	TOPSOIL		0.00				191			
				190.89							
		Dark brown to brown moist SILTY SAND		0.31	1	50 DO	-				
				190.44							
1		Very dense moist brown SILTY SAND, trace clay, trace to some gravel (TILL)		0.76	2	50 DO	56	190			
					3	50 DO	50/ .13				
2				189.07							
		Very dense moist to wet brown to grey SILTY SAND, trace gravel		2.13	4	50 DO	50/ .15	189			
3					5	50 DO	50/ .10	188			
4											
					6	50 DO	68	187			
5											
				185.71				186			
		Very dense moist to wet brown to grey SAND, trace silt		5.49							
6					7	50 DO	50/ .13	185			
7								184			
					8	50 DO	75/ .25				
8								183			
9					9	50 DO	70	182			
				181.60							
		END OF BOREHOLE		9.60							
10											



DEPTH SCALE
1 : 50

Golder Associates

LOGGED: AZ
CHECKED: OS

LDN_ENV 11-1111-0068.GPJ GLDR_LDN.GDT 7/12/11 DATA INPUT: MK JUNE 2011

PROJECT: 11-1111-0068

RECORD OF BOREHOLE BH11-2

SHEET 1 OF 1

LOCATION: SEE FIGURE 2

BORING DATE: May 30, 2011

DATUM: GEODETIC

SAMPLER HAMMER, 63.5kg; DROP, 760mm

PENETRATION TEST HAMMER, 63.5kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	ELEVATION	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT (Wp — W — Wl, 10 20 30 40)	ADDITIONAL LAB. TESTING	INSTALLATION AND GROUNDWATER OBSERVATIONS (B / A)
0		GROUND SURFACE		193.69							
		TOPSOIL		0.00							
				193.38							
		Stiff brown moist CLAYEY SILT, some sand, trace to some gravel, oxidation staining (TILL)		0.31	1	AS	-	193			50 mm Dia. Monitoring Well (B)
1					2	50 DO	10				50 mm Dia. Monitoring Well (A)
				192.32							Bentonite Seal
		Very dense moist brown SILTY SAND to SANDY SILT, trace to some clay trace to some gravel, containing cobbles and boulders, sand seams (TILL)		1.37	3	50 DO	75/ .28	192			
2					4	50 DO	75				
								191			Bentonite Seal (B)
3					5	50 DO	50/ .15				
								190			Sand (B)
4	TRACK MOUNTED POWER AUGER 160 mm Dia. Augers				6	50 DO	50/ .12	189			
5				188.29							
		Dense to very dense moist to wet SILTY SAND to SANDY SILT, trace gravel		5.40				188			
6					7	50 DO	36				
								187			
7											
					8A	50 DO	79/ .25	186			Water encountered during drilling at a depth of 6.1 m below ground surface, May 30, 2011
8				185.76							
		Very dense moist brown to grey SANDY SILT		7.93	8B						Water level at a depth of 7.62 m below ground surface upon completion of drilling May 30, 2011
								185			Sand (A)
9					9	50 DO	50/ .13				
				184.27							
		END OF BOREHOLE		9.42							
10											

DEPTH SCALE

1 : 50

Golder Associates

LOGGED: AM

CHECKED: OS

LDN_ENV 11-1111-0068.GPJ GLDR_LDN.GDT 7/12/11 DATA INPUT: MK JUNE 2011

PROJECT: 11-1111-0068

RECORD OF BOREHOLE BH11-3

SHEET 1 OF 1

LOCATION: SEE FIGURE 2

BORING DATE: June 1, 2011

DATUM: GEODETIC

SAMPLER HAMMER, 63.5kg; DROP, 760mm

PENETRATION TEST HAMMER, 63.5kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	ELEVATION	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. +, rem V. ⊕, Q - ⊖, U - O)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT (Wp, W, Wl; 10 20 30 40)	ADDITIONAL LAB. TESTING	INSTALLATION AND GROUNDWATER OBSERVATIONS
		GROUND SURFACE		199.15								
0	TRACK MOUNTED POWER AUGER 160 mm Dia. Augers	TOPSOIL		0.00 / 198.87				199				
		Brown moist CLAYEY SILT, some sand, trace gravel (TILL)		0.28 / 198.44	1	AS	-					50 mm Dia. Monitoring Well
1		Dense to very dense brown moist SANDY SILT to SILTY SAND, trace to some clay, trace to some gravel, containing cobbles and boulders, oxidation staining (TILL)		0.71	2	50 DO	48	198				
					3	50 DO	59					
2								197				Bentonite Seal
					4	50 DO	77/ .28					
3					5	50 DO	78	196				
4								195				
					6	50 DO	50/ .15					
5								194				Sand
6					7	50 DO	50/ .15	193				
				192.75								
		END OF BOREHOLE		6.40								Borehole dry upon completion of drilling, June 1, 2011
7												
8												
9												
10												

DEPTH SCALE

1 : 50

Golder Associates

LOGGED: AZ

CHECKED: OS

LDN_BHS 11-1111-0068.GPJ GLDR_LDN.GDT 7/12/11 DATA INPUT: MK JUNE 2011

PROJECT: 11-1111-0068

RECORD OF BOREHOLE BH12-1

SHEET 1 OF 1

LOCATION: SEE FIGURE 2

BORING DATE:

DATUM: GEODETIC

SAMPLER HAMMER, 63.5kg; DROP, 760mm

PENETRATION TEST HAMMER, 63.5kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	NUMBER	TYPE	BLOWS/0.3m	ELEVATION
		GROUND SURFACE		200.01				200
0	TRACK MOUNTED POWER AUGER 160 mm Dia. Augers	TOPSOIL		0.00 / 199.76				
		Dark brown to brown moist SANDY SILT, some clay		0.25 / 199.25	1	AS	-	
1		Compact to very dense brown moist SANDY SILT, trace to some clay, trace to some gravel, containing cobbles and boulders (TILL)		0.76	2	50 DO	21	199
					3	50 DO	53	
2				197.88				198
		Hard brown and grey mottled moist CLAYEY SILT, some sand, trace to some gravel (TILL)		2.13	4	50 DO	40	
				197.11				
3		Dense to very dense brown to grey wet SILTY FINE SAND to SANDY SILT, zones of silt		2.90	5	50 DO	46	197
4								196
					6	50 DO	78/ .25	
5								195
6					7	50 DO	76	194
7								193
					8	50 DO	46	
8								192
9				190.56	9	50 DO	50/ .15	191
		END OF BOREHOLE		9.45				
10								

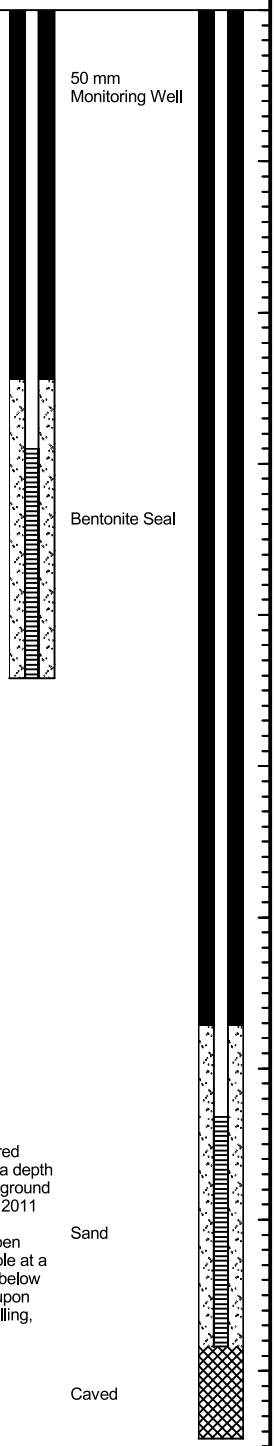
HYDRAULIC CONDUCTIVITY, k, cm/s: 10^{-6} 10^{-5} 10^{-4} 10^{-3}

WATER CONTENT PERCENT: Wp — W — Wl; 10 20 30 40

ADDITIONAL LAB. TESTING

INSTALLATION AND GROUNDWATER OBSERVATIONS

B A



Water encountered during drilling at a depth of 7.62 m below ground surface, June 1, 2011

Water level in open portion of borehole at a depth of 7.01 m below ground surface upon completion of drilling, June 1, 2011

DEPTH SCALE

1 : 50

Golder Associates

LOGGED: AZ

CHECKED: OS

LDN_ENV 11-1111-0068.GPJ GLDR_LDN.GDT 7/12/11 DATA INPUT: MK JUNE 2011

PROJECT: 11-1111-0068

RECORD OF BOREHOLE BH12-2

SHEET 1 OF 1

LOCATION: SEE FIGURE 2

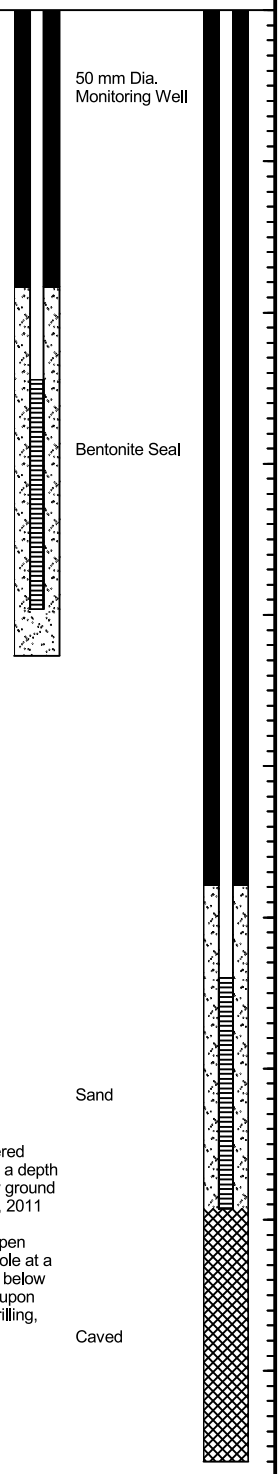
BORING DATE: June 1, 2011

DATUM: GEODETIC

SAMPLER HAMMER, 63.5kg; DROP, 760mm

PENETRATION TEST HAMMER, 63.5kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	ELEVATION	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT (Wp, W, Wl; 10 20 30 40)	ADDITIONAL LAB. TESTING	INSTALLATION AND GROUNDWATER OBSERVATIONS
		GROUND SURFACE		197.21							
0		TOPSOIL		0.00				197			
		Compact to very dense brown moist to wet SILTY SAND		0.15	1	AS	-				50 mm Dia. Monitoring Well; Bentonite Seal
1					2	50 DO	18	196			
					3	50 DO	37				
2					4	50 DO	41	195			
3					5	50 DO	30	194			Sand
4	TRACK MOUNTED POWER AUGER 160 mm Dia. Augers							193			
5					6	50 DO	60	192			
				191.65							
6		Very dense brown wet medium to coarse SAND, trace to some silt, trace to some gravel		5.56	7	50 DO	57	191			
7								190			Sand
					8	50 DO	88				Water encountered during drilling at a depth of 2.29 m below ground surface, June 1, 2011
8								189			Water level in open portion of borehole at a depth of 2.13 m below ground surface upon completion of drilling, June 1, 2011
9					9	50 DO	86	188			Caved
				187.61							
		END OF BOREHOLE		9.60							
10											



DEPTH SCALE
1 : 50

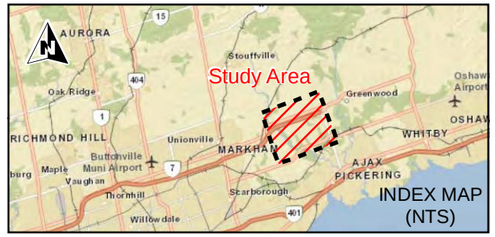
Golder Associates

LOGGED: AZ
CHECKED: AM

LDN_ENV 11-1111-0068.GPJ GLDR_LDN.GDT 7/12/11 DATA INPUT: MK JUNE 2011

LEGEND

ORC BOREHOLE WITH MONITORING WELL



REFERENCE

Base Data - MNR NRVIS, obtained 2004, CANMAP v2006.4
Produced by Golder Associates Ltd under licence from
Ontario Ministry of Natural Resources, © Queens Printer 2008
Projection: Transverse Mercator Datum: NAD 83 Coordinate System: UTM Zone 17

500 250 0 500 1,000
SCALE 1:25,000 METRES

PROJECT
Ontario Realty Corporation Lands
Seaton Neighbourhood's 17 to 21
Pickering, Ontario

TITLE
BOREHOLE LOCATION PLAN

Golder Associates
Whitby, Ontario

PROJECT NO. 11-1111-0068			SCALE AS SHOWN	REV. 0.0
DESIGN	DL	June 2011	FIGURE 1	
GIS	SS	June 2011		
CHECK	AM	July 2011		
REVIEW	DL	July 2011		

N:\GIS\Projects\2011\11-1111-0068 (ORC, Seaton-Pickering)\GIS\MXDs\Working\1111110068AA01.mxd

APPENDIX A

Important Information and Limitations of This Report

IMPORTANT INFORMATION AND LIMITATIONS TO THIS REPORT

Standard of Care: Golder Associates Ltd. (Golder) has prepared this report in a manner consistent with that level of care and skill ordinarily exercised by members of the engineering and science professions currently practising under similar conditions in the jurisdiction in which the services are provided, subject to the time limits and physical constraints applicable to this report. No other warranty, expressed or implied is made.

Basis and Use of the Report: This report has been prepared for the specific site, design objective, development and purpose described to Golder by the Client. The factual data, interpretations and recommendations pertain to a specific project as described in this report and are not applicable to any other project or site location. Any change of site conditions, purpose, development plans or if the project is not initiated within eighteen months of the date of the report may alter the validity of the report. Golder can not be responsible for use of this report, or portions thereof, unless Golder is requested to review and, if necessary, revise the report.

The information, recommendations and opinions expressed in this report are for the sole benefit of the Client. No other party may use or rely on this report or any portion thereof without Golder's express written consent. If the report was prepared to be included for a specific permit application process, then upon the reasonable request of the client, Golder may authorize in writing the use of this report by the regulatory agency as an Approved User for the specific and identified purpose of the applicable permit review process. Any other use of this report by others is prohibited and is without responsibility to Golder. The report, all plans, data, drawings and other documents as well as all electronic media prepared by Golder are considered its professional work product and shall remain the copyright property of Golder, who authorizes only the Client and Approved Users to make copies of the report, but only in such quantities as are reasonably necessary for the use of the report by those parties. The Client and Approved Users may not give, lend, sell, or otherwise make available the report or any portion thereof to any other party without the express written permission of Golder. The Client acknowledges that electronic media is susceptible to unauthorized modification, deterioration and incompatibility and therefore the Client cannot rely upon the electronic media versions of Golder's report or other work products.

The report is of a summary nature and is not intended to stand alone without reference to the instructions given to Golder by the Client, communications between Golder and the Client, and to any other reports prepared by Golder for the Client relative to the specific site described in the report. In order to properly understand the suggestions, recommendations and opinions expressed in this report, reference must be made to the whole of the report. Golder cannot be responsible for use of portions of the report without reference to the entire report.

Unless otherwise stated, the suggestions, recommendations and opinions given in this report are intended only for the guidance of the Client in the design of the specific project. The extent and detail of investigations, including the number of test holes, necessary to determine all of the relevant conditions which may affect construction costs would normally be greater than has been carried out for design purposes. Contractors bidding on, or undertaking the work, should rely on their own investigations, as well as their own interpretations of the factual data presented in the report, as to how subsurface conditions may affect their work, including but not limited to proposed construction techniques, schedule, safety and equipment capabilities.

Soil, Rock and Groundwater Conditions: Classification and identification of soils, rocks, and geologic units have been based on commonly accepted methods employed in the practice of geotechnical engineering and related disciplines. Classification and identification of the type and condition of these materials or units involves judgment, and boundaries between different soil, rock or geologic types or units may be transitional rather than abrupt. Accordingly, Golder does not warrant or guarantee the exactness of the descriptions.

Special risks occur whenever engineering or related disciplines are applied to identify subsurface conditions and even a comprehensive investigation, sampling and testing program may fail to detect all or certain subsurface conditions. The environmental, geologic, geotechnical, geochemical and hydrogeologic conditions that Golder interprets to exist between and beyond sampling points may differ from those that actually exist. In addition to soil variability, fill of variable physical and chemical composition can be present over portions of the site or on

adjacent properties. The professional services retained for this project include only the geotechnical aspects of the subsurface conditions at the site, unless otherwise specifically stated and identified in the report. The presence or implication(s) of possible surface and/or subsurface contamination resulting from previous activities or uses of the site and/or resulting from the introduction onto the site of materials from off-site sources are outside the terms of reference for this project and have not been investigated or addressed.

Sample Disposal: Golder will dispose of all uncontaminated soil and/or rock samples 90 days following issue of this report or, upon written request of the Client, will store uncontaminated samples and materials at the Client's expense. In the event that actual contaminated soils, fills or groundwater are encountered or are inferred to be present, all contaminated samples shall remain the property and responsibility of the Client for proper disposal.

Follow-Up and Construction Services: All details of the design were not known at the time of submission of Golder's report. Golder should be retained to review the final design, project plans and documents prior to construction, to confirm that they are consistent with the intent of Golder's report.

During construction, Golder should be retained to perform sufficient and timely observations of encountered conditions to confirm and document that the subsurface conditions do not materially differ from those interpreted conditions considered in the preparation of Golder's report and to confirm and document that construction activities do not adversely affect the suggestions, recommendations and opinions contained in Golder's report. Adequate field review, observation and testing during construction are necessary for Golder to be able to provide letters of assurance, in accordance with the requirements of many regulatory authorities. In cases where this recommendation is not followed, Golder's responsibility is limited to interpreting accurately the information encountered at the borehole locations, at the time of their initial determination or measurement during the preparation of the Report.

Changed Conditions and Drainage: Where conditions encountered at the site differ significantly from those anticipated in this report, either due to natural variability of subsurface conditions or construction activities, it is a condition of this report that Golder be notified of any changes and be provided with an opportunity to review or revise the recommendations within this report. Recognition of changed soil and rock conditions requires experience and it is recommended that Golder be employed to visit the site with sufficient frequency to detect if conditions have changed significantly.

Drainage of subsurface water is commonly required either for temporary or permanent installations for the project. Improper design or construction of drainage or dewatering can have serious consequences. Golder takes no responsibility for the effects of drainage unless specifically involved in the detailed design and construction monitoring of the system.