Geotechnical Engineering

**Environmental Engineering** 

**Hydrogeology** 

Geological Engineering

**Materials Testing** 

**Building Science** 

**Archaeological Services** 

# patersongroup

## **Hydrogeological Assessment**

Proposed Residential Development 3640 Greenbank Road Ottawa, Ontario

## **Prepared For**

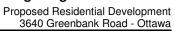
Tamarack (Nepean) Corporation

## **Paterson Group Inc.**

Consulting Engineers 154 Colonnade Road South Ottawa, Ontario Canada K2E 7J5

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Report PG3443-2





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## 1.0 INTRODUCTION

Paterson Group (Paterson) was commissioned by Tamarack (Nepean) Corporation to prepare a hydrogeological assessment for Phases 3 to 5 of the proposed residential development to be located at 3640 Greenbank Road in Ottawa, Ontario (refer to Figure 1 - Key Plan within Appendix 1).

Subsurface information was obtained from the geotechnical investigation carried out to determine the subsoil and groundwater conditions at the site by means of test holes.

The following report has been prepared specifically and solely for the aforementioned project which is described herein. It contains the investigation findings and includes hydrogeological assessments pertaining to the proposed program as understood at the time of writing this report.

## 1.1 Proposed Project

It is our understanding that Phases 3 to 5 of the proposed residential development, to be located on the west side of Greenbank Road and east of Borrisokane Road, consists of the municipal address 3640 Greenbank Road.

The subject site consists of an approximate 47 hectare undeveloped property consisting of former agricultural field land, active construction sites and forested areas. The majority of the property is relatively flat, with the exception of part of Phase 5 which rises to a ridge approximately 5 to 7 m above the grade of the surrounding areas. It is bordered to the north by residential buildings, forested areas and Cambrian Road, to the east by residential buildings, to the south by residential buildings, forested areas and a sand pit and to the west by forested areas and Borrisokane Road.

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### 2.0 SITE CONDITIONS

### **Physical Setting**

As previously noted, the subject site is located on the west side of Greenbank Road and the east side of Borrisokane Road and contains a mixture of former agricultural land, active construction sites and densely treed areas. Site topography is generally flat with the exception of Phase 5, with average elevations of 95 m above sea level (asl) along the eastern and western portions of the property and average elevations of 100 m asl along the central portion. The general drainage direction is expected to vary locally but travel regionally in a southwest to northeast direction, following topographic trends. There were no named water bodies known to exist on the subject site.

According to available mapping, the subject site is located in the Ottawa Valley Clay Plains physiographic region, which is characterized by relatively flat clay plains interrupted by rock ridges. While the site is relatively flat, several physiographic landforms are present including an esker, till plains and clay plains, all of which were encountered during the various field programs conducted as part of the geotechnical investigations.

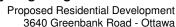
## 2.1 Geology

### **Surficial Geology**

The field programs for the geotechnical investigations were carried out over an extended period of time for the various phases of the project, with the earliest work being completed in April 2004 and the most recent being completed in February 2018. Over the course of the various field programs, total of 18 boreholes and 34 test pits were advanced to a maximum depth of 11.3 m. The test hole locations were distributed in a manner to provide general coverage of the subject site. The approximate locations of the test holes are shown on Drawings PG4242-1, PG3786-1 and PG0214-4 - Test Hole Location Plans included in Appendix 2.

Overburden soils identified during the geotechnical field investigation were generally consistent with available mapping for the area. Within Phase 3 of the proposed development, the overburden generally consisted of topsoil overlying a overlying a thin layer of brown silty clay, which was underlain by glacial till comprised of a silty sand/silty clay matrix with gravel, cobbles and boulders.

Within Phase 4 of the proposed development, the overburden materials were variable but generally consisted of topsoil overlying a deposit of silty sand, which was underlain





by a layer of brown silty clay becoming grey with depth. This was further underlain by glacial till comprised of a silty sand/silty clay matrix with gravel, cobbles and boulders.

The overburden materials within Phase 5 of the proposed development were variable but generally consisted of topsoil overlying a deposit of silty sand. This was either underlain by a layer of silty clay or a glacial till deposit comprised of a silty sand/silty clay matrix with gravel, cobbles and boulders.

Specific details of the soil profile at each test hole location are presented on the Soil Profile and Test Data sheets included in Appendix 2.

#### **Bedrock**

Based on available geological mapping, the subject site is located in an area where the bedrock consists of dolomite of the Oxford formation, with an estimated overburden thickness ranging from 10 to 25 m.

#### **Karst Features**

The term "karst" refers to a geologic formation characterized by the dissolution of carbonate bedrock, such as limestone or dolostone. In order for karstification to occur, precipitation must be allowed to infiltrate the top of the bedrock to dissolutionally enlarge previously existing joints and bedding planes. Given the depth of surficial soils overlying the dolomite bedrock that are non-conducive to groundwater infiltration, it is highly unlikely that karstification is occurring.

## 2.2 Hydrogeology

### **Existing Aquifer Systems**

Aquifer systems may be defined as geological media, either overburden soils or fractured bedrock, which permit the movement of groundwater under hydraulic gradients. Although groundwater has been observed within the overburden soils, the composition of materials throughout the majority of the site does not allow for the development of significant water supply wells, with the only exception to this being wells that are installed within the esker located south of the site. However, despite the presence of the esker, water supply wells in the vicinity of the study area are generally found to be accessing bedrock aquifers.

Bedrock aquifer mapping, provided by Natural Resources Canada Urban Geology of the National Capital Region mapping, was reviewed as part of this assessment. Using

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this tool, the Oxford formation aquifer system was identified as the only bedrock water supply aquifer system in the vicinity of the study area.

The Oxford formation aquifer system is present throughout the study area. While there are no wells extending into this aquifer on the subject site, wells completed within this formation located in proximity to the site reported encountering water-bearing fractures at depths typically ranging from 25 to 35 m bgs.

### **Groundwater Levels**

Groundwater was observed in the piezometers/monitoring wells installed in the overburden at the borehole locations and was also observed in the field during the excavation of the test pits. Based on a review of water well records, groundwater is also present in the bedrock at depth.

Groundwater levels in the overburden at the subject site were observed to vary from 0.1 to 3.2 m bgs at the time of the geotechnical field investigations. It should be noted that groundwater levels may have been influenced by surface water infiltrating the backfilled boreholes. Subsequent groundwater level readings within the piezometers can be also influenced by perched water in the backfill material within the borehole. Groundwater levels are also influenced by seasonal variations in temperature and precipitation. As such, long-term groundwater levels are also estimated based on other factors such as colour and consistency of the recovered soil samples. Based on these observations, the long-term groundwater level at the subject site is expected to range from approximately 0.5 to 2.0 m bgs, with water levels expected to be higher within Phase 4 of the proposed development and slightly lower within Phases 3 and 5.

### **Hydraulic Gradients**

Vertical hydraulic gradients were not measured at the subject site as the previous studies completed did not warrant the installation of monitoring well nests.

With respect to horizontal hydraulic gradients, due to the nature of the water levels obtained from field work conducted at the site (piezometers and groundwater monitoring wells), the absolute direction of horizontal hydraulic gradients was not determined. However, using the available data, it was possible to approximate the horizontal hydraulic gradients in the overburden material given that the horizontal hydraulic gradient between any 2 points is the slope of the hydraulic head between those points:

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i=h2-h1/L

Where: i=horizontal hydraulic gradient

h=water level (m bgs)

L=horizontal distance between test hole locations

Using the above noted formula, the horizontal hydraulic gradient was observed to have an approximate north-to-northeast orientation and a magnitude ranging from 0.02 to 0.001. Shallow groundwater flow in the vicinity of the subject site is expected to reflect local topography. Regional groundwater flow is considered to be in a northerly direction, towards the Jock River.

### **Hydraulic Conductivity**

The hydraulic conductivity values were conservatively estimated based upon previous experience at similar sites in the area, information obtained from the results of the geotechnical field program, results of slug testing completed at select locations and typical published values for similar stratigraphy. The values are interpreted to be in the order of 1 x  $10^{-4}$  to 1 x  $10^{-7}$  m/sec for silty sand, 1 x  $10^{-6}$  to 1 x  $10^{-10}$  m/sec for glacial till with a variable matrix composition and 1 x  $10^{-7}$  to 1 x  $10^{-10}$  m/sec for silty clay.

### **Groundwater Recharge and Discharge**

In general, groundwater will follow the path of least resistance from areas of higher hydraulic head to areas of lower hydraulic head. While upward and downward hydraulic gradients may be indicative of discharge and recharge respectively, other factors must be considered.

Based on the hydraulic conductivity estimates obtained from previous studies and published literature, the silty clay overburden is generally considered to act as a confining layer. It is our interpretation that groundwater will generally flow laterally through the upper layer of silty sand/weathered brown silty clay, as opposed to vertically upwards or downwards through overburden soils with lower hydraulic conductivity such as the grey silty clay. As such, the volume of recharge occurring within the majority of the site boundaries is expected to be minimal. The only exception to the above is a small portion along the southern boundary within Phase 5 of the proposed development, where available information indicates esker materials such as silty sand and glacial till dominate the overburden material composition in the area. However, given the limited extent of these materials within the confines of the subject site, the volume of recharge expected to occur remains minimal.





Proposed Residential Development 3640 Greenbank Road - Ottawa

With regards to discharge zones, neither the topographical or geological conditions are suitable for discharge to be occurring at the subject site.

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## 3.0 POTENTIAL IMPACTS

## 3.1 Adverse Effects on Adjacent Structures

The overburden in the area varies dependant on location but generally consists of topsoil overlying a silty sand layer which is further underlain by either a silty clay deposit or glacial till. The potential dewatering volumes due to groundwater infiltration into potential excavation footprints are anticipated to be low to moderate depending on the majority composition of the materials at a given location, with lower volumes expected within silty clay and higher volumes expected within the silty sand. Given the nature of the development (low lying residential housing and associated servicing), the duration of any excavation on site is expected to be short term in duration. Additionally, the majority of the site is surrounded by undeveloped land, with only the eastern boundary containing existing residential buildings. As such, any effects related to ground surface settlement due to potential groundwater removal as part of construction activities are expected to be negligible.

## 3.2 Adverse Effects on Neighbouring Water Wells

A search of the Ontario Water Well Records online mapping database and the Groundwater Information Network (GIN) indicates there are 11 wells within 500 m of the site as depicted on Drawing PG3443-3 - MOECC Water Well Location Plan included in Appendix 1. However, upon investigation it was determined that these wells are no longer in use due to both their installation dates and the developed nature of the region. Additionally, the developed area surrounding the eastern portion of the site is serviced by municipal water supplies. Construction activities at the site are therefore not expected to cause any interference to the water supply of surrounding properties or other negative impacts.

A series of calculations were carried out on theoretical radii of influence for a typical servicing trench excavation withdrawing water from the upper 3 to 5 m of the saturated zone. These calculations were completed based on Sichardt (1992) using the equation:

$$R = r_e + 3000^* \Delta h(k^{0.5})$$

- R = radius of influence (m)
- r<sub>e</sub> = equivalent radius of excavation (m)
- $\Delta h = \text{thickness of drawdown within the aguifer (m)}$
- k = hydraulic conductivity (m/sec)

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For the purposes of completing the calculations, the following assumptions were made:

$r_{\rm e} = 7.96 \text{ m}$
$k = 1 \times 10^{-4}$ m/sec to $1 \times 10^{-10}$ m/sec, based upon our experience in the area,
the results of the slug testing analyses and published values.
$\Delta h = 2$ to 4 m, to review potential minimum/maximum variable conditions.

Using the above equation and assumptions, a radius of influence of approximately 1 to 120 m will develop as a steady state condition, extending from the edge of the excavation, in the area of the subject site.

Given the hydrogeological characteristics of the subject site, the theoretical radii of influence for the potential excavations related to the development and the lack of water supply wells within 500 m, a long-term groundwater monitoring program is not required to be implemented based on our review.

### 3.3 Groundwater

A search of the MOECC Brownfields Environmental Site Registry was conducted as part of the assessment of the site, neighbouring properties and the general area of the site. Using a search radius of 1 km provided no recorded Brownfield sites in that area. No concerns were identified in the review of the MOECC Brownfields database.

It is anticipated that the material on site will be disposed of or re-used as per the MOECC policy, *Management of Excess Soil - A Guide for Best Management Practices* dated January, 2014.

The groundwater that is pumped from site excavations must be managed in an appropriate manner. The contractor will be required to implement a water management program to dispose of the pumped water.



## 4.0 STATEMENT OF LIMITATIONS

The recommendations provided in this report are in accordance with our present understanding of the project.

A hydrogeological review of this nature is a limited sampling of a site. The recommendations are based on information gathered at the specific test locations and can only be extrapolated to an undefined limited area around the test locations. Should any conditions at the site be encountered which differ from those at the test locations, we request notification immediately in order to permit reassessment of our recommendations.

The present report applies only to the project described in this document. Use of this report for purposes other than those described herein or by person(s) other than Tamarack (Nepean) Corporation or their agent(s) is not authorized without review by Paterson Group for the applicability of our recommendations to the altered use of the report.

Paterson Group Inc.

Michael Laflamme, GIT

David J. Gilbert, P.Eng.

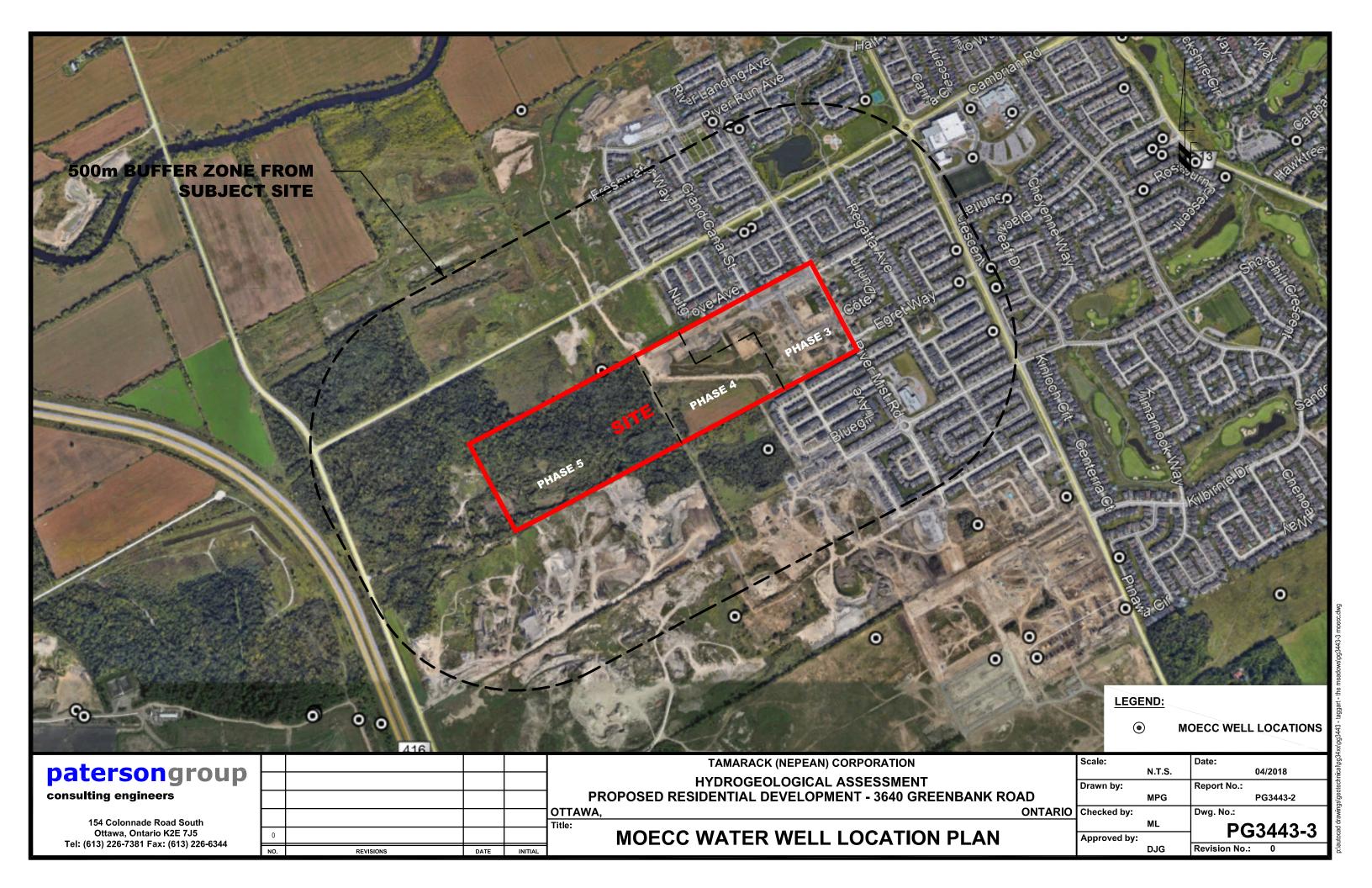
## **APPENDIX 1**

Figure 1 - Key Plan

**Drawing PG3443-3 - MOECC Water Well Location Plan** 



FIGURE 1
KEY PLAN



## **APPENDIX 2**

**Soil Profile and Test Data** 

**Drawing PG4242-1 - Test Hole Location Plan** 

**Drawing PG3786-1 - Test Hole Location Plan** 

**Drawing PG0214-4 - Test Hole Location Plan** 

**PG3786 - Hydraulic Conductivity Testing Results** 

**SOIL PROFILE AND TEST DATA** 

154 Colonnade Road South, Ottawa, Ontario K2E 7J5

Geotechnical Investigation Prop. Residential Development - The Meadows Phase 4 Greenbank Road, Ottawa, Ontario

**DATUM** Ground surface elevations were provided by Taggart Construction Ltd. FILE NO. **PG3786 REMARKS** HOLE NO. TP 1-18 **BORINGS BY** Hydraulic Shovel DATE February 27, 2018 **SAMPLE** Pen. Resist. Blows/0.3m STRATA PLOT DEPTH ELEV. Piezometer Construction **SOIL DESCRIPTION**  50 mm Dia. Cone (m) (m) N VALUE or RQD RECOVERY NUMBER Water Content % **GROUND SURFACE** 80 20 0+93.65Loose, brown SILTY SAND with gravel, cobbles and boulders, trace clay 1 + 92.65G 1 1.60 2+91.65 Stiff to firm, grey SILTY CLAY, trace sand 2 End of Test Pit (TP dry upon completion) 40 60 100 Shear Strength (kPa) ▲ Undisturbed △ Remoulded

154 Colonnade Road South, Ottawa, Ontario K2E 7J5

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**SOIL PROFILE AND TEST DATA** 

Geotechnical Investigation
Prop. Residential Development - The Meadows Phase 4
Greenbank Road, Ottawa, Ontario

DATUM Ground surface elevations were provided by Taggart Construction Ltd.

FILE NO. PG3786

REMARKS

BORINGS BY Hydraulic Shovel  DATE February 27, 2018  TP 2-18													
SOIL DESCRIPTION	PLOT		SAMPLE			DEPTH	ELEV.	Pen. Resist. Blows/0.3m  ■ 50 mm Dia. Cone			on on		
	STRATA	TYPE	NUMBER	% RECOVERY	N VALUE or RQD	(m)	(m)	0 V	Vater C	Content %	Piezometer Construction		
GROUND SURFACE				2	Z	0-	-93.40	20	40	60 80	Ē Ö		
Loose, brown <b>SILTY SAND,</b> trace clay		_ _ _	1										
Stiff, brown <b>SILTY CLAY</b> , some sand		_ _ G _	2			1 -	-92.40						
End of Test Pit (TP dry upon completion)								20 Shea ▲ Undist		60 80 10 ngth (kPa) △ Remoulded	000		

154 Colonnade Road South, Ottawa, Ontario K2E 7J5

**SOIL PROFILE AND TEST DATA** 

Geotechnical Investigation

Prop. Residential Development - The Meadows Phase 4 Greenbank Road, Ottawa, Ontario

DATUM Ground surface elevations were provided by Taggart Construction Ltd.

PG3786

REMARKS

BORINGS BY Hydraulic Shovel

DATE February 27, 2018

FILE NO.

PG3786

HOLE NO.

TP 3-18

BORINGS BY Hydraulic Shovel				D	ΔTF	- ebruary	27 2018	}	HOL	E NO.	ΓP 3-18	
SOIL DESCRIPTION	PLOT		SAN	IPLE		DEPTH (m)		Pen. R	Resist. Blows/0.3m 50 mm Dia. Cone			
	STRATA TYPE NUMBER		% RECOVERY	N VALUE or RQD				Water Content %				
GROUND SURFACE				2	2	0-	94.05	20	40	60	80	Piezometer
Loose, brown <b>SILTY SAND to</b>												
Loose, brown <b>SILTY SAND to</b> SANDY SILT						_	22.25					
						1 -	93.05					
		_ G	1									
1.75 End of Test Pit		_ -										
								20 Shea	40 ar Stre	60 ength (	80 (kPa)	100

**SOIL PROFILE AND TEST DATA** 

154 Colonnade Road South, Ottawa, Ontario K2E 7J5

Geotechnical Investigation Prop. Residential Development - The Meadows Phase 4 Greenbank Road, Ottawa, Ontario

DATUM Ground surface elevations	were	prov	ided k	oy Tag	gart C	Constructi	ion Ltd.		FILE NO. PG3786	
REMARKS				_		<b>-</b>	07 0010	,	HOLE NO. <b>TP 4-18</b>	
BORINGS BY Hydraulic Shovel	H		SAN	/IPLE	DAIL	February			esist. Blows/0.3m	
SOIL DESCRIPTION	A PLOT				шо	DEPTH (m)	ELEV. (m)			ter
	STRATA	TYPE	NUMBER	» RECOVERY	N VALUE or RQD			0 V	Vater Content %	Piezometer Construction
GROUND SURFACE	ρÿ	<u>.</u>	ğ	REC	z ö	0-	93.96	20	40 60 80	S Pie
Loose, brown SILTY SAND, trace clay  1.30 End of Test pit (Groundwater infiltration at 0.7m depth)		_ G	1			1-	-92.96	20 Shea	40 60 80 10 ar Strength (kPa)	00
								▲ Undist		

**SOIL PROFILE AND TEST DATA** 

154 Colonnade Road South, Ottawa, Ontario K2E 7J5

Geotechnical Investigation Prop. Residential Development - The Meadows Phase 4 Greenbank Road, Ottawa, Ontario

DATUM Ground surface elevations	s were	prov	ided b	y Tag	gart C	Construct	ion Ltd.			FIL	E NO	PG	3786	
REMARKS				_			07 0010	,		НО	LE N	<sup>).</sup> <b>TP</b>	5-18	
BORINGS BY Hydraulic Shovel			CA1		AIE	February 	27, 2018		F	<u> </u>	. DI			
SOIL DESCRIPTION	A PLOT			#PLE	ĦO	DEPTH (m)	ELEV. (m)	P	Pen. Resist. Blows/0.3m  ● 50 mm Dia. Cone					ster
	STRATA	TYPE	NUMBER	% RECOVERY	N VALUE or RQD							ntent		Piezometer Construction
GROUND SURFACE				<u> </u>		0-	95.23	1 : :	20	40	: : :	50	80	L C
FILL: Brown sand and gravel, some silt, cobbles and boulders, trace clay		_ G	1			1-	-94.23							
Stiff to very stiff, brown SILTY CLAY, trace sand  2.30 End of Test Pit		_ G	2			2-	-93.23							
								•		40 ar St	reng	th (kP	a)	00

### **SOIL PROFILE AND TEST DATA**

154 Colonnade Road South, Ottawa, Ontario K2E 7J5

Prop. Resident

Geotechnical Investigation
Prop. Residential Development - Borrisokane Road
Ottawa, Ontario

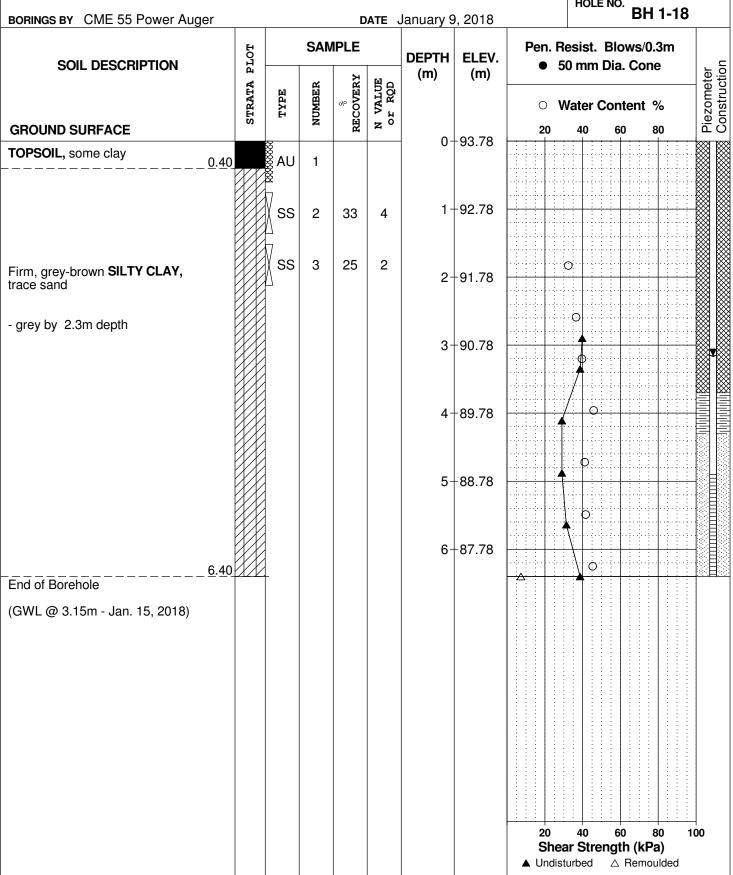
Ground surface elevation provided by Stantec Geomatics Ltd.

FILE NO.

PG4242

HOLE NO.

BH 1-18



Ground surface elevation provided by Stantec Geomatics Ltd.

**SOIL PROFILE AND TEST DATA** 

FILE NO.

154 Colonnade Road South, Ottawa, Ontario K2E 7J5

**DATUM** 

Geotechnical Investigation
Prop. Residential Development - Borrisokane Road
Ottawa, Ontario

**PG4242 REMARKS** HOLE NO. **BH 2-18** BORINGS BY CME 55 Power Auger DATE January 9, 2018 **SAMPLE** Pen. Resist. Blows/0.3m Monitoring Well Construction STRATA PLOT **DEPTH** ELEV. **SOIL DESCRIPTION** 50 mm Dia. Cone (m) (m) RECOVERY N VALUE or RQD NUMBER Water Content % **GROUND SURFACE** 80 20 0+97.02**TOPSOIL** 0.36 1 + 96.02SS 2 33 16 SS 3 33 21 Ō. 2+95.02 SS 4 29 20 Ö GLACIAL TILL: Compact to dense, brown silty sand with gravel, cobbles 3+94.02and boulders SS 5 42 38 0. 4+93.02SS 6 38 36 Ó - compact by 4.5m depth SS 7 42 25 Ö 5+92.02SS 8 46 27 O 6+91.02SS 8 21 28 0 6.70 Dynamic Cone Penetration Test 7 + 90.02commenced at 6.70m depth. Inferred GLACIAL TILL 8+89.02 8.23 End of Borehole Practical DCPT refusal at 8.23m depth (GWL @ 0.20m - Jan. 15, 2018) 20 40 60 80 100 Shear Strength (kPa) ▲ Undisturbed △ Remoulded

**SOIL PROFILE AND TEST DATA** 

154 Colonnade Road South, Ottawa, Ontario K2E 7J5

Geotechnical Investigation
Prop. Residential Development - Borrisokane Road
Ottawa, Ontario

**DATUM** Ground surface elevation provided by Stantec Geomatics Ltd. FILE NO. **PG4242 REMARKS** HOLE NO. **BH 3-18** BORINGS BY CME 55 Power Auger DATE January 10, 2018 **SAMPLE** Pen. Resist. Blows/0.3m STRATA PLOT **DEPTH** ELEV. Piezometer Construction **SOIL DESCRIPTION** 50 mm Dia. Cone (m) (m) N VALUE or RQD RECOVERY NUMBER Water Content % **GROUND SURFACE** 80 20 0+95.74ΑU Loose to compact, brown SILTY **SAND** 1 + 94.74SS 2 9 38 SS 3 75 11 Ó 1.98 2 + 93.743 + 92.74SS 4 2 100 Firm to soft, grey SILTY CLAY, 4+91.74 trace sand 5 + 90.746 + 89.74O: End of Borehole (GWL @ 0.3m - Jan. 15, 2018) 40 60 80 100 Shear Strength (kPa) ▲ Undisturbed △ Remoulded

Ground surface elevation provided by Stantec Geomatics Ltd.

**SOIL PROFILE AND TEST DATA** 

FILE NO.

154 Colonnade Road South, Ottawa, Ontario K2E 7J5

**DATUM** 

Geotechnical Investigation
Prop. Residential Development - Borrisokane Road
Ottawa, Ontario

**PG4242 REMARKS** HOLE NO. **TP 1-18 BORINGS BY** Backhoe DATE January 8, 2018 **SAMPLE** Pen. Resist. Blows/0.3m STRATA PLOT DEPTH ELEV. Piezometer Construction **SOIL DESCRIPTION**  50 mm Dia. Cone (m) (m) N VALUE or RQD RECOVERY NUMBER Water Content % **GROUND SURFACE** 80 20 0+93.42**TOPSOIL** G 1 0.30 G 2 Brown SILTY SAND 0.60 G 3 1 + 92.42Brown **CLAYEY SAND** with silt G 4 - grey by 2.1m depth 2+91.42 ⊻ G 5 3 + 90.42G 6 4.00 4+89.42 End of Test Pit (GWL @ 2.1m depth based on field observations) 40 60 80 100 Shear Strength (kPa) ▲ Undisturbed △ Remoulded

**SOIL PROFILE AND TEST DATA** 

154 Colonnade Road South, Ottawa, Ontario K2E 7J5

Geotechnical Investigation Prop. Residential Development - Borrisokane Road Ottawa, Ontario

**DATUM** Ground surface elevation provided by Stantec Geomatics Ltd. FILE NO. **PG4242 REMARKS** HOLE NO. **TP 2-18 BORINGS BY** Backhoe DATE January 8, 2018 **SAMPLE** Pen. Resist. Blows/0.3m STRATA PLOT DEPTH ELEV. Piezometer Construction **SOIL DESCRIPTION**  50 mm Dia. Cone (m) (m) N VALUE or RQD RECOVERY NUMBER Water Content % **GROUND SURFACE** 80 20 0+93.78G 1 TOPSOIL with clay 0.38 G 2 Brown FINE SAND, trace clay 1 + 92.781.32 ⊻ G 3 **Grey CLAYEY SAND** 2 + 91.782.13 G 4 Grey SILTY CLAY with sand 3 + 90.78G 5 4+89.78 End of Test Pit (GWL @ 1.3m depth based on field observations) 40 60 80 100 Shear Strength (kPa) ▲ Undisturbed △ Remoulded

**SOIL PROFILE AND TEST DATA** 

154 Colonnade Road South, Ottawa, Ontario K2E 7J5

Geotechnical Investigation Prop. Residential Development - Borrisokane Road Ottawa, Ontario

**DATUM** Ground surface elevation provided by Stantec Geomatics Ltd. FILE NO. **PG4242 REMARKS** HOLE NO. **TP 3-18 BORINGS BY** Backhoe DATE January 8, 2018 **SAMPLE** Pen. Resist. Blows/0.3m STRATA PLOT DEPTH ELEV. Piezometer Construction **SOIL DESCRIPTION**  50 mm Dia. Cone (m) (m) N VALUE or RQD RECOVERY NUMBER Water Content % **GROUND SURFACE** 80 20 0+96.11**TOPSOIL** G 0.30 G 2 1 + 95.11**Brown SILTY SAND** G 3 2 + 94.11G 4  $\nabla$ 3 + 93.113.05 **Brown CLAYEY SAND** G 5 4.00 4+92.11 End of Test Pit (GWL @ 3.0m depth based on field observations) 40 60 80 100 Shear Strength (kPa) ▲ Undisturbed △ Remoulded

**SOIL PROFILE AND TEST DATA** 

154 Colonnade Road South, Ottawa, Ontario K2E 7J5

<b>DATUM</b> Ground surface elevation	n provid	ded by	/ Stan	itec G	eoma	tics Ltd.			FILE NO.	PG4242	
REMARKS				_		1			HOLE NO. T	P 4-18	
BORINGS BY Backhoe					ATE .	January 8	3, 2018 		•		
SOIL DESCRIPTION	PLOT			/IPLE		DEPTH (m)	ELEV. (m)		esist. Blows 0 mm Dia. C		er
	STRATA	TYPE	NUMBER	RECOVERY	N VALUE or RQD			0 V	/ater Conten	nt %	Piezometer Construction
GROUND SURFACE	0,			2	Z	0-	97.13	20	40 60	80	i <u>E</u> Ö
TOPSOIL 0.1	8	G	1				37.10				ӯ
		G	2								
GLACIAL TILL: Brown silty sand with gravel, cobbles and boulders											
		G	3			1-	96.13				
1.5	52\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\										
End of Test Pit		Ť									
(GWL @ 0.3m depth based on field observations)											
								20 Shea ▲ Undist	40 60 ar Strength (lurbed △ Re	80 10 kPa) moulded	<sup>1</sup> 00

Ground surface elevation provided by Stantec Geomatics Ltd.

**SOIL PROFILE AND TEST DATA** 

FILE NO.

154 Colonnade Road South, Ottawa, Ontario K2E 7J5

DATUM

DEMARKO	-	_								PG4242			
REMARKS BORINGS BY Backhoe				Г	ΔTF .	January 8	3 2018		HOLE N	IO. TP 5-18			
DOTHINGS BT DECKNOC	H		SAN	/IPLE	AIL			Pen. R	esist. E	lows/0.3m			
SOIL DESCRIPTION	PLOT					DEPTH (m)	ELEV. (m)			ia. Cone	er		
	STRATA	TYPE	NUMBER	RECOVERY	N VALUE or RQD			0 V	Vater Co	ater Content %			
GROUND SURFACE	ST	H	N	REC	N A			20	40	60 80	Piezometer Construction		
TOPSOIL 0.	15					0-	96.86						
GLACIAL TILL: Brown silty sand with gravel, cobbles and boulders		GGGGGGG	2			2-	-95.86 -94.86				\(\square\)		
	35 \^^^^												
(GWL @ 0.6m depth based on field observations)									10	60 00			
								20 Shea ▲ Undist		60 80 1 gth (kPa) △ Remoulded	100		

Ground surface elevation provided by Stantec Geomatics Ltd.

**SOIL PROFILE AND TEST DATA** 

FILE NO.

154 Colonnade Road South, Ottawa, Ontario K2E 7J5

DATUM

around surface elevation	provid	ica by	Clai	illoc ai	coma	ilos Liu.			TILL NO.	PG4242	
REMARKS				_		lanuam.	0.010		HOLE NO.	TP 6-18	
BORINGS BY Backhoe	T		CAL		AIL	January 8	3, 2018	Don B	lesist. Blo		
SOIL DESCRIPTION	PLOT		SAMPLE		м .	DEPTH (m)	ELEV. (m)		60 mm Dia.		ter
	STRATA	TYPE	NUMBER	RECOVERY	N VALUE or RQD			0 <b>V</b>	Vater Cont	ent %	Piezometer Construction
GROUND SURFACE	, w		z	RE	z °	0	97.26	20	40 60	80	<u> </u>
TOPSOIL 0.1	0	G	1				97.20				
GLACIAL TILL: Brown silty sand with gravel, cobbles and boulders		G	3				-96.26 -95.26				. ♀
End of Test Pit  (GWL @ 1.2m depth based on field observations)		G	4				94.26				
								20 She	40 60 ar Strength turbed △ I		00

Ground surface elevation provided by Stantec Geomatics Ltd.

**SOIL PROFILE AND TEST DATA** 

FILE NO.

154 Colonnade Road South, Ottawa, Ontario K2E 7J5

DATUM

DEMARKS											P	34242	
REMARKS BORINGS BY Backhoe				n	ΔTF .	January 8	2018			HOL	E NO. TP	7-18	
SOIL DESCRIPTION	PLOT		SAN	/IPLE		DEPTH	ELEV.				Blows/0		
	STRATA E	TYPE	BER	% RECOVERY	ALUE ROD	(m)	(m)						mete
GROUND SURFACE	STR	Ţ	NUMBER	RECO	N VALUE or RQD				⊃ W 20	ater 40	ater Content % 40 60 80		Piezometer Construction
						0-	-97.89						
		G _	1										
		G	2			1-	-96.89						
Brown <b>SILTY SAND</b>						2-	-95.89						
		G	3				33.03						
						3-	-94.89						
		G	4										
Grey <b>SANDY CLAY</b> with silt	.00	G	5			4-	-93.89						
5													
								9			60 ength (kF △ Remo	Pa)	<b>00</b>

**SOIL PROFILE AND TEST DATA** 

154 Colonnade Road South, Ottawa, Ontario K2E 7J5

Geotechnical Investigation Prop. Residential Development - The Meadows Phase 4 Greenbank Road, Ottawa, Ontario

**DATUM** Ground surface elevations were provided by Stantec Geomatics Limited. FILE NO. **PG3786 REMARKS** HOLE NO. **BH 1-16** BORINGS BY CME 55 Power Auger **DATE** March 11, 2016 **SAMPLE** Pen. Resist. Blows/0.3m Monitoring Well Construction STRATA PLOT **DEPTH** ELEV. **SOIL DESCRIPTION** 50 mm Dia. Cone (m) (m) RECOVERY N VALUE or RQD NUMBER Water Content % **GROUND SURFACE** 80 20 40 0+94.86FILL: Brown silty sand with clay 0.30 and topsoil 1 + 93.86SS 2 100 3 Stiff, brown SILTY CLAY 2 + 92.86- grey by 2.1m depth 3+91.86GLACIAL TILL: Grey silty sand with clay, gravel, cobbles, trace boulders SS 3 33 9 . Q. Grey SILTY FINE SAND, trace 4 + 90.868 SS 4 33 Ō gravel - running sand encountered between SS 5 62 50 +3.8 and 5.0m depth 5+89.86End of Borehole Practical refusal to augering at 5.00m depth (GWL @ 0.20m-April 4, 2016) 20 40 60 80 100 Shear Strength (kPa) ▲ Undisturbed △ Remoulded

Ground surface elevations were provided by Stantec Geomatics Limited.

**SOIL PROFILE AND TEST DATA** 

154 Colonnade Road South, Ottawa, Ontario K2E 7J5

**DATUM** 

Geotechnical Investigation Prop. Residential Development - The Meadows Phase 4 Greenbank Road, Ottawa, Ontario

FILE NO.

**PG3786 REMARKS** HOLE NO. **BH 2-16** BORINGS BY CME 55 Power Auger **DATE** March 11, 2016 **SAMPLE** Pen. Resist. Blows/0.3m STRATA PLOT **DEPTH** ELEV. Piezometer Construction **SOIL DESCRIPTION** 50 mm Dia. Cone (m) (m) RECOVERY N VALUE or RQD NUMBER Water Content % **GROUND SURFACE** 80 20 0+94.101 Ö Loose, light brown to brown SILTY **FINE SAND** 1 + 93.10SS 2 92 4 <u>1.45</u> 3 100 2 + 92.10Soft, grey SILTY CLAY 3+91.104 92 - firm and grey by 3.35m depth 4 + 90.104.62 SS 5 21 88 Ö 5 + 89.10GLACIAL TILL: Grey silty sand with clay, gravel, cobbles, trace boulders SS 6 71 47 Ó 6 + 88.10SS 7 83 35 0 6.71 End of Borehole (GWL @ 0.20m-April 4, 2016) 20 40 60 80 100 Shear Strength (kPa) ▲ Undisturbed △ Remoulded

Ground surface elevations were provided by Stantec Geomatics Limited.

**SOIL PROFILE AND TEST DATA** 

154 Colonnade Road South, Ottawa, Ontario K2E 7J5

**DATUM** 

Geotechnical Investigation
Prop. Residential Development - The Meadows Phase 4
Greenbank Road, Ottawa, Ontario

FILE NO.

**PG3786 REMARKS** HOLE NO. **BH 3-16** BORINGS BY CME 55 Power Auger **DATE** March 11, 2016 **SAMPLE** Pen. Resist. Blows/0.3m Monitoring Well Construction STRATA PLOT **DEPTH** ELEV. **SOIL DESCRIPTION**  50 mm Dia. Cone (m) (m) RECOVERY N VALUE or RQD NUMBER Water Content % **GROUND SURFACE** 80 20 0+93.93FILL: Topsoil with brown silty sand, 0.30 1 Ö trace gravel Very loose, brown SILTY FINE 1 + 92.93SS 2 2 96 SAND, trace clay 1.47 SS 3 71 2 2 + 91.934 96 **Grey SILTY FINE SAND to SANDY** SILT, trace clay 3+90.933.96 4 + 89.935 100 6 100 5 + 88.93Soft to firm, grey SILTY CLAY 6 + 87.937 100 GLACIAL TILL: Grey silty sand with 6.71 SS 8 100 4 clay, gravel, cobbles, trace boulders End of Borehole (GWL @ 0.1m above existing ground surface - April 4, 2016) 40 60 80 100 Shear Strength (kPa) ▲ Undisturbed △ Remoulded

**SOIL PROFILE AND TEST DATA** 

154 Colonnade Road South, Ottawa, Ontario K2E 7J5

Geotechnical Investigation Prop. Residential Development - The Meadows Phase 4 Greenbank Road, Ottawa, Ontario

**DATUM** Ground surface elevations were provided by Stantec Geomatics Limited. FILE NO. **PG3786 REMARKS** HOLE NO. **BH 4-16** BORINGS BY CME 55 Power Auger **DATE** March 14, 2016 **SAMPLE** Pen. Resist. Blows/0.3m STRATA PLOT **DEPTH** ELEV. Piezometer Construction **SOIL DESCRIPTION** 50 mm Dia. Cone (m) (m) RECOVERY N VALUE or RQD NUMBER Water Content % **GROUND SURFACE** 80 20 0+94.100.20 **TOPSOIL** with silty sand 1 Ö Brown SILTY FINE SAND to **CLAYEY SILT** 1 + 93.10SS 2 83 3 - clay content increasing with depth 1.52 2 + 92.103+91.10Stiff to firm, grey SILTY CLAY, some sand seams 3 100 4 + 90.104 77 5 + 89.106 + 88.10<u>6</u>.40 Dynamic Cone Penetration Test commenced at 6.40m depth. Cone pushed to 9.30m depth.  $7 \pm 87.10$ 8+86.10 Inferred SILTY CLAY  $9 \pm 85.10$ 9.30 End of Borehole Borehole terminated on inferred glacial till at 9.30m depth (GWL @ 0.26m-April 4, 2016) 40 60 100 Shear Strength (kPa) ▲ Undisturbed △ Remoulded

SOIL PROFILE AND TEST DATA

154 Colonnade Road South, Ottawa, Ontario K2E 7J5

Geotechnical Investigation Prop. Residential Development - The Meadows Phase 4 Greenbank Road, Ottawa, Ontario

**DATUM** Ground surface elevations were provided by Stantec Geomatics Limited. FILE NO. **PG3786 REMARKS** HOLE NO. **BH 5-16** BORINGS BY CME 55 Power Auger **DATE** March 14, 2016 **SAMPLE** Pen. Resist. Blows/0.3m Monitoring Well Construction STRATA PLOT **DEPTH** ELEV. **SOIL DESCRIPTION** 50 mm Dia. Cone (m) (m) RECOVERY N VALUE or RQD NUMBER Water Content % **GROUND SURFACE** 80 20 0+94.92**PEAT** with organics 0.25 1 Loose, brown SILTY SAND 1 + 93.92SS 2 6 54 1.22 SS 3 50 2 0 2+92.92Loose to very loose, grey SILTY **FINE SAND** SS 4 42 3 ⊙ - running sand encountered between 1.5 and 3.0m depth 3+91.92SS 5 50 5 3.96 4+90.92SS 6 100 1 7 92 5+89.92Firm, grey SILTY CLAY 6 + 88.92**Dynamic Cone Penetration Test** commenced at 6.40m depth. Cone pushed to 7.3m depth.  $7 \pm 87.92$ 7.67 End of Borehole Practical DCPT refusal at 7.67m depth (GWL @ 0.1m-April 4, 2016) 40 60 100 Shear Strength (kPa) ▲ Undisturbed △ Remoulded

**SOIL PROFILE AND TEST DATA** 

154 Colonnade Road South, Ottawa, Ontario K2E 7J5

Geotechnical Investigation Prop. Residential Development - The Meadows Phase 4 Greenbank Road, Ottawa, Ontario

**DATUM** Ground surface elevations were provided by Stantec Geomatics Limited. FILE NO. **PG3786 REMARKS** HOLE NO. **BH 6-16 BORINGS BY** CME 55 Power Auger **DATE** March 14, 2016 **SAMPLE** Pen. Resist. Blows/0.3m STRATA PLOT **DEPTH** ELEV. Piezometer Construction **SOIL DESCRIPTION** 50 mm Dia. Cone (m) (m) RECOVERY N VALUE or RQD NUMBER Water Content % **GROUND SURFACE** 80 20 0+94.78**TOPSOIL** with organics and silty 0.25 1 Loose, brown SILTY SAND 1 + 93.78SS 2 71 4 - grey by 0.6m depth - running sand encountered between 1.4 and 2.5m depth SS 3 67 5 2 + 92.782.54 SS 4 67 2 3+91.785 100 4 + 90.78Soft to firm, grey SILTY CLAY 5 + 89.786 + 88.786 100 Dynamic Cone Penetration Test 6.81 commenced at 6.70m depth End of Borehole Borehole terminated on inferred glacial till at 6.81m depth (GWL @ 0.10m-April 4, 2016) 40 60 100 Shear Strength (kPa) ▲ Undisturbed △ Remoulded

**SOIL PROFILE AND TEST DATA** 

28 Concourse Gate, Unit 1, Ottawa, ON K2E 7T7

DATUM Ground surface elevations	prov	ided k	oy Tag	gart (	Group	of Comp	anies		FILE NO. PG0214	4
REMARKS				_		D b -	- 47 000	20	HOLE NO. TP 6-0	)9
BORINGS BY Hydraulic Shovel	PLOT		SAM	IPLE	DATE	Decembe DEPTH	ELEV.	Pen. R	esist. Blows/0.3m	
SOIL DESCRIPTION			ŭ	RY	E Q	(m)	(m)	• 5	0 mm Dia. Cone	Piezometer Construction
	STRATA	TYPE	NUMBER	% RECOVERY	N VALUE or RQD			0 V	Vater Content %	Piez
GROUND SURFACE	02		_	2	Z	0-		20	40 60 80	
TOPSOIL 0.20										
Brown SILTY CLAY with 0.40	レレメノ									
GLACIAL TILL: Very dense, brown silty sand with clay, gravel, cobbles, trace boulders						1-				
gravel, cobbles, trace boulders	\^^^^ \^^^^									
2.10						2-	_			
GLACIAL TILL: Very dense, grey sandy silt with gravel, cobbles, boulders, trace clay										
3.20	\^^^^					3-	_			
End of Test Pit										:
(TP dry upon completion)										
									40 60 80 ar Strength (kPa) turbed △ Remoulded	100

**SOIL PROFILE AND TEST DATA** 

28 Concourse Gate, Unit 1, Ottawa, ON K2E 7T7

DATUM Ground surface eleva	tions provi	ded b	oy Tag	gart (	∃roup	of Compa	anies		FILE NO	D. PG0214	ļ
REMARKS  BODINGS BY Hydraulic Shovel					ATE	Decembe	r 17 200	20	HOLE N	O. TP 7-0	9
BORINGS BY Hydraulic Shovel			0.41		AIE	Decembe	1 17, 200		:- D		
SOIL DESCRIPTION	A PLOT			IPLE 젊	置り	DEPTH (m)	ELEV. (m)	1		lows/0.3m ia. Cone	Piezomețer
	STRATA	TYPE	NUMBER	% RECOVERY	N VALUE or RQD					entent %	Piezo
GROUND SURFACE				<u> </u>	-	0-	-	20	40 	60 80	+
TOPSOIL	0.30										
Brown SILTY CLAY, trace	0.50										
sand and gravel	'\^^^^										
	[^^^^^					1-	_				
						'					
GLACIAL TILL: Very dense, prown silty sand with gravel, cobbles, trace clay and	\^^^^										
cobbles, trace clay and	\^^^^										
poulders											
	(^^^^										
						2-	-				1
	\^^^^										
	1,2,2,2,2										
	2.70										
GLACIAL TILL: Grey sandy silt with gravel, cobbles and											-
oulders	3.00 [^^^^^					3-	_			+ : : : + : : :	-
End of Test Pit											
(TP dry upon completion)											
. ,											
								20	40	60 80 1	100
								Shea  ▲ Undist		gth (kPa) △ Remoulded	

**SOIL PROFILE AND TEST DATA** 

28 Concourse Gate, Unit 1, Ottawa, ON K2E 7T7

DATUM Ground surface elevation	s prov	ided b	у Та	ggart (	Group	of Comp	anies		FILE NO.	PG0214	
REMARKS  BORINGS BY Hydraulic Shovel				-	ATE !	Decembe	r 17 200	00	HOLE NO.	TP 8-09	•
SOIL DESCRIPTION	PLOT		SAN	/IPLE	I	DEPTH (m)	ELEV. (m)	Pen. R	esist. Blows 0 mm Dia. Co	/0.3m	
	STRATA	TYPE	NUMBER	RECOVERY	N VALUE or RQD		,	0 V	Vater Conten	t %	Piezometer Construction
GROUND SURFACE	0,2			2	z °	0-	-	20	40 60	80	
TOPSOIL 0.40											
GLACIAL TILL: Brown silty Clay with sand, gravel, Cobbles and boulders	) \\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\										
	\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\					1-	_				
GLACIAL TILL: Brown sandy silt/silty sand											
	\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\					2-					
2.20						3-	-				⊽
End of Test Pit	) (^^^^										
(GWL @ 2.7m depth based on field observations)											
									40 60 ar Strength (F	-	00

**SOIL PROFILE AND TEST DATA** 

28 Concourse Gate, Unit 1, Ottawa, ON K2E 7T7

DATUM Ground surface elevat	ions prov	ided l	оу Тад	gart (	Group	of Comp	anies		FILE NO.	PG0214	
REMARKS  BORINGS BY Hydraulic Shovel				П	ATE	Decembe	er 17 200	n.9	HOLE NO.	TP 9-09	9
SOIL DESCRIPTION	PLOT		SAN	IPLE		DEPTH	ELEV.	Pen. R	esist. Blov 0 mm Dia.		eter
	STRATA 1	TYPE	NUMBER	% RECOVERY	VALUE or RQD	(m)	(m)		Vater Cont		Piezometer Construction
GROUND SURFACE	SI	H	<u>R</u>	REC	N O V			20	40 60	80	100
TOPSOIL	0.35					0-					
Brown fine to coarse <b>SAND</b>	0.90										
						1-	_				
										1.	28
Very stiff to stiff, brown SILTY CLAY						2-	_		<b>A</b>		
- firm and grey by 2.4m depth											₽
CLACIAL TILL Crow sith	3.30					3-	_				
//copples alia podiacis	3.60										
grey sandy silt to silty sand with gravel, cobbles, boulders, trace clay	3.80\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\										
End of Test Pit  (GWL @ 2.5m depth based on field observations)											
								20 Shea ▲ Undist	40 60 ar Strength		⊣ <b>00</b>

**SOIL PROFILE AND TEST DATA** 

28 Concourse Gate, Unit 1, Ottawa, ON K2E 7T7

DATUM Ground surface elevations	s prov	ided k	oy Tag	ggart (	Group	of Compa	anies		FILE NO.	PG0214	
REMARKS				_		Dagamba	- 17 00	00	HOLE NO	D. TP10-0	)9
BORINGS BY Hydraulic Shovel	F.		SVI	/IPLE	AIL	Decembe	1 17, 200		ociet Pl	ows/0.3m	
SOIL DESCRIPTION	A PLOT				B Q.	DEPTH (m)	ELEV. (m)		0 mm Dia		Piezometer Construction
	STRATA	TYPE	NUMBER	» RECOVERY	N VALUE or RQD			0 V	Vater Cor	itent %	Piez
GROUND SURFACE	Ω		z	R	z °	0-	_	20	40 6	80 80	
TOPSOIL 0.50											
Red-brown <b>SILTY CLAY</b> with sand 0.85											
Brown <b>SILTY SAND</b>						1-	_				
Soft to firm, grey-brown SILTY CLAY with sand											<u>▼</u>
						2-	_				
- grey by 1.9m depth						3-					
4.90						4-	_				
End of Test Pit		1									1
(GWL @ 1.8m depth based on field observations)											
									ar Streng		100

**SOIL PROFILE AND TEST DATA** 

28 Concourse Gate, Unit 1, Ottawa, ON K2E 7T7

DATUM Ground surface elevat	ons prov	ided	by Ta	ggart (	Group	of Comp	anies		FILE NO.	PG0214	ı
REMARKS BORINGS BY Hydraulic Shovel				г	DATE	Decembe	er 17, 200	)9	HOLE NO.	TP11-0	)9
·	PLOT		SAN	/IPLE		DEPTH	ELEV.	Pen. R	esist. Blows		<u></u>
SOIL DESCRIPTION			K	ïRY	E C	(m)	(m)	• 5	0 mm Dia. C	one	Piezometer
	STRATA	TYPE	NUMBER	RECOVERY	N VALUE or RQD			0 V	Vater Conten	ıt %	Piez
GROUND SURFACE				<u> </u>	4	0-	-	20	40 60	80	+
TOPSOIL (	0.30										
Brown <b>SILTY CLAY</b> with sand											
(	0.70										.]
						1-	-				_
Brown <b>SILTY SAND</b> with clay and clay seams											.
,	.50										
											-
						2-	_				1
Soft to firm, grev <b>SILTY</b>								4	<b>\</b>		
Soft to firm, grey <b>SILTY CLAY</b> with sand seams											
						3-	-			:	4
									/:   : : :   : :		
						4-	-				1
End of Test Pit	1.30	1									-
GWL @ 1.5m depth based											
on field observations)											
								20	40 60		⊣  00
									ar Strength (I	-	

**SOIL PROFILE AND TEST DATA** 

28 Concourse Gate, Unit 1, Ottawa, ON K2E 7T7

DATUM Ground surface elevations	prov	ided b	y Tag	gart (	Group	of Comp	anies		FILE NO.	PG0214	
REMARKS  BORINGS BY Hydraulic Shovel				_	ATE	Decembe	or 17 200	na	HOLE NO.	TP13-0	9
SOIL DESCRIPTION	PLOT		SAN	IPLE		DEPTH (m)	ELEV.	Pen. R	esist. Blow		eter
	STRATA	TYPE	NUMBER	% RECOVERY	N VALUE or RQD	(111)	(111)	0 V	Vater Conte		Piezometer Construction
GROUND SURFACE	<u> </u>			2	Z	0-		20	40 60	80	
TOPSOIL											
Red-brown <b>SILTY SAND</b> with gravel 0.50											
GLACIAL TILL: Brown silty clay with sand, gravel, cobbles and boulders											
1.00	\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\					1-	_				Σ
GLACIAL TILL: Brown silty sand with gravel, cobbles,											-
boulders, trace clay						2-					
- grey by 2.1m depth						2-					
End of Test Pit	^^^^										
(GWL @ 1.3m depth based on field observations)											
,											
									40 60 ar Strength	(kPa)	<b>00</b>

28 Concourse Gate, Unit 1, Ottawa, ON K2E 7T7

Consulting Engineers

## **SOIL PROFILE AND TEST DATA**

**Supplemental Geotechnical Investigation** Prop. Residential Development-Greenbank Road Ottawa, Ontario

DATUM Ground surface elevations provided by Taggart Group of Companies

FILE NO.

PG0214

**REMARKS** 

HOLE NO.

BORINGS BY CME 55 Power Auge	r				D	ATE 2	2 Mar 09			BH 2-09
SOIL DESCRIPTION		PLOT		SAN	IPLE		DEPTH	ELEV.		esist. Blows/0.3m mm Dia. Cone
		STRATA P	TYPE	NUMBER	% RECOVERY	N VALUE or RQD	(m)	(m)		esist. Blows/0.3m mm Dia. Cone atter Content %
GROUND SURFACE					24	z °	0-	-93.76	20	40 60 80
TOPSOIL	0.08		AU	1				33.70		
Brown organic <b>SILT</b>	0.60		<b>À</b> AU	'						
Stiff, brown <b>SILTY CLAY</b> , trace sand	1.52		ss	2	58	6	1-	-92.76		
	- <u>1.92</u>	^\^^^ ^\^^^ ^\^^^	ss	3	67	50+	2-	-91.76		
GLACIAL TILL: Grov silty			ss	4	4	22	3-	-90.76		
<b>GLACIAL TILL:</b> Grey silty clay with sand, gravel, cobbles and boulders		`^^^^ `^^^^ `^^^^	SS 7	5		15		00.70		
			SS	6	0	37	4-	-89.76		
			ss ss ss	7 8	52 42	73	5-	-88.76		
End of Borehole	6.04	^^^^/ ^^^^/				, 0	6-	-87.76		
Practical refusal to augering @ 6.04m depth										
(GWL @ 1.79m-Mar. 11/09)										
									20 Shea • Undistu	40 60 80 100 r Strength (kPa) rbed △ Remoulded

28 Concourse Gate, Unit 1, Ottawa, ON K2E 7T7

Consulting Engineers

## **SOIL PROFILE AND TEST DATA**

**Supplemental Geotechnical Investigation** Prop. Residential Development-Greenbank Road Ottawa, Ontario

Ground surface elevations provided by Taggart Group of Companies **DATUM** 

FILE NO. PG0214

**REMARKS** 

HOLE NO.

**BH 3-09** 

BORINGS BY CME 55 Power Auger				D	ATE 2	2 Mar 09		BH 3-09	
SOIL DESCRIPTION	PLOT		SAN	<b>IPLE</b>		DEPTH	ELEV.	Pen. Resist. Blows/0.3m  ■ 50 mm Dia. Cone	tion
	STRATA P	TYPE	NUMBER	% RECOVERY	N VALUE or RQD	(m)	(m)		Construction
GROUND SURFACE		×		Н.		0	-93.33	20 40 60 80	শ ক্রু
CLAYEY SILT , some sand. High organic content in upper	0.08	AU SS	1 2	58	2		-92.33		<b>▼</b>
600mm. 	<u>2</u> . <u>13</u>	ss	3	83	2	2-	-91.33		
		ss	4	100	1	3-	-90.33		
Firm to stiff, grey <b>SILTY CLAY</b>		TW	5	88		4-	-89.33		
5	5.72	ss	6	100	2	5-	-88.33		
		ss	7	42	7	6-	-87.33		
GLACIAL TILL: Grey silty clay with sand, gravel, cobbles and boulders		ss	8	25	11	7-	-86.33		
		SS SS	9	0	50+	8-	-85.33		
End of Borehole  (GWL @ 0.50m-Mar. 11/09)	3.99	SS	10	4	52				
								20 40 60 80 100 Shear Strength (kPa)  ▲ Undisturbed △ Remoulded	

28 Concourse Gate, Unit 1, Ottawa, ON K2E 7T7

Consulting Engineers

## **SOIL PROFILE AND TEST DATA**

Supplemental Geotechnical Investigation Prop. Residential Development-Greenbank Road Ottawa, Ontario

Ground surface elevations provided by Taggart Group of Companies **DATUM** 

FILE NO.

PG0214

**REMARKS** 

HOLE NO.

RH 3R-09

BORINGS BY CME 55 Power Auger				0	ATE (	3 Mar 09		BH 3B-0	)9
SOIL DESCRIPTION	PLOT		SAN	IPLE	T	DEPTH	ELEV.	Pen. Resist. Blows/0.3m  • 50 mm Dia. Cone	eter
	STRATA I	TYPE	NUMBER	% RECOVERY	N VALUE or RQD	(m)	(m)	O Water Content %	Piezometer
GROUND SURFACE						0-	-93.33	20 70 00 00	
OVERBURDEN						1-	-92.33		
2.44						2-	-91.33		
SILTY CLAY  3.05 End of Borehole		TW	1			3-	-90.33		
								20 40 60 80 100 Shear Strength (kPa)  ▲ Undisturbed △ Remoulded	0

Consulting Engineers

## **SOIL PROFILE AND TEST DATA**

**Supplemental Geotechnical Investigation** Prop. Residential Development-Greenbank Road Ottawa, Ontario

28 Concourse Gate, Unit 1, Ottawa, ON K2E 7T7 DATUM Ground surface elevations provided by Taggart Group of Companies

**REMARKS** 

FILE NO.

PG0214

REMARKS  BORINGS BY CME 55 Power Auger	r			D	ATE (	3 Mar 09		HOLE NO. BH 4-09	
SOIL DESCRIPTION	PLOT		SAN	<b>I</b> PLE	1	DEPTH	ELEV.	Pen. Resist. Blows/0.3m  • 50 mm Dia. Cone	ter
COL BECOME HON	STRATA P	TYPE	NUMBER	% RECOVERY	N VALUE or RQD	(m)	(m)		Piezometer
GROUND SURFACE				24	<b>Z</b>	0-	-93.44	20 40 60 80	
	0.05 0.61	AU	1						
Loose, brown <b>SANDY SILT</b> , some clay		ss	2	25	5	1-	92.44		ӯ
	2.13	ss	3	100	2	2-	-91.44		-
		ss	4	0	1				
Soft, grey SILTY CLAY		ss	5	100	1	3-	90.44		
End of Borehole	4.27					4-	89.44		
BH terminated due to clay entering augers @ 4m depth.									
(Open hole GWL @ 1.5m depth)									
								20 40 60 80 100 Shear Strength (kPa)  ▲ Undisturbed △ Remoulded	0

28 Concourse Gate, Unit 1, Ottawa, ON K2E 7T7

Consulting Engineers

## **SOIL PROFILE AND TEST DATA**

Supplemental Geotechnical Investigation Prop. Residential Development-Greenbank Road Ottawa, Ontario

DATUM Ground surface elevations provided by Taggart Group of Companies

FILE NO.

PG0214

**REMARKS** 

HOLE NO.

BORINGS BY CME 55 Power Auger				0	ATE (	3 Mar 09		_	BH 5-09	)
SOIL DESCRIPTION	PLOT		SAN	<b>IPLE</b>		DEPTH	ELEV.	1	esist. Blows/0.3m 0 mm Dia. Cone	ter tion
	STRATA P	TYPE	NUMBER	% RECOVERY	N VALUE or RQD	(m)	(m)	0 W	ater Content %	Piezometer Construction
GROUND SURFACE				μ,		0-	-93.35	20	40 60 80	
TOPSOIL 0.03  Brown SILTY SAND, some 0.66	11 1.1	AU	1				00.00			⊽
		ss	2	25	9	1-	-92.35			
Loose to compact, grey <b>SAND</b> , some gravel		ss	3	33	9	2-	-91.35			
SAND, some gravei		ss	4	42	10	3-	-90.35			
3. <u>6</u> 0 End of Borehole	3	ss	5	83	12					
(Open hole GWL @ 0.6m depth)										
								20 Shea ▲ Undistu	40 60 80 10 ar Strength (kPa) urbed △ Remoulded	)0

28 Concourse Gate, Unit 1, Ottawa, ON K2E 7T7

Consulting Engineers

#### **SOIL PROFILE AND TEST DATA**

**Supplemental Geotechnical Investigation** Prop. Residential Development-Greenbank Road Ottawa, Ontario

DATUM Ground surface elevations provided by Taggart Group of Companies

FILE NO.

PG0214

**REMARKS** 

HOLE NO.

BORINGS BY CME 55 Power Auger				D	ATE (	3 Mar 09			HOLE NO. BH 6-0	9
SOIL DESCRIPTION	PLOT		SAN	/IPLE		DEPTH	ELEV.		esist. Blows/0.3m 0 mm Dia. Cone	ețer
	STRATA E	TYPE	NUMBER	% RECOVERY	N VALUE or RQD	(m)	(m)		/ater Content %	Piezomețer
GROUND SURFACE				2	z o	n-	-94.00	20	40 60 80	
25mm Topsoil		AU	1							
Compact, brown <b>SILTY SAND</b> with clay and gravel		:.X SS :7	2	33	13	1-	-93.00			
		ss :://	3	42	4	2-	-92.00			
<u>3</u> .	00:	ss :	4	50	3	3-	-91.00			
Soft, grey <b>SILTY CLAY</b> , some fossiliferous shells		ss	5	100	2					
<u>4</u> .	57	SS	6	100	2	4-	-90.00			
		ss :://	7	83	6	5-	-89.00			
		: SS : 7	8	100	4	6-	-88.00			
Loose to compact, brown SILTY SAND		:\\\\ SS :\ \\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\	9	83	4	7_	-87.00			
		ss :://	10	100	6		<i>67.</i> 00			
		ss :://	11	83	10	8-	-86.00			
		SS SS	12	67	13	9-	-85.00			
9. End of Borehole	75	<u>                                     </u>								
(GWL @ 0.70m-Mar. 11/09)										
								20 Shea ▲ Undistu	ar Strength (kPa)	00

28 Concourse Gate, Unit 1, Ottawa, ON K2E 7T7

Consulting Engineers

## **SOIL PROFILE AND TEST DATA**

**Preliminary Geotechnical Investigation** Part 1, Lot 10 and Part 1, Lot 9, Concession 3 Ottawa (Nepean), Ontario

DATUM Ground surface elevations provided by Webster and Simmonds Surveying Ltd.

FILE NO.

**REMARKS** 

PG0214

HOLE NO.

PLOT		SAN	/DI E					
14			MPLE		DEPTH (m)	ELEV. (m)	Pen. Resist. Blows/0.3m  • 50 mm Dia. Cone	eter ction
STRATA	TYPE	NUMBER	% RECOVERY	N VALUE or RQD			O Water Content %	Piezometer Construction
0.40	G –	1			0-	-95.00		
	G -	2			1-	-94.00		∇
					2-	-93.00		
					3-	-92.00		
<u>3.50</u>								
	0.40	G G	G 1  G 2	G 1  G 2	G 1  G 2	G 1 1 - 0.40 G 2 1-	G 1 1 94.00 2 1 95.00 3 92.00	G 1 1 94.00 2 95.00 3 92.00

Consulting Engineers

Ground surface elevations provided by Webster and Simmonds Surveying Ltd.

## **SOIL PROFILE AND TEST DATA**

**Preliminary Geotechnical Investigation** Part 1, Lot 10 and Part 1, Lot 9, Concession 3 Ottawa (Nepean), Ontario

28 Concourse Gate, Unit 1, Ottawa, ON K2E 7T7

FILE NO.

PG0214

**DATUM** 

REMARKS								HOLE NO.
BORINGS BY Backhoe	Ę		SAN	IPLE	DATE 2	28 Apr 04		TP 2 Pen. Resist. Blows/0.3m
SOIL DESCRIPTION	STRATA PLOT	TYPE	NUMBER	% RECOVERY	N VALUE or RQD	DEPTH (m)	ELEV. (m)	Pen. Resist. Blows/0.3m  ■ 50 mm Dia. Cone  ○ Water Content %
GROUND SURFACE	אַ	F	M	REC	Z O	0-	97.95	20 40 60 80
TOPSOIL	_ 0.40							
Red-brown <b>SAND</b> with gravel, cobbles and boulders	_ 0.80							
						1-	96.95	
Firm, grey-brown <b>SILTY CLAY</b> , some boulders, trace sand seams and shells						2-	-95.95	
GLACIAL TILL: Grey silty clay with gravel, cobbles and	3.10	– G	1			3-	-94.95	
with gravel, cobbles and boulders  End of Test Pit	_ 4.00 \\ \hat{\lambda}					4-	-93.95	
(Water infiltration @ 2.0m depth)								
								20 40 60 80 100 Shear Strength (kPa)  ▲ Undisturbed △ Remoulded

Consulting Engineers

Ground surface elevations provided by Webster and Simmonds Surveying Ltd.

## **SOIL PROFILE AND TEST DATA**

FILE NO.

**Preliminary Geotechnical Investigation** Part 1, Lot 10 and Part 1, Lot 9, Concession 3

28 Concourse Gate, Unit 1, Ottawa, ON K2E 7T7

Ottawa (Nepean), Ontario

**REMARKS** 

**DATUM** 

PG0214

BORINGS BY Backhoe				D	ATE 2	28 Apr 04		HOLE NO. TP 3
SOIL DESCRIPTION	PLOT		SAN	/IPLE		DEPTH	ELEV.	Pen. Resist. Blows/0.3m  ■ 50 mm Dia. Cone
COL DESCRIPTION	STRATA P	TYPE	NUMBER	% RECOVERY	N VALUE or RQD	(m)	(m)	O Water Content %
GROUND SURFACE				2	Z	0+1	103.11	20 40 60 80
TOPSOIL 	0.20	_						
		G	1			1-1	102.11	
<b>GLACIAL TILL</b> : Brown sand with gravel, cobbles and boulders		_				2-1	101.11	
		G	2			3-1	100.11	
	4.50 \\ \hat{\hat{\hat{\hat{\hat{\hat{\hat{	_				4-9	99.11	
End of Test Pit								
(TP dry upon completion)								
								20

28 Concourse Gate, Unit 1, Ottawa, ON K2E 7T7

Consulting Engineers

## **SOIL PROFILE AND TEST DATA**

**Preliminary Geotechnical Investigation** Part 1, Lot 10 and Part 1, Lot 9, Concession 3 Ottawa (Nepean), Ontario

DATUM Ground surface elevations provided by Webster and Simmonds Surveying Ltd.

FILE NO.

**REMARKS** 

PG0214

HOLE NO.

RORINGS BY Backhoe DATE 28 Apr 04 TP 4

BORINGS BY Backhoe					DATE	28 Apr 04				11	P 4	
SOIL DESCRIPTION	PLOT		SAN	<b>IPLE</b>		DEPTH	ELEV.			Blows/0. Dia. Cone		ter
	STRATA F	TYPE	NUMBER	% RECOVERY	N VALUE or RQD	(m)	(m)			ontent %		Piezometer
GROUND SURFACE	w		<b>E</b>	Ä	z ö		.=	20	40	60 8	30	_
TOPSOIL	0.20					- 0-	-97.88					
Red-brown <b>SAND</b> with gravel												
	0.50	7										Ž
						1-	96.88					
LACIAL TILL: Brown sand						2-	95.88					
rith gravel, cobbles and oulders		G	1									
		1										
		7				3-	-94.88					
	\^^^^ \^^^^											
	\^^^^											
						Δ-	-93.88					
							30.00					
	\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\											
ind of Test Pit	4.50 ^^^^	1										
Water infiltration @ 0.5m lepth)												
icpui)												
								20 She	40 ear Strei	60 8 ngth (kPa	30 10 a)	00
								▲ Undis		△ Remou		

Consulting Engineers

Ground surface elevations provided by Webster and Simmonds Surveying Ltd.

#### SOIL PROFILE AND TEST DATA

**Preliminary Geotechnical Investigation** Part 1, Lot 10 and Part 1, Lot 9, Concession 3

28 Concourse Gate, Unit 1, Ottawa, ON K2E 7T7

Ottawa (Nepean), Ontario

**REMARKS** 

**DATUM** 

FILE NO.

PG0214

HOLE NO.

TP 5 **BORINGS BY** Backhoe **DATE** 28 Apr 04 SAMPLE Pen. Resist. Blows/0.3m STRATA PLOT **DEPTH** ELEV. **SOIL DESCRIPTION** 50 mm Dia. Cone (m) (m) RECOVERY N VALUE or RQD NUMBER TYPE Water Content % 80 **GROUND SURFACE** 0 + 94.22**TOPSOIL**  $\nabla$ 1 + 93.22Firm, grey-brown **SILTY CLAY**, trace sand seams 2 + 92.223.00 3+91.22Very loose, grey SANDY SILT 4 + 90.224.50 End of Test Pit (Water infiltration @ 1.0m depth) 40 60 80 100 Shear Strength (kPa) ▲ Undisturbed △ Remoulded

28 Concourse Gate, Unit 1, Ottawa, ON K2E 7T7

Consulting Engineers

## **SOIL PROFILE AND TEST DATA**

**Preliminary Geotechnical Investigation** Part 1, Lot 10 and Part 1, Lot 9, Concession 3 Ottawa (Nepean), Ontario

Ground surface elevations provided by Webster and Simmonds Surveying Ltd. DATUM

FILE NO.

**REMARKS** 

PG0214

HOLE NO.

TP<sub>6</sub>

BORINGS BY Backhoe					ATE :	28 Apr 04				TP 6	
SOIL DESCRIPTION	PLOT		SAN	<b>IPLE</b>		DEPTH	ELEV.			Blows/0.3m Dia. Cone	ter
	STRATA E	TYPE	NUMBER	% RECOVERY	N VALUE or RQD	(m)	(m)			ontent %	Piezometer Construction
GROUND SURFACE				22	Z	0-	-99.11	20	40	60 80	
<b>TOPSOIL</b> 0.10	)						00.11				
Brown medium to coarse <b>SAND</b> 0.50		G	1								
		_									
						1-	-98.11				
		G	2								
		_									
Firm, grey-brown <b>SILTY CLAY</b> , some sand, trace shells						2-	-97.11				,
SI ICIIS											
						3-	-96.11				⊽
						4-	-95.11				
	YXX										
(Water infiltration @ 3.0m											
								20	40	60 80 1	100
								She	ear Strer	ngth (kPa)	
depth)								20 She			80 1 (kPa) emoulded

Consulting Engineers

#### **SOIL PROFILE AND TEST DATA**

Preliminary Geotechnical Investigation Part 1, Lot 10 and Part 1, Lot 9, Concession 3 Ottawa (Nepean), Ontario

28 Concourse Gate, Unit 1, Ottawa, ON K2E 7T7

Ground surface elevations provided by Webster and Simmonds Surveying Ltd.

FILE NO. PG0214

REMARKS

DATUM

HOLE NO.

BORINGS BY Backhoe					D	ATE 2	28 Apr 04		HOI	TP 7	
SOIL DESCRIPTION		PLOT		SAN	IPLE		DEPTH (m)	ELEV.		t. Blows/0.3m n Dia. Cone	eter ction
		STRATA	TYPE	NUMBER	% RECOVERY	N VALUE or RQD	(111)	(m)		Content %	Piezometer Construction
GROUND SURFACE					24	2	0-	-97.75	20 40	60 80	
TOPSOIL	0. <u>30</u>										
Brown medium to coarse <b>SAND</b> , trace gravel			- G	1			1-	-96.75			⊽
							2-	-95.75			
End of Test Pit  (Water infiltration @ 1.0m	3.00						3-	-94.75			
depth)									20 40 Shear Str ▲ Undisturbed	60 80 10 rength (kPa) △ Remoulded	00

28 Concourse Gate, Unit 1, Ottawa, ON K2E 7T7

Consulting Engineers

#### SOIL PROFILE AND TEST DATA

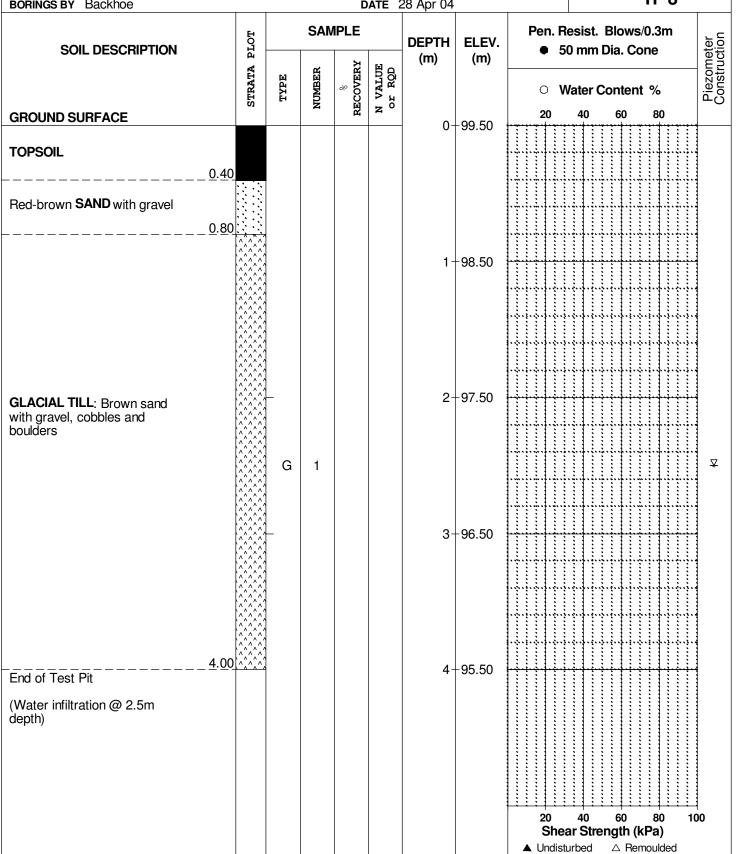
**Preliminary Geotechnical Investigation** Part 1, Lot 10 and Part 1, Lot 9, Concession 3 Ottawa (Nepean), Ontario

Ground surface elevations provided by Webster and Simmonds Surveying Ltd. **DATUM** 

FILE NO.

PG0214

**REMARKS** HOLE NO. TP8 **BORINGS BY** Backhoe **DATE** 28 Apr 04



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Ground surface elevations provided by Webster and Simmonds Surveying Ltd.

## **SOIL PROFILE AND TEST DATA**

**Preliminary Geotechnical Investigation** Part 1, Lot 10 and Part 1, Lot 9, Concession 3 Ottawa (Nepean), Ontario

28 Concourse Gate, Unit 1, Ottawa, ON K2E 7T7

FILE NO.

DATUM

PG0214

**REMARKS** 

HOLE NO.

TD a

BORINGS BY Backhoe				D	ATE 2	28 Apr 04		_	TP 9	
SOIL DESCRIPTION	PLOT		SAN	/IPLE	ı	DEPTH	ELEV.		esist. Blows/0.3m 0 mm Dia. Cone	eter Xion
	STRATA 1	TYPE	NUMBER	% RECOVERY	N VALUE or RQD	(m)	(m)	0 V	/ater Content %	Piezometer Construction
GROUND SURFACE				2	Z	0-	-98.73	20	40 60 80	
TOPSOIL0.14	1						00.70			
		_				1-	-97.73			
Brown medium to coarse SAND, trace gravel		G	1							
		_				2-	-96.73			⊽
3.00 End of Test Pit	)::::					3-	-95.73			
(Water infiltration @ 2.1m depth)								20 She	40 60 80 10 ar Strength (kPa)	00

28 Concourse Gate, Unit 1, Ottawa, ON K2E 7T7

Consulting Engineers

#### **SOIL PROFILE AND TEST DATA**

Preliminary Geotechnical Investigation Part 1, Lot 10 and Part 1, Lot 9, Concession 3 Ottawa (Nepean), Ontario

DATUM Ground surface elevations provided by Webster and Simmonds Surveying Ltd.

REMARKS

FILE NO.

PG0214

BORINGS BY Backhoe  SOIL DESCRIPTION  FOR THE SAMPLE  SAMPLE  SAMPLE  SAMPLE  SAMPLE  DEPTH (m)  For many big services and services are services are services are services and services are services are services are services are services are services and services are services are services are services and services are services ar		HOLE NO.										REMARKS
SOIL DESCRIPTION  TOPSOIL  Brown fine to medium SAND, trace gravel  GG 3  Firm, grey SILTY CLAY, trace shells  End of Test Pit  (Water infiltration @ 1.1m  DEPTH (m)  DEPTH (m)		TP10			28 Apr 04	ATE 2	D					BORINGS BY Backhoe
GROUND SURFACE  TOPSOIL  Brown fine to medium SAND, trace gravel  G 3  Firm, grey SILTY CLAY, trace shells  End of Test Pit (Water infiltration @ 1.1m	eter						IPLE	SAN		PLOT	E	SOIL DESCRIPTION
TOPSOIL  Brown fine to medium SAND, trace gravel  G 2  1-98.00  Firm, grey SILTY CLAY, trace shells  End of Test Pit (Water infiltration @ 1.1m	Piezometer Construction	/ater Content %	0 W	(111)	(111)	VALUE RQD	SOVERY	MBER	IYPE			
TOPSOIL  Brown fine to medium SAND, trace gravel  G 2  1-98.00  Firm, grey SILTY CLAY, trace shells  2-97.00  End of Test Pit  (Water infiltration @ 1.1m		40 60 80	20	00.00	0	Z O	REC	Ħ		ល	Ū	GROUND SURFACE
Brown fine to medium SAND, trace gravel  1.10  G 2  1-98.00  Firm, grey SILTY CLAY, trace shells  2-97.00  End of Test Pit  (Water infiltration @ 1.1m				-99.00	0-						0.30	TOPSOIL
Firm, grey SILTY CLAY, trace shells  G 3  2-97.00  End of Test Pit (Water infiltration @ 1.1m								1	G			Brown fine to medium <b>SAND</b> , trace gravel
Firm, grey SILTY CLAY, trace shells  2-97.00  3-96.00  End of Test Pit (Water infiltration @ 1.1m				-98.00	1 -			2	– G		1 10	
Firm, grey SILTY CLAY, trace shells  2-97.00  3-96.00  End of Test Pit (Water infiltration @ 1.1m									_			
3.50  End of Test Pit  (Water infiltration @ 1.1m								3	G			
3.50 End of Test Pit (Water infiltration @ 1.1m				-97.00	2-				_			Firm, grey <b>SILTY CLAY</b> , trace shells
3.50 End of Test Pit (Water infiltration @ 1.1m												
3.50 End of Test Pit (Water infiltration @ 1.1m												
End of Test Pit  (Water infiltration @ 1.1m				-96.00	3-							
(Water infiltration @ 1.1m depth)	· · · · · · · · · · · · · · · · · · ·										3.50	End of Test Pit
												(Water infiltration @ 1.1m depth)
20 40 60 80	100	40 60 90 14	20									
Shear Strength (kPa)	100	r Strength (kPa)	Shea									

Consulting Engineers

## **SOIL PROFILE AND TEST DATA**

Preliminary Geotechnical Investigation Part 1, Lot 10 and Part 1, Lot 9, Concession 3 Ottawa (Nepean), Ontario

28 Concourse Gate, Unit 1, Ottawa, ON K2E 7T7

Ground surface elevations provided by Webster and Simmonds Surveying Ltd.

PG0214

REMARKS

DATUM

HOLE NO.

FILE NO.

SOIL DESCRIPTION    Soil   DESCRIPTION   Soil   DESCRIPTION   Soil   DESCRIPTION   Soil   DESCRIPTION   Soil   DESCRIPTION   Soil   DESCRIPTION   Soil   DESCRIPTION   Soil   DESCRIPTION   Soil   DESCRIPTION   Soil   DESCRIPTION   Soil   DESCRIPTION   Soil   Soil   DESCRIPTION   Soil   Soi	BORINGS BY Backhoe				D	ATE 2	28 Apr 04			TP11	
Capital Surface	SOIL DESCRIPTION	PLOT		SAN							eter ction
D-98.98			TYPE	NUMBER	% RECOVERY	N VALUE or RQD	()	(111)			Piezom Constru
Red-brown SAND, some gravel  Brown SAND, some gravel  G 1 2-96.98  Brown SAND, some gravel  3-95.98  End of Test Pit (Water infiltration @ 2.5m depth)							0-	98.98	20	40 60 60	
Brown SAND with gravel, cobbles and boulders	TOPSOIL 	0									
1.50  G 1 2 −96.98  Brown SAND, some gravel  3 −95.98  End of Test Pit (Water infiltration @ 2.5m depth)  20 40 60 80 100 Shear Strength (kPa)	are al	) 									
G 1 2−96.98  Brown SAND, some gravel  3−95.98  End of Test Pit (Water infiltration @ 2.5m depth)  20 40 60 80 100 Shear Strength (kPa)							1-	-97.98			
3.50  End of Test Pit (Water infiltration @ 2.5m depth)  20 40 60 80 100 Shear Strength (kPa)			G	1			2-	-96.98			
End of Test Pit  (Water infiltration @ 2.5m depth)  20 40 60 80 100 Shear Strength (kPa)							3-	-95.98			፟
(Water infiltration @ 2.5m depth)  20 40 60 80 100 Shear Strength (kPa)	3. <u>5</u> End of Test Pit	) : : : :									
	(Water infiltration @ 2.5m								20	40 60 80 10	00
▲ Undisturbed △ Remoulded									Shea	ar Strength (kPa)	
									▲ Undistu	urbed △ Remoulded	

Consulting Engineers

#### **SOIL PROFILE AND TEST DATA**

Preliminary Geotechnical Investigation Part 1, Lot 10 and Part 1, Lot 9, Concession 3 Ottawa (Nepean), Ontario

28 Concourse Gate, Unit 1, Ottawa, ON K2E 7T7

Ottawa (Nepean), Ont

DATUM

Ground surface elevations provided by Webster and Simmonds Surveying Ltd.

FILE NO.

PG0214

**REMARKS** 

HOLE NO.

TEMATIKO

**TP12 BORINGS BY** Backhoe **DATE** 28 Apr 04 **SAMPLE** Pen. Resist. Blows/0.3m STRATA PLOT **DEPTH** ELEV. **SOIL DESCRIPTION** 50 mm Dia. Cone (m) (m) RECOVERY N VALUE or RQD NUMBER TYPE Water Content % 80 20 **GROUND SURFACE** 0+96.33**TOPSOIL** 1 + 95.331.30  $\nabla$ 2 + 94.33Firm, grey-brown SILTY CLAY, some sand seams - grey by 2.5m depth 3+93.33End of Test Pit (Water infiltration @ 1.3m depth) 40 60 80 100 Shear Strength (kPa) ▲ Undisturbed △ Remoulded

Consulting Engineers

Ground surface elevations provided by Webster and Simmonds Surveying Ltd.

## **SOIL PROFILE AND TEST DATA**

**Preliminary Geotechnical Investigation** Part 1, Lot 10 and Part 1, Lot 9, Concession 3

28 Concourse Gate, Unit 1, Ottawa, ON K2E 7T7

Ottawa (Nepean), Ontario

**DATUM REMARKS**  FILE NO.

PG0214

BORINGS BY Backhoe				D	ATE 2	28 Apr 04			HOLE NO. TP13	
SOIL DESCRIPTION	PLOT		SAN	<b>I</b> PLE		DEPTH	ELEV.		esist. Blows/0.3m 0 mm Dia. Cone	ster tion
	STRATA E	TYPE	NUMBER	% RECOVERY	N VALUE or RQD	(m)	(m)		Vater Content %	Piezometer Construction
GROUND SURFACE	Ø		Z	RE	z °	0-	95.48	20	40 60 80	
TOPSOIL0.40						, and the second	00.10			
Firm, grey-brown <b>SILTY CLAY</b>						1-	-94.48			
- grey by 1.7m depth						2-	-93.48			፟፟፟፟፟፟፟፟
End of Test Pit						3-	-92.48			
(Water infiltration @ 1.7m depth)										
								20 Shea ▲ Undist	40 60 80 100 ar Strength (kPa) urbed △ Remoulded	0

28 Concourse Gate, Unit 1, Ottawa, ON K2E 7T7

Consulting Engineers

#### **SOIL PROFILE AND TEST DATA**

Preliminary Geotechnical Investigation Part 1, Lot 10 and Part 1, Lot 9, Concession 3 Ottawa (Nepean), Ontario

DATUM Ground surface elevations provided by Webster and Simmonds Surveying Ltd.

nound surface cievations provided by vvebster and o

FILE NO.

PG0214

BORINGS BY CME 55 Power Auger

DATE 22 Apr 04

BH 1

BORINGS BY CME 55 Power Auger				D	ATE 2	22 Apr 04		BH 1
SOIL DESCRIPTION	PLOT		SAN	IPLE	1	DEPTH	ELEV.	Pen. Resist. Blows/0.3m  ■ 50 mm Dia. Cone
GROUND SURFACE	STRATA F	TYPE	NUMBER	% RECOVERY	N VALUE or RQD	(m)	(m)	Pen. Resist. Blows/0.3m
FOPSOIL 0.30						0-	-93.32	
Brown <b>CLAYEY SILT</b> , some sand seams		ss	1	100	3	1-	-92.32	
		ss	2	100	2	2-	-91.32	
stiff, grey-brown <b>CLAYEY</b> SILT to <b>SILTY CLAY</b> , some and seams		∑ SS	3	100	1	3-	-90.32	
4.57						4-	-89.32	
LACIAL TILL: Stiff, grey ayey silt with sand, gravel, bbbles and boulders nd of Borehole 5.18		ss s	4	100	5	5-	-88.32	
GWL @ 0.20m-May 1/04)								
								20 40 60 80 100 Shear Strength (kPa)
								Indisturbed △ Remoulded

28 Concourse Gate, Unit 1, Ottawa, ON K2E 7T7

Consulting Engineers

#### **SOIL PROFILE AND TEST DATA**

**Preliminary Geotechnical Investigation** Part 1, Lot 10 and Part 1, Lot 9, Concession 3 Ottawa (Nepean), Ontario

DATUM Ground surface elevations provided by Webster and Simmonds Surveying Ltd.

FILE NO.

PG0214

**REMARKS** 

HOLE NO.

BORINGS BY CME 55 Power Auger DATE 22 Apr 04											BH3	
SOIL DESCRIPTION		PLOT	SAMPLE				DEPTH	<b>I</b>	Pen. Resist. Blows/0.3m  ■ 50 mm Dia. Cone		ețer	
		STRATA	TYPE	NUMBER	% RECOVERY	N VALUE or RQD	(m)	(m)	Pen. Resist. Blows/0.3m  ■ 50 mm Dia. Cone  □ Water Content %			
GROUND SURFACE		.		_	2	z o		04.07	20	40 60	80	
TOPSOIL	<u>0.36</u>						0-	-94.97				
Stiff, brown CLAYEY SAND			ss	1	75	4	1-	-93.97				
grey by 1.5m depth			ss	2	100	W	2-	-92.97				
			ss   7	3	71	W	3-	-91.97				
Stiff. arev <b>CLAYEY SAND</b> to	_ <u>3.80</u>		ss	4	100	W	4-	-90.97				
Stiff, grey CLAYEY SAND to SANDY SILT	4. <u>5</u> 7		ss ss	5 6	100	1 W						
Very loose, grey fine to medium <b>SAND</b>	<u>5</u> . <u>6</u> 0		33	0	100	VV	5-	-89.97				
			ss	7	100	W	6-	-88.97				
Stiff, grey <b>SILTY CLAY</b>			7				7-	-87.97				
			ss	8	100	W	8-	-86.97				
			ss	9	100	1	9-	-85.97				
GLACIAL TILL: Loose, grey	9.75 ^^		7				10-	-84.97				
	11.28\^^		ss	10	50	7	11-	-83.97				
End of Borehole (GWL @ 1.20m-May 1/04)												
									20 Shea	40 60 ar Strength		- 00
									▲ Undist		Remoulded	

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## **SOIL PROFILE AND TEST DATA**

Geotechnical Investigation Francis Lands-Cambrian Road @ Greenbank Road Ottawa (Nepean), Ontario

**DATUM** FILE NO. **PG0177 REMARKS** HOLE NO. **TP11 BORINGS BY** Backhoe DATE 1 Apr 04 **SAMPLE** Pen. Resist. Blows/0.3m STRATA PLOT **DEPTH** ELEV. **SOIL DESCRIPTION** 50 mm Dia. Cone (m) (m) RECOVERY N VALUE or RQD NUMBER TYPE Water Content % 80 20 **GROUND SURFACE** 0 **TOPSOIL** 0.40 Very stiff, grey-brown **SILTY CLAY**, trace roots ⊻ 2 **GLACIAL TILL**: Grey sandy silt with gravel, cobbles and boulders 2.50 End of Test Pit (Open hole GWL @ 1.6m depth) 40 60 80 100 Shear Strength (kPa) ▲ Undisturbed △ Remoulded

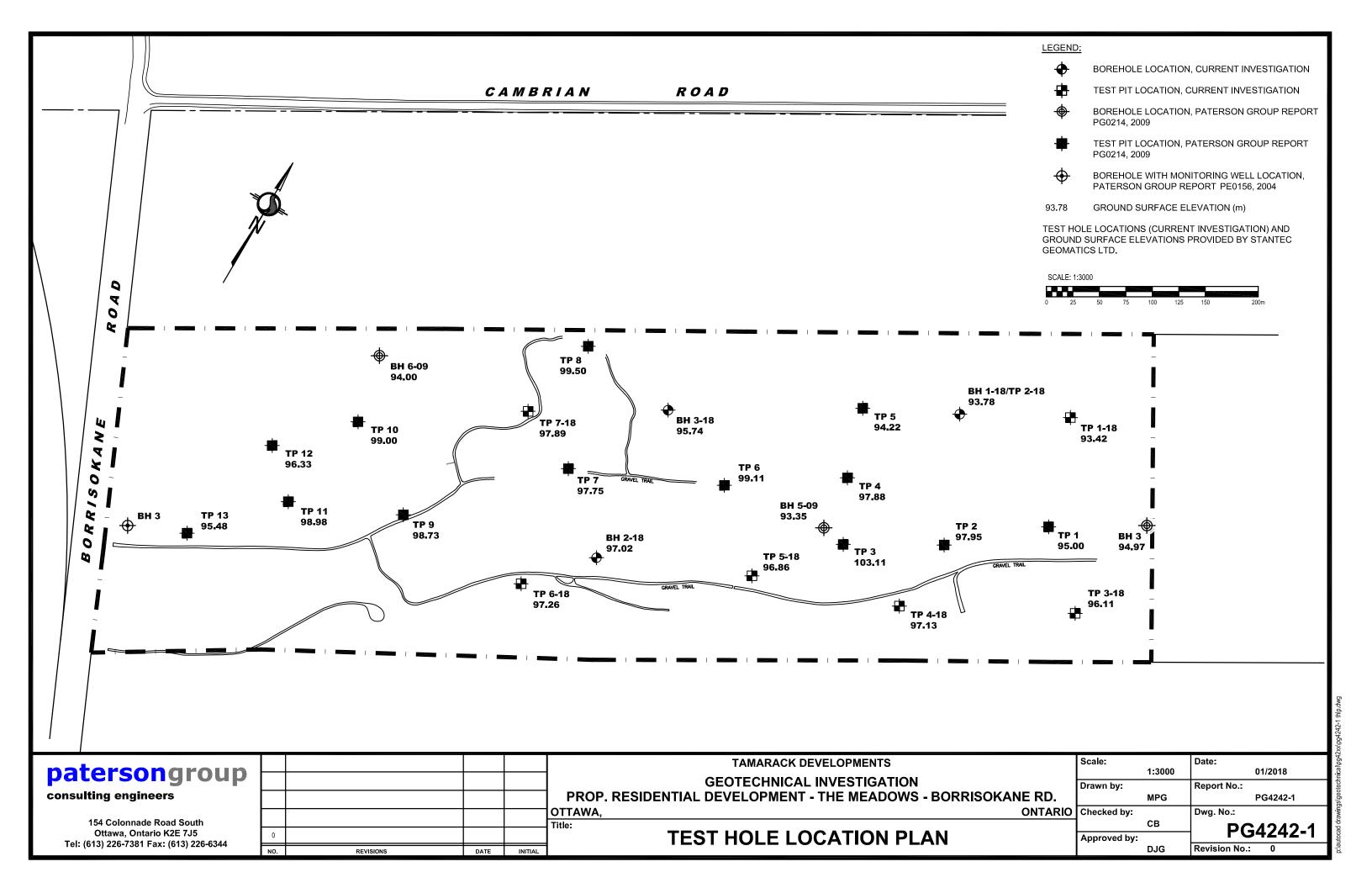
28 Concourse Gate, Unit 1, Ottawa, ON K2E 7T7

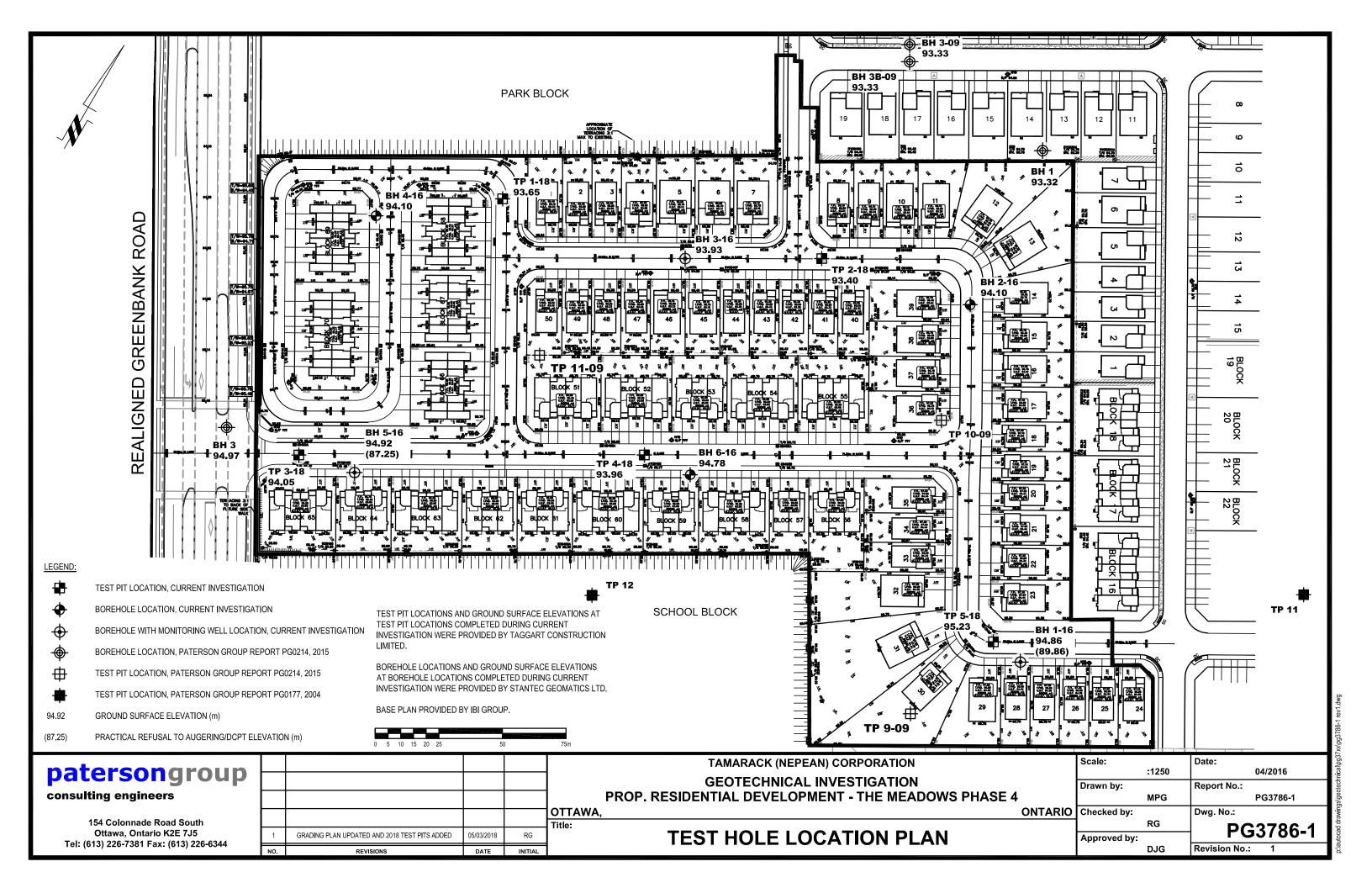
Consulting Engineers

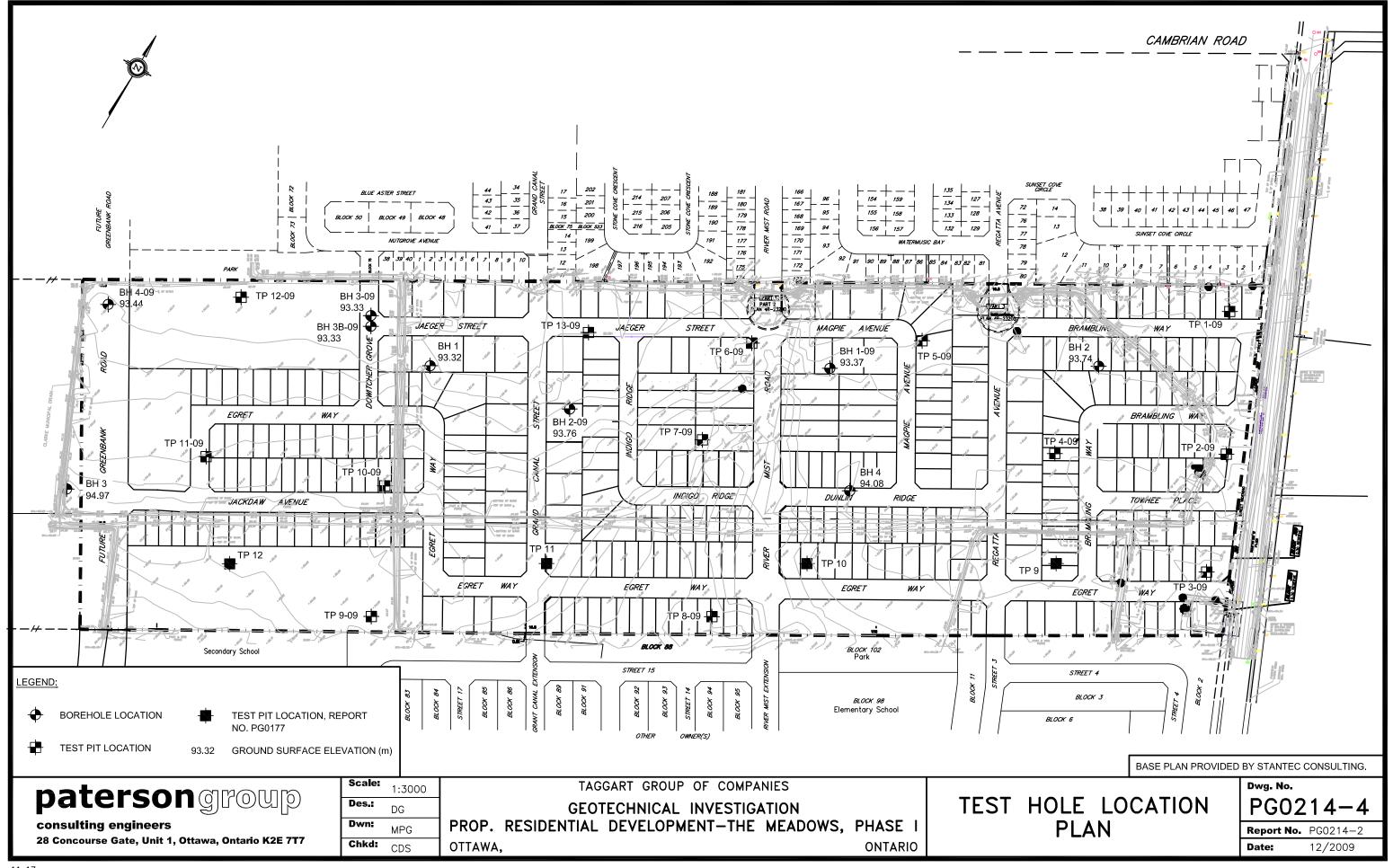
#### **SOIL PROFILE AND TEST DATA**

Geotechnical Investigation Francis Lands-Cambrian Road @ Greenbank Road Ottawa (Nepean), Ontario

**DATUM** FILE NO. **PG0177 REMARKS** HOLE NO. **TP12 BORINGS BY** Backhoe DATE 1 Apr 04 **SAMPLE** Pen. Resist. Blows/0.3m STRATA PLOT **DEPTH** ELEV. **SOIL DESCRIPTION** 50 mm Dia. Cone (m) (m) RECOVERY N VALUE or RQD NUMBER TYPE Water Content % 60 80 20 **GROUND SURFACE** 0 **TOPSOIL** 0.40 Reddish brown fine to medium G 1 SAND  $\nabla$ 1 - coarse sand with some gravel and shells by 1.0m depth G 2 2 3.00 3 End of Test Pit (Open hole GWL @ 1.0m depth) 40 60 80 100 Shear Strength (kPa) ▲ Undisturbed △ Remoulded









Ottawa Kingston North Bay

Table 9: Hydraulic Conductivity Test Results									
Well ID	Depth of Well (mbgs)	Depth to Water Level (mbgs)	Test Type	Hydraulic Conductivity (m/sec)					
BH1-16	3.1	0.4	Falling Head	4.02E-07					
BH3-16	6.1	0.1	Falling Head	5.59E-06					
		0.1	Rising Head	2.52E-06					
BH5-16	4.5		Falling Head	9.90E-05					
			Rising Head	6.20E-05					
		0.6	Falling Head	8.48E-05					
			Rising Head	5.94E-05					
Maximum 9.90E-05									
Minimum 4.02E-									
<b>Geometric Mean</b>	1.51E-05								

# APPENDIX 3 Stantec Geomatics Limited - Draft Plan of Subdivision With Contours



AND HAS NOT BEEN VERIFIED BY FIELD MEASUREMENTS. ALL DISTANCES ARE APPROXIMATE, TO BE VERIFIED BY FINAL REGISTERED PLAN(S).

"E"-Mail: brian.webster@stantec.com Website: www.stantec.com 161610681v-131-Curkovic-Lands-Greenbank\_rev1.dwg P.M.: FP DRAWN: CS FIELD: CHECKED: FP JOB No. : 161610681-131 Sept 18-09