

# **Geotechnical Investigation**

Slope Stability Analysis and Geotechnical Setback Study Part of Lots 3 and 4, Concession 5, City of Pickering, Ontario

Prepared For:

869547 Ontario Inc.



GeoPro Project No.: 17-1780GHE3 Report Date: October 27, 2023

Professional, Proficient, Proactive

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### Appendix A

Borehole Location Plan and Borehole Logs of Previous Geotechnical Investigation Carried Out by GeoPro

### Limitations to the Report

### 1. INTRODUCTION

GeoPro Consulting Limited (GeoPro) was retained by 869547 Ontario Inc.(the Client) to conduct a slope stability analysis and a geotechnical setback study for the slopes located at Part of Lots 3 and 4, Concession 5, in the City of Pickering, Regional Municipality of Durham, Ontario.

The purpose of this geotechnical investigation was to obtain information on the existing subsurface conditions by means of a limited number of boreholes, in-situ tests and laboratory tests of soil samples to provide required geotechnical design information. Based on GeoPro's interpretation of the data obtained, geotechnical comments and recommendations related to the project designs are provided.

The report is prepared with the condition that the design will be in accordance with all applicable standards and codes, regulations of authorities having jurisdiction, and good engineering practice. Further, the recommendations and opinions in this report are applicable only to the proposed project as described above. On-going liaison and communication with GeoPro during the design stage and construction phase of the project is strongly recommended to confirm that the recommendations in this report are applicable and/or correctly interpreted and implemented. Also, any queries concerning the geotechnical aspects of the proposed project shall be directed to GeoPro for further elaboration and/or clarification.

This report is provided on the basis of the terms of reference presented in our approved proposal and our understanding of the project. If there are any changes in the design features relevant to the geotechnical analyses, or if any questions arise concerning the geotechnical aspects of the codes and standards, this office should be contacted to review the design. It may then be necessary to carry out additional borings and reporting before the recommendations of this report can be relied upon.

This report deals with geotechnical issues only. The geo-environmental (chemical) aspects of the subsurface conditions, including the consequences 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, were not investigated and were beyond the scope of this assignment.

The site investigation and recommendations follow generally accepted practice for geotechnical consultants in Ontario. Laboratory testing for most part follows ASTM or CSA Standards or modifications of these standards that have become standard practice in Ontario.

This report has been prepared for the Client only. Third party use of this report without GeoPro's consent is prohibited. The limitations to the report presented in this report form an integral part of the report and they must be considered in conjunction with this report.

### 2. GEOTECHNICAL INVESTIGATION FOR PROPOSED RESIDENTIAL DEVELOPMENT BY GEOPRO

Geotechnical investigations and supplementary geotechnical investigations were carried out for the proposed residential development at the site in 2017 and 2021. The geotechnical reports entitled "Geotechnical Investigation – Proposed Residential Development" dated May 31, 2017 and "Supplementary Geotechnical Investigation – Proposed Residential Development" dated December 5, 2022 were submitted to the Client. The borehole location plan and borehole logs of the geotechnical investigation and supplementary geotechnical investigation for the proposed residential development carried out by GeoPro were attached in Appendix A.

### 3. DISCUSSION AND RECOMMENDATIONS

This section of the report provides a slope stability assessment for the subject slope based on our interpretation of subsurface data from a limited number of boreholes, slope profiles obtained, our field observations and our understanding of the project requirements. The information in this portion of the report is provided for the guidance of the design engineers and professionals. The results of the slope stability assessment are subject to the review and approval of the relevant agencies.

Based on the borehole information, our visual slope inspection and slope profiles interpreted from the contour lines of the provided topographic drawings, a detailed slope stability study was carried out to evaluate the long-term global stability of the existing slope as well as the setback requirement. The assessment of the stability of the subject slope consisted of two components:

- 1. Visual field review of the current slope conditions from a slope stability perspective; and
- 2. Global stability analyses based on the subsurface conditions encountered in the boreholes carried out during the geotechnical investigation.

### 3.1 Existing Slope Conditions and Profile

The following section provides geotechnical comments related to the measured slope geometry based on the topographic plan provided by the Client, as well as observations made during a visual inspection of the existing slopes carried out by our geotechnical staff on April 10, 2017. Six (6) typical slope profiles (Sections A-A to F-F) were provided for the global stability analyses (See Drawing 1B for the locations).

Based on our site observations and the slope profiles measured, the slope conditions at the site are described as follows:

The subject slopes are situated on both sides of the Carruthers Creek. Within the study area, the inclinations of the slopes generally range from about 1.7 horizontal to 1 vertical (1.7H:1V) to 5.6 horizontal to 1 vertical (5.6 H:1V) with localized steeper or flatter areas; the heights of the slope are generally about 5.0 m to 7.0 m;

- 2. The slope surface are generally covered by trees or bushes with decayed leaves/branches;
- 3. No water seepage was noted at the slope surface within the study area;
- Obvious Erosion caused by surface runoff was not noted at the time of the investigation. Minor active erosion of the slope toe was observed at a portion of the existing slopes during the site visit;
- 5. Indications of shallow slumping/sloughing at or near-surface slope were not observed along the slope during our field review;
- 6. Tension cracks and/or other indicators of deep seated movement of the slope were not observed at or beyond the crest of the slope.
- Vegetation in the subject site was observed to be uniform and no previous soil disturbance was noted at the time of site visit.

### 3.2 Erosion Setback

The magnitude of the erosion component is typically the estimated recession of the slope toe due to erosion over a specified design period, and is measured as a horizontal distance from the existing creek channel. The toe erosion component is to be assessed using suggested guidelines for toe erosion allowances contained in "Technical Guide for River & Stream Systems: Erosion Hazard Limit (2002)" prepared by the Ontario Ministry of Natural Resources.

For the slope Cross-Sections B-B, C-C and E-E, a toe erosion component is typically not required for these sections where the valley floor is greater than 15 m from the toe of the slope.

For the slope Cross-Sections A-A, D-D and F-F, an erosion setback is required due to the presence of existing water course. Based on the soil conditions in the boreholes and the site observations, the soils at the slope toe generally consisted of fine sandy/silty soils at Cross-Sections A-A, F-F and clayey silt at Cross-Section D-D. Obvious evidence of active erosion of the slope toe was observed at a portion of the slope toe during the site visit. In accordance with "Technical Guide for River & Stream Systems: Erosion Hazard Limit (2002)", the design erosion setback allowance of 8.0 m is considered applicable for the exposed soils at Cross-Section D-D. The erosion allowance of e = 8.0 m will be used to establish the long-term stable top of slope at Cross-Section D-D.

### 3.3 Soil Parameters

Soil strength parameters selected for the soil strata have been estimated based on the boreholes drilled near the slope, previously published information and from our experience on similar

projects. A global slope stability analysis was carried out for the soil stratigraphy using effective stress/strength parameters as shown in the following Table:

Material Type	Unit Weight (kN/m³)	Effective Friction Angle Φ'	Cohesion (kPa)
Surficial Vegetation	16	28°	1
Loose (Probable) Fill Materials	18	28°	0
Very Loose Silty Fine Sand	18	28°	0
Loose to Compact Silty (Fine) Sand	20	31°	0
Compact to Dense Silt and Fine Sandy Silt	20	30°	0
Compact to Very Dense Fine Sand and Silt to Fine Sandy Silt	20	31°	0
Dense Fine Sand and Silt to Silty Fine Sand	21	31°	0
Stiff to Hard Clayey Silt and Clayey Silt (Till Like)	19	30°	1
Hard Clayey Silt Till to Silty Clay Till	20	31°	2
Dense to Very Dense Sandy Silt Till to Sand and Silt Till	21	31°	1
Very Dense Silty Sand	21	32°	0
Very Dense Gravelly Sand	22	33°	0

### **Material Parameters for Slope Stability Analysis**

### 3.4 Stability Analysis of Existing Slope

The *"Technical Guide, River & Stream Systems: Erosion Hazard Limit"* document published by the Ontario Ministry of Natural Resources in 2002 ("The Guide"), provides recommendations for minimum Factors of Safety (FOS) for the design of stable slopes on the basis of land-use above or below the slopes. A Design Minimum Factor of Safety of 1.30 to 1.50 is recommended in Table 4.3 of the Guide (Section 4.3.3.1 Design Minimum Factors of Safety) for Active Land Uses, such as those containing residential structures. A Factor of Safety greater than 1.5 should be used in consideration of the proposed residential development. Based on our previous experience, Factor of Safety of 1.5 is usually required by conservative authorities.

Long-term stability analysis of the existing slope at above noted section was carried out with the computer program SLIDE (Version 6.0) using the Simplified Bishop method. The analysis results for the existing slopes are presented in Drawings 2 to 7 and are summarized in the following table:

Slope Location/Drawing Number	Existing Slope Inclination	Existing Slope Height (m)	Calculated Factor of Safety	Note
Existing Slope, Cross-Section A-A / Drawing 2	2.00 H : 1V	6.0	1.03	Not Stable (FS<1.5)
Existing Slope, Cross-Section B-B / Drawing 3	2.21 H : 1V	6.0	1.10	Not Stable (FS<1.5)
Existing Slope Cross-Section C-C / Drawing 4	3.10 H : 1V	7.0	1.51	Stable (FS>1.5)
Existing Slope Cross-Section D-D / Drawing 5	3.29 H : 1V	6.0	1.37	Not Stable (FS<1.5)
Existing Slope Cross-Section E-E / Drawing 6	1.65 H : 1V	7.0	0.93	Not Stable (FS<1.5)
Existing Slope Section F-F / Drawing 7	5.57 H : 1V	5.0	2.33	Stable (FS>1.5)

The calculated FOS of the existing slope at Cross- Sections A-A to E-E ranged from 0.93 to 2.33, as shown on Drawings 2 to 7. The FOS of Cross-Sections C-C and F-F are greater than the minimum acceptable value of 1.5. The existing slope at Cross-Sections C-C and F-F are considered stable in terms of long term stability based on the requirements. However, the FOS of Cross-Sections A-A, B-B, D-D and E-E are less than the minimum acceptable value of 1.5. The existing slope at Cross-Sections A-A, B-B, D-D and E-E are considered not stable in terms of long term stability based on the requirements of long term stability based on requirements.

### 3.5 Long Term Stable Top of Slope considering Erosion Setback

The long-term stable top of slope does not include a development/access setback component or a rear-yard allowance. The requirement for these additional setbacks, if any, are typically set by the Town/City, District or Provincial regulations and should be determined through consultation with the applicable regulatory bodies/agencies. Similarly, the setback required for safety against flood conditions or preservation of vegetation or wildlife is independent of the geotechnical setback criteria proposed.

A target minimum factor of safety of 1.5 is used to explore the slope failure surface. Since the toe erosion component is not required for section C-C and the existing slope is considered stable in terms of long term stability based on the requirements, the long term stable top of slope line stays at the existing crest of the slope at Section C-C. The slope stability analyses were carried out and the results indicate that the 4.17 H:1 V for slope at Cross-Section A-A, 3.17 H:1 V for slope at Cross-Section B-B, 3.96 H:1 V for slope at Cross-Section D-D and 3.71 H:1 V for slope at Cross-Section E-E have a factor of safety greater than 1.5. Drawing 8 represents the long term stable top of slope at Cross-Section A-A (20.98 m away from the existing top of the slope). Drawing 9 represents the long term stable top of slope at Cross-Section B-B (5.75 m away from the existing top of the slope). Drawing 10 represents the long term stable top of slope at Cross-Section E-E (14.45 m away from the existing top of the slope). Drawing 12 represents the long term stable top of slope at Cross-Section F-F (stays at the existing crest of the slope).

Based on the long-term stable top of slope at Cross-Sections A-A to F-F, the topographic survey plan and our visual slope inspection, the recommended long-term stable top of slope line is plotted on the Drawing 1. This long-term stable top of slope line must be reviewed by the Conservation Authority for the approval.

### 3.6 Other Comments

Additional comments related to the slope stability at the site are as follows:

- In order to prevent soil erosion at the slope surface, the vegetation on the existing slopes must be preserved.
- Surface water should be directed away from the slope surface using measures such as swale behind the crest of the slope, should any erosion be caused by surface runoff.
- Soils or other materials must not be placed on the existing slope surfaces or near the top of the slopes.

Any foundations near the slope should be founded below an imaginary 3H:1V line drawn up from the toe of the long term stable slope. Should this requirement be not meet, a geotechnical engineer from GeoPro should be consulted for further evaluation.

#### 4. CLOSURE

We trust that the geotechnical information presented in the report is sufficient for your present requirements. If you have any questions regarding the contents of this report or require additional information, please do not hesitate to contact this office.

Yours very truly,

GEOPRO CONSULTING LIMITED

Niko 2. Carrasco, B.Eng. Geotechnical Group

David B. Liu, P.Eng., Principal



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Geotechnical-Hydrogeology-Environmental-Materials-Inspection

# DRAWINGS





# Slope Stability Analysis of Existing Slope, Cross-Section A-A





# Slope Stability Analysis of Existing Slope, Cross-Section B-B





# Slope Stability Analysis of Existing Slope, Cross-Section C-C





# Slope Stability Analysis of Existing Slope, Cross-Section D-D





# Slope Stability Analysis of Existing Slope, Cross-Section E-E





# Slope Stability Analysis of Existing Slope, Cross-Section F-F





# Slope Stability Analysis of Long-Term Stable of Slope, Cross-Section A-A





# Slope Stability Analysis of Long-Term Stable of Slope, Cross-Section B-B





# Slope Stability Analysis of Long-Term Stable of Slope, Cross-Section D-D





# Slope Stability Analysis of Long-Term Stable of Slope, Cross-Section E-E





# Slope Stability Analysis of Long-Term Stable of Slope, Cross-Section F-F





GeoPro Consulting Limited

Geotechnical-Hydrogeology-Environmental-Materials-Inspection

# **APPENDIX A**



Legend:		Client:	869547	Ontario Inc.		Project No.:	17-1780GHE3	Drawing No.: 1
		Drawn:	RF	Approved:	DL	Title:	Boreh	ole Location Plan
	Borehole Location Previous Borehole Location	Date:	Nov. 2022	Scale:	N.T.S	Project:	Geotechn Proposed Re Parts of Lots 3	ical Investigation for esidential Development and 4, Pickering, Ontario
<b>▼</b>		Original Size:	Letter	Rev:	DX		GeoPr	o Consulting Limited



PROJECT: Geotechnical Investigation for Proposed Residential Development CLIENT: JFC Developments Ltd.

PROJECT LOCATION: Parts of Lots 3 and 4, Concession 5, Pickering, Ontario DATUM: Geodetic

BH LOCATION: See Borehole Location Plan

DRILLING DATA

Method: Continuous Flight Auger- Auto Hammer

Diameter: 155/205 mm Date: Apr/10/2017

REF. NO.: 17-1780GHE

ENCL NO.: 2

SOIL PROFILE SAMPLES

	SOIL PROFILE		S	ampl	ES			DYNAI RESIS	VIC CO TANCE	NE PEN PLOT		TION			. NAT	URAL			т	REM	ARKS
(m)		F				TER		2	0 4	0 6		30 1	00	LIMIT	IC MOIS	STURE	LIQUID	Ë,	NIT W	AN	ID
ELEV		PLO	~		MS E	4W C	No	SHEA	R ST	RENG	TH (kl	Pa)		W <sub>P</sub>		w 0	WL	(kPa	KAL UI	GRAIN	I SIZE
DEPTH	DESCRIPTION	ATA	1BEF	ш	BLC 0.3	DUNE	VATI				+	FIELD V & Sensit	ANE	WA	TER CO		Г (%)	00 00	IATUR (	(%	6)
135.3		STR	NUN	ТҮР	ż	GRO	Ē	2	0 4	0 6	0 6	BO 1	00	1	10 2	20 3	30		2	GR SA	SI CL
130.0	TOPSOIL: (180 mm)	<u>\ 1,</u>				22	Concr	ete													
0.2	REWORKED SILTY FINE SAND: trace organics, trace rootlets, brown.	$\bigotimes$	1	SS	4	¥. ¥	135								•						
	moist, loose	$\bigotimes$						-													
134 2		$\bigotimes$	2	SS	4			-								0					
1.1	SILTY FINE SAND: trace organics,		_	00	<u> </u>		124	-													
-	trace rootlets, brown, wet, loose to compact					<u> </u>	W. L.	<b>i</b> 133.9 r	n												
			3	SS	23	$\nabla$	May 0	9, 2017	7							0					
133.2							Apr 28	, 2017	11												
2.1	FINE SAND AND SILT TO FINE						133														
-	grey, wet, dense to very dense		4	SS	37		-Bento	nite F							0						
-								-													
-								-													
			5	SS	55		132	-								<b> </b>					
			-					-													
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-								Ę													
-							131	-													
-	grey			00	00			-													
5			6	55	82			Ē													
							130	-													
-								-													
							Sand	-													
<u>-</u> 6							Scree	n F													
-			7	SS	50 /	に目い	129	-							0						
-					<u>mm</u>	[:目:	·	-													
						200		-													
								-													
-							Natura	al Pack	(												
					50 /			-													
127.4			8	55	150			-							0						
1.9	Notes:																				
	<ol> <li>Water encountered at a depth of</li> <li>5 m below ground surface</li> </ol>																				
	(mBGS) during drilling.																				
	mBGS upon completion of drilling.																				
	3) Borehole caved at a depth of 3.0 mBGS upon completion of drilling.																				
	4) 51 mm dia. Monitoring Well was																				
	completion of drilling.																				
	Water Level Reading																				
	Date W.L. Depth (mBGS)																				
	April 28, 2017 1.72 May 9, 2017 1.35																				



PROJECT: Geotechnical Investigation for Proposed Residential Development CLIENT: JFC Developments Ltd.

DRILLING DATA

Method: Continuous Flight Auger- Auto Hammer

PROJ	ECT LOCATION: Parts of Lots 3 and 4,	, Con	icess	ion 5, I	Pickeri	ng, Onta	ario	Diame	eter: 1	55/20	5 mm					I	REF. N	0.: 1	7-178	BOGHE		
DATU	M: Geodetic							Date:	Apr/	10/201	7			ENCL NO.: 3								
BHLC	CATION: See Borehole Location Plan SOIL PROFILE		5	SAMPL	ES	~		DYNAM RESIS	AIC CO	DNE PE E PLOT		TION		DIAST	NA	TURAL			L.	REMARK		
(m) <u>ELEV</u> DEPTH	DESCRIPTION	STRATA PLOT	NUMBER	ТҮРЕ	"N" <u>BLOWS</u> 0.3 m	GROUND WATER CONDITIONS	ELEVATION	2 SHEA 0 UN • QU 2	0 RST ICONF JICK T	40 ( RENG FINED RIAXIAI 40 (	50 FTH (k + - ×	80 Pa) FIELD & Sen: LAB	VANE sitivity VANE 100		TER C	ISTURE NTENT W -0 CONTE 20	NT (%)	POCKET PEN. (Cu) (kPa)	NATURAL UNIT W (kN/m <sup>3</sup> )	AND GRAIN SI DISTRIBUT (%) GR SA SI		
139.9	TOPSOIL: (250 mm)	<u>x1 1/</u>			-		Concr	rete														
0.3	<b>REWORKED SILTY FINE SAND:</b> trace clay, trace organics, trace rootlets, brown moist loose		1	SS	5		001101								c	0						
0.7	NO RECOVERY: likely silty fine sand, loose		2	NR	6	Σ Γ	W. L. May 09 W. L.	132.3 r 9, 2017 131.9 r	n / n									_				
131.6	FINE SAND AND SILT: trace clay	1111					Apr 28	, 2017														
1.4	trace organics, seams of clayey silt, brown to grey, wet, compact to very dense		3	SS	18		131	-								0						
	grey		_				101	-														
			4	SS	30		Sand Scree	- - n							0							
			5	SS	32										0							
			· · ·				129	-										_				
			6	ss	46			-							0							
							128	-														
								-														
			:				127	_														
			7	SS	53			-							0							
125.9							126	-						-								
7.1	CLAYEY SILT: some fine sand, seams of sand, grey, wet, stiff							-														
			8	SS	10		125							<u> </u>	0	,		-				
124.3							Natura	ai Pack	(													
8.6	CLAYEY SILT (TILL LIKE): trace to some sand, trace gravel, containing cobbles and boulders, grey, wet stiff						124															

CLAYEY SILT TILL TO SILTY CLAY TILL: trace sand, trace gravel, containing cobbles and boulders, grey, moist, hard



122.8 122.8

11

123

122

9 SS 10

10 SS 80

O <sup>8=3%</sup> Strain at Failure

0

0



PROJECT: Geotechnical Investigation for Proposed Residential Development

CLIENT: JFC Developments Ltd.

PROJECT LOCATION: Parts of Lots 3 and 4, Concession 5, Pickering, Ontario DATUM: Geodetic

BH LOCATION: See Borehole Location Plan

DRILLING DATA

Method: Continuous Flight Auger- Auto Hammer

Diameter: 155/205 mm Date: Apr/10/2017

REF. NO.: 17-1780GHE ENCL NO.: 3

	SOIL PROFILE			SAMPL	ES			DYNA			IETRA	TION								DEMARKO
(m)		⊢				TER		2	0 4	0 6	0 8	0 1	00	PLAST LIMIT	IC MOIS CON	URAL STURE TENT	Liquid Limit	N	UIT WT	AND
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		STR	NN	L∠F	ż	GRO	ELE	2	0 4	0 6	o îa	10 10		1	0 2	20 3	30		2	GR SA SI CL
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-120.2			11	SS	280			-							ο					
120.3	END OF BOREHOLE Notes: 1) Water encountered at a depth of 1.5 m below ground surface (mBGS) during drilling. 2) Water was at a depth of 2.1 mBGS upon completion of drilling. 4) 51 mm dia. Monitoring Well was installed in borehole upon completion of drilling. Water Level Reading Date W.L. Depth (mBGS) April 28, 2017 1.05 May 9, 2017 0.70			SS	90/ 280 mm															





PROJECT: Geotechnical Investigation for Proposed Residential Development

CLIENT: JFC Developments Ltd.

PROJECT LOCATION: Parts of Lots 3 and 4, Concession 5, Pickering, Ontario DATUM: Geodetic

BH LOCATION: See Borehole Location Plan

#### DRILLING DATA

Method: Continuous Flight Auger- Auto Hammer

Diameter: 155/205 mm

Date: Apr/10/2017

ENCL NO.: 4
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	SOIL PROFILE		s	AMPL	.ES			DYNAI RESIS	MIC CO TANCE	NE PEN PLOT		TION			ΝΔΤ					REMARKS
(m)		⊢				TER		2	.0 4	0 6	io 8	30 1	00	PLASTI LIMIT	MOIS CON	STURE	LIQUID	Ľ.	IT WI	AND
ELEV		PLO.	~		SN E	o WA	N	SHEA	AR STI	RENG	L TH (kl	Pa)	1	W <sub>P</sub>		w 0	WL	KET F (KPa	AL UN	GRAIN SIZE
DEPTH	DESCRIPTION	ATA	BER		BLO 0.3	DITIO	ĬŤ.			INED	÷	FIÉLD V & Sensit	ANE	WA			Г (%)	DO DO	ATUR (k	(%)
133.6		STR.	NUN	ТҮРІ	z	GRO	ELE	• Q(	JICK 1F 10 4	riaxial 0 6	. Χ 10 ε	LAB V/ 30 1	ANE 00	1	0 2	20 3	BO		z	GR SA SI C
- 13 <b>9.4</b>	TOPSOIL: (180 mm)	<u>x 1/.</u>	-	-			Concr	ete												
0.2	REWORKED SILTY FINE SAND:	$\bigotimes$	1	SS	4	× ×	-Bonto	t nite								0				
Ē	brown to brown, wet, loose to	$\bigotimes$	-				W.L.	133.0 r	n n											
4225	compact	$\bigotimes$	2	66	22		W. L.	132.8 r	'n											
1.1	SILTY FINE SAND: trace clay,		2	50	23		Apr 28	, 2017 F												
- 132.2 L 1.4	trace rootlets, brown, wet, compact					に目:														
-	SANDY SILT: trace clay, brown to		. 3	22	26	1:目:	- 132 Sand									0				
2	grey, wet, compact to dense		Ľ	00	20	目:	Scree	L n								Ĩ				
-						目:		Ê												
			4	SS	48		404	-							0					
				00		H	131	-												
3						665		-												
Ē	grey		5	SS	43			F							0					
-			<u> </u>				130	-												
			1			R S S	150	-												
4129.5						R S		_												
4.0	layers of fine sand and silt, grey,	[].				R		-												
-	wet, dense					R S	129	-												
-			6	SS	39			E							0					
- 5								_												
-			·				Nation													
128.0	FINE SAND AND SILT: trace clay						128		< 											
E. 0.0	grey, wet, very dense							-												
-			<b> </b>		50/			-												
E			7	SS	150			-							0					
Ē					\ <u>mm</u>		127	-												
7126.6																				
7.0	SILT: some fine sand, trace to		1					F												
	grey, wet, compact																			
			<u> </u>				126	-												
<sup>8</sup> 125 5			8	SS	30										0					
8.1	END OF BOREHOLE					11 700													1	
	Notes: 1) Water encountered at a depth of																			
	0.8 m below ground surface																			
	2) Borehole caved at a depth of 1.8																			
	mBGS upon completion of drilling.																			
	installed in borehole upon																			
	completion of drilling.																			
	Water Level Reading																			
	April 28, 2017 0.76																			
	May 9, 2017 0.57																			



O <sup>8=3%</sup> Strain at Failure



PROJECT: Geotechnical Investigation for Proposed Residential Development

CLIENT: JFC Developments Ltd.

PROJECT LOCATION: Parts of Lots 3 and 4, Concession 5, Pickering, Ontario DATUM: Geodetic

BH LOCATION: See Borehole Location Plan 

DRILLING DATA

Method: Continuous Flight Auger- Auto Hammer

Diameter: 155/205 mm Date: Apr/05/2017

REF. NO.: 17-1780GHE

ENCL NO.: 5

	SOIL PROFILE		s	SAMPL	.ES			DYNA RESIS	MIC CO TANCE	NE PEN PLOT		TION			NATI	IRAI			L	REMAR	ĸs
(m)		F				TER		2	.0 4	0 6	i0 8	30 1	00	PLASTI LIMIT	C MOIS	TURE	LIQUID	Ľ.	lT W	AND	10
(III) ELEV		LO.			S	o WA	z	SHEA	AR STI	RENG	L TH (ki	Pa)	1	W <sub>P</sub>		v	WL	KET F (KPa	AL UN N/m <sup>3</sup> )	GRAIN S	IZE
DEPTH	DESCRIPTION	ATA	BER		0.3 0.3	UND IL	Ĭ Į	O UI	NCONF	INED	÷	FIÉLD V. & Sensiti	ANE vity					0 DO	ATUR (k	(%)	
126.1		STR/	N N N	ΓΥΡΕ	ż	SR0 NON	ELE/		JICK TF 20 4	RIAXIAL 0 6	. × 10 8	LAB VA 30 1	ANE DO		0 2	0 3	(%) 10		Ż	GR SA S	
- 139.9	TOPSOIL: (200 mm)	<u></u>	-		-	▼∐▼		oto				-						-			
0.2	REWORKED SAND AND SILT:	×	1	SS	3	Q₩Q	W I	135 8 i	 m						0						
-	organics, trace rootlets, brown, wet,	$\bigotimes$					W. L. <sup>-</sup> Apr 28	ו 135.7 2017	n 'i												
E, I	very loose to dense	$\mathbb{X}$	-				, (pi 20	ţ_													
<u>-135.0</u>	SANDY SILT THE TO SAND AND	<u> </u>	2	SS	40		135	_							0						
E	SILT TILL: some clay, trace gravel,	[].					-Bento	r nite													
-	layers of silty sand, containing cobbles and boulders, brown to		3	55	50/			F													
-	grey, moist to wet, dense to very		Ĕ		150 mm																
É	cobbles and boulders				<u>[</u> ]		134														
-	grey							-													
-			4	SS	67			Ē						°							
3																					
						⋮≣∷	133														
E		¢.	5	55	/3	日:								°							
								-													
		<b> </b>						-													
4.0	SILTY SAND: some gravel,					ŀ∃:	132 Sand	-													
	grey, wet, very dense						Oanu	F													
E			6	99	68	1.目:	Scree	n. Ľ													
5		惃		33	00			-							1						
		臣臣				「目:	131	5													
-130.5								-													
5.6	CLAYEY SILT TILL: some sand to sandy trace gravel containing							F													
6	cobbles and boulders, grey, moist,	FI/				l · ⊟ ·	130	-													
-	naro		7	SS	50 /		100	-							0						
		11			<u>mm</u>			_													
- 								ţ,													
- 7.0	CLAYEY SILT: trace sand, trace						-Natura 129	ai Paci	< 												
-	gravel, grey, moist, hard																				
-				00	50 /			-							_						
7.8	END OF BOREHOLE	411	<u>ŏ</u>	55	130										5						
	Notes: 1) Water encountered at a depth of				\ <u>mm</u>																
	1.8 m below ground surface																				
	2) Water was at a depth of 1.5																				
	mBGS upon completion of drilling.																				
	installed in borehole upon																				
	completion of drilling.																				
	Water Level Reading																				
	April 28, 2017 0.39																				
	May 9, 2017 0.27																				
I		1	I	1	1	1	1					1	1	1			1	1	1		

O <sup>8=3%</sup> Strain at Failure



PROJECT: Geotechnical Investigation for Proposed Residential Development

CLIENT: JFC Developments Ltd.

PROJECT LOCATION: Parts of Lots 3 and 4, Concession 5, Pickering, Ontario DATUM: Geodetic

BH LOCATION: See Borehole Location Plan

DRILLING DATA

Method: Continuous Flight Auger- Auto Hammer

Diameter: 155/205 mm Date: Apr/05/2017

REF. NO.: 17-1780GHE ENCL NO.: 6

	SOIL PROFILE		s	SAMPL	ES			DYNA RESIS	MIC CC	NE PEN PLOT		TION			_ NAT	URAL			F	REMAR	ĸs
(m)		Ц				ATER		2	20 4	0 6	0 8	30 10	0	LIMIT	C MOIS	TURE	LIQUID	a) EN	NIT W	AND	
ELEV	DECODIDITION	PLC	~		2MS B		NO	SHEA	AR ST	RENG	TH (kl	Pa)		W <sub>P</sub>		w o	WL	u) (KP.	SAL U KN/m <sup>3</sup>	GRAIN S	IZE TION
DEPTH	DESCRIPTION	ATA	1BEF	ш	BLO	NUC	L AT				+	& Sensitiv	NE vity	WA	TER CO		T (%)	80 Ö	INTUR (	(%)	
135 5		STR	ŊN	ΥP	ż	GR C		2	20 4	0 6	0 6	BO 10	INE 10	1	0 2	20 3	30		2	GR SA S	I CL
139.9	TOPSOIL: (200 mm)	<u>x 1/</u>					Concr	l ete													-
- 0.2	FILL: silty fine sand, trace organics,	$\mathbb{X}$	1	SS	4	¥, ¥		È								ø					
- 134.8	wet, loose	$\otimes$	<u> </u>			¥.	W. L.	135.0 ı	m												
0.7	SANDY SILT TILL: trace to some				76/	Ξ¥	May 0 W. L.	a 2011 134.7 i	7 M												
F	clay, trace gravel, pockets of sand, containing cobbles and boulders,		2	SS	280		Apr 28	, 2017 I	1						0						
	brown to grey, moist, very dense	· •   .			<u> </u>		-Bento	r nite													
-							134	-													
		.   •	3	SS	87			-						0							
-								-													
	arev							-													
-	9.09		4	SS	94		133	-						0							
- 132.6								-													
3 2.9	FINE SANDY SILT: trace clay,		5	90	50 /	╢┟		F													
	trace graver, grey, wet, very dense		- 5	33	80	目.		-							0						
-					\ <u>mm</u>	1:8:	132	-													
131.6							·	-													
<u>_</u> 3.9	CLAYEY SILT TILL: some sand to		1			に目の		-													
E	cobbles and boulders, grev, moist.	11				に目:	Sand	Ē													
-	hard				50/	ド目・	Scree	r n										1			
-		HX	6	SS	130	l:∃:		Ē						0	•						
-					mm	「目こ		-													
-			1			1:目:		Ē													
- 5.5	SANDY SILT TILL: trace to some	-				ŀ.≣∙	130	-													
-	clay, trace gravel, containing					ľ∙⊟·		Ē													
-	very dense		_					-													
-	cobbles and boulders			<u>ss</u>	50 / 80		R.	Ē						Ĭ							
-					mm		129	-													
- 128.6								Ē													
<u>7</u> 6.9	GRAVELLY SAND: trace silt,	0.0					Natura	L al Pacl	l k												
-	and boulders, grey, wet, very dense						N N	E													
-		. O					128	-													
E		60	8	SS	59			Ē							0						
≜ <u>127.4</u>		0	<u> </u>			19426	N	<u> </u>										<u> </u>			
Ö.1	Notes:																				
	1) Water encountered at a depth of																				
	(mBGS) during drilling.																				
	2) Water was at a depth of 0.3																				
	3) Borehole caved at a depth of 6.7																				
	mBGS upon completion of drilling. 4) 51 mm dia Monitoring Well was																				
	installed in borehole upon																				
	completion of drilling.																				
	Water Level Reading						1														
	Date W.L. Depth (mBGS) April 28, 2017 0.76																				
	May 9, 2017 0.49																				



PROJECT: Geotechnical Investigation for Proposed Residential Development

CLIENT: JFC Developments Ltd.

PROJECT LOCATION: Parts of Lots 3 and 4, Concession 5, Pickering, Ontario DATUM: Geodetic

BH LOCATION: See Borehole Location Plan

DRILLING DATA

Method: Continuous Flight Auger- Auto Hammer

Diameter: 155/205 mm

REF. NO.: 17-1780GHE

Date: Apr/05/2017

ENCL NO.: 7
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	SOIL PROFILE		5	SAMPL	ES			DYNA RESIS	MIC CONE	E PEN LOT	ETRAT	TION			ΝΑΤΙ				L	REMA	PKS
(m)		⊢				TER		2	0 40	- 60	) 8	0 10	00	PLASTI LIMIT	C MOIS	TURE	LIQUID	Ľ.	lT W	ANI	D
(III) ELEV		LO.			SΣε	o WA	z	SHEA	AR STRE	ENGT	ΓH (kF	Pa)	1	W <sub>P</sub>	\	N	WL	KET F (KPa	AL UN N/m <sup>3</sup> )		SIZE
DEPTH	DESCRIPTION	ATA	BER		BLO 0.3	DITIO	ATI /			ED	+	FIÉLD V	ANE vity	\\/\A			г (%)	POC DO	ATUR (k	(%)	)
136.7		STR/	NUM	ΤΥΡΕ	z	GRO CON	ELEV		JICK TRIA 0 40	AXIAL 60	) ×	LAB VA 0 10	ANE DO	1	0 2	20 3	30		z	GR SA	SI CL
- 0.0	TOPSOIL: (530 mm)	<u>x1 1/</u>	-				Concr	tete													0. 02
126 1		4	1	SS	4	<b>Z</b>   Z		Ē								0					
136.6	REWORKED SAND AND SILT:	İX	<u> </u>				136														
- 0.7	trace to some clay, trace organics, /	. <b>0</b>	5	<u> </u>	14			-													
	loose		Ľ	- 33	14			-							ĺ						
E	<b>SANDY SILT TILL:</b> trace clay, trace gravel, pockets of sand, layers of	• <b>0</b>   .				<u>*</u>	Ŵ. L.	135.4 ı	n												
	silty sand, containing cobbles and		3	ss	44	¥	May 09 W. L.	9, 201 135.0 i	n T						0						
2	wet, compact to very dense	0	Ŀ				Apr 28	, 2017 L													
		.						F													
E			4	SS	68			-							>						
			<u> </u>				134														
-	arev	•   •						-													
	grey	·. •	5	SS	45	l·目·		Ē						0							
-		0	⊢			ŀ₿	133	-													
4			1																		
-			1			:目:		-													
			1				-Sand	Ę													
E	containing shale fragments		6	66	45	1:目:		n F						0				-			
5			Ľ	00										Ű							
-								-													
-131.1			1				121	-													
- J.U	trace clay, layers of silty sand,		i				. 131	-													
-	grey, moist to wet, very dense		⊢		91/		24	_													
130.1			7	SS	280		Natura	al Pacl	c l					0							
6.5	END OF BOREHOLE				<u> </u>																
	1) Water encountered at a depth of																				
	1.5 m below ground surface (mBGS) during drilling.																				
	2) 51 mm dia. Monitoring Well was																				
	completion of drilling.																				
	Water Level Reading																				
	Date W.L. Depth (mBGS) April 28, 2017 1,62																				
	May 9, 2017 1.31																				
			1																		



D

#### LOG OF BOREHOLE BH7

PROJECT: Geotechnical Investigation for Proposed Residential Development

CLIENT: JFC Developments Ltd.

PROJECT LOCATION: Parts of Lots 3 and 4, Concession 5, Pickering, Ontario DATUM: Geodetic

SAMPLES

BH LOCATION: See Borehole Location Plan

SOIL PROFILE

#### DRILLING DATA

Method: Continuous Flight Auger- Auto Hammer

Diameter: 155/205 mm Date: Apr/13/2017

DYNAMIC CONE PENETRATION RESISTANCE PLOT

REF. NO.: 17-1780GHE

ENCL NO.: 8

	SOIL PROFILE		S	SAMPL	.ES	~		RESIS	TANCE	PLOT	$\geq$					JRAL			5	REMARKS	
(m)		F				Ë.		2	20 4	0 6	0 E	30 10	00	LIMIT	CON	TURE TENT	LIMIT	eN.	× ⊢⊼	AND	
		PLO			Sε		Ž	SHE		RENG	TH (kl	Pa)		W <sub>P</sub>	V	N	WL	KET F (kPa	AL U	GRAIN SIZE	
EPTH	DESCRIPTION	4 TA	BER .		0.3	N E	W. L. <sup>7</sup>	136.8 2017	m <sub>CONF</sub>	INED	+	FIÉLD V/ & Sensiti	ANE vity					POCI (Cu	JUR X	(%)	1
		TRA	ШЙ	ΥPΕ	5	ONE	лрі 20 Щ	, <u>2</u> 0 [7		RIAXIAL	×	LAB VA	NE	WA			(%)	_	₹		
136.1	<b>TORCOLL</b> (220 mm)	0 UL	z	-	5		ш	- 4	20 2	0 0			0	· ·	0 2	0 3				GR SA SI C	L
139:9				~~~	2		-Concr	ete –													
0.2	trace organics, trace rootlets, brown.	$\otimes$	1	33	2			-						0							
	moist, very loose	$\boxtimes$	}—					F													
		$\mathbb{K}$																			
135.1	SILTY FINE SAND: trace organics	<u>K</u>	2	SS	3		135	-							0						
1.1	trace rootlets. brown. moist to wet.	臣臣					100	-													
	very loose to dense	田田						Ę.													
			3	SS	14			F								0					
		日日						E													
			1				134														
								-													
133 4		밑ট	4	SS	40			-							Ċ	Þ					
2.7	FINE SAND AND SILT: trace clay,		1					-													
	grey, wet to saturated, very dense		i				100	-													
			5	SS	52		155								o						
			.					-													
			]					-													
132.1								-													
4.0	SILTY FINE SAND: trace clay,						132														
	grey, wet to saturated, dense	招告	1																		
		hhi						-													
		티뷰	6	SS	46			-							0						
							101	-													
		말날					131														
130.6								-													
5.6	FINE SAND AND SILT: trace clay,							-													
	clavers of sitty fine sand, seams of clavers sitt, grey, wet, very dense							-													
			<u> </u>				130														
			7	SS	55			-							0						
								-													
								-													
129.0			1				120	-													
7.1	SILTY FINE SAND: trace clay,	旧다					129														
	grey, wet, very dense	11h						-													
		臣臣	. 8	SS	50 /			-							0						
		hhi			100			-													
		l i f					128														
		臣臣	ł					t i													
127.5			1					F													
0.0	to some clay, grey, wet, compact							E													
							127	-													
				~~~	10		121	-													
			9	33	12			-							0						
								E													
								E													
							126														
								È .													
			L					E													
			10	SS	28			E								0					
			Ľ				125			L											
							.20	ţ.													
124.5								E													
11.7		1/9/	1					Ł													
		N.Y	1	1				ŀ	1	1		1		I							

Continued Next Page GROUNDWATER ELEVATIONS

<u>GRAPH</u> <u>NOTES</u> + <sup>3</sup>,  $\times$  <sup>3</sup>: Numbers refer to Sensitivity O <sup>8=3%</sup> Strain at Failure



PROJECT: Geotechnical Investigation for Proposed Residential Development

CLIENT: JFC Developments Ltd.

PROJECT LOCATION: Parts of Lots 3 and 4, Concession 5, Pickering, Ontario DATUM: Geodetic

SAMPLES

BH LOCATION: See Borehole Location Plan

SOIL PROFILE

#### DRILLING DATA

Method: Continuous Flight Auger- Auto Hammer

Diameter: 155/205 mm Date: Apr/13/2017

DYNAMIC CONE PENETRATION RESISTANCE PLOT

REF. NO .: 17-1780GHE ENCL NO.: 8

LIQUID

PLASTIC NATURAL MOISTURE LIMIT CONTENT GROUND WATER CONDITIONS POCKET PEN. (Cu) (kPa) AND LIMIT 40 60 100 20 80 IN (m) STRATA PLOT SHEAR STRENGTH (kPa) GRAIN SIZE BLOWS 0.3 m Wp w WL NATURAL U ELEVATION ELEV DEPTH DISTRIBUTION -0 -1 DESCRIPTION NUMBER + FIELD VANE & Sensitivity × LAB VANE O UNCONFINED (%) WATER CONTENT (%) TYPE QUICK TRIAXIAL ż 40 60 80 100 10 20 30 20 GR SA SI CL SILTY CLAY TILL: trace to some 19. 124 sand, trace gravel, grey, moist to wet, very stiff(Continued) 11 SS 20 0 122.9 123 13.2 SANDY SILT TILL: trace clay, trace gravel, containing cobbles and boulders, grey, moist to wet, very dense 122.3 12 SS 50 / Bentonite -cobbles and boulders <u>14</u> 13.9 80 SAND AND SILT TILL: some clay, 122 \mm/ trace to some gravel, zones of silty sand, containing cobbles and boulders, grey, wet, dense to very dense -- auger grinding 121 SS 13 50 0 120 ---cobbles and boulders 50/ 14 SS 100 119 mm 118.4 CLAYEY SILT TILL: some sand to 17.8 sandy, trace gravel, grey, moist, 118 hard 100 / 15 SS ¢ 250 mm 117 SS 78 16 116 115.3 <sub>21</sub> 20.8 SANDY SILT TILL: trace to some clay, trace gravel, grey, moist to wet, 115 very dense 17 SS 71 114 18 SS 61 113

Continued Next Page GROUNDWATER ELEVATIONS Measurement  $\stackrel{1st}{\checkmark} \stackrel{2nd}{\blacktriangledown} \stackrel{3rd}{\blacktriangledown} \stackrel{4th}{\blacktriangledown}$ 

to Sensitivity

O <sup>8=3%</sup> Strain at Failure

REMARKS



PROJECT: Geotechnical Investigation for Proposed Residential Development

CLIENT: JFC Developments Ltd.

PROJECT LOCATION: Parts of Lots 3 and 4, Concession 5, Pickering, Ontario DATUM: Geodetic

BH LOCATION: See Borehole Location Plan

DRILLING DATA

Method: Continuous Flight Auger- Auto Hammer

Diameter: 155/205 mm Date: Apr/13/2017 REF. NO.: 17-1780GHE ENCL NO.: 8

DYNAMIC CONE PENETRATION RESISTANCE PLOT SOIL PROFILE SAMPLES PLASTIC NATURAL MOISTURE LIMIT CONTENT REMARKS GROUND WATER CONDITIONS LIQUID POCKET PEN. (Cu) (kPa) AND LIMIT 40 60 80 100 NATURAL UNIT 20 (m) STRATA PLOT GRAIN SIZE WL BLOWS 0.3 m Wp w SHEAR STRENGTH (kPa) O UNCONFINED + FIELD VANE QUICK TRIAXIAL × LAB VANE ELEVATION ELEV DEPTH -0 DISTRIBUTION -1 DESCRIPTION NUMBER (%) WATER CONTENT (%) TYPE ż 40 60 80 100 10 20 30 20 GR SA SI CL SANDY SILT TILL: trace to some .6 112 clay, trace gravel, grey, moist to wet, very dense(Continued) 19 SS 66 0 111 20 SS 58 110 109 SS 53 21 108 107.8 PROBABLE WEATHERED 28.4 Sand SHALE: grey, moist Screen 22 SS 50/ 107 100 mm 106.6 END OF BOREHOLE 29.6 Notes: 1) Water encountered at a depth of 1.5 m below ground surface (mBGS) during drilling. 2) 51 mm dia. Monitoring Well was installed in borehole upon completion of drilling. Water Level Reading Date W.L. Depth (mBGS) April 28, 2017 -0.65 May 9, 2017 -0.63



PRO	JECT: Supplementray Geotechnical In	vestig	ation	for I	Prop	osed Residenti	ial D	evel	lopm	ent						DRI	LLI	NG D	ATA					
CLIE	NT: 869547 Ontario Inc.		M	ΞTΗ	OD:	Con	ntinu	ous	Flig	ght /	Aug	er	Auto	Ham	mer	I	DIAM	ETER	: 155	mm				
PRO	JECT LOCATION: Parts of Lots 3 and	ckering, ON	FII	ELD	ENG	GINE	EER	: JF								I	DATE	: 202	1-08	-27				
DAT	JM: N/A		SA	MP	LE R	EVI	EW:	: CL								I	REF.	NO.: 1	17-17	80GHE3				
BHL	OCATION: See Borehole Plan Locatio		Cł	IEC	KED	: DX	(										ENCL	NO.:	: 2					
	SOIL PROFILE		SA	MPL	ES	с			)YNA	AMIC		INE	TRA	ATIC	ON T	TES	T	Plac	tic M	Natura	al	Liquid	3)	REMARKS
		DT			0.3m	ATEI			20	)	40	)	6	0	9010 3	is/0.3	111	Limi	t	Conter	nt	Limit	M/m	AND GRAIN SIZ
ELEV	DESCRIPTION	PLO	~		WS/(	) Š	NOI		SF	IEA	RS	TRE	ENG	σн	(kP	a)		Wp		W		WL	⊢≚	DISTRIBUTI
DEPTH	DESCRIPTION	ATA	1BEF	ш	3LO'		VAT	• L	Inconf	fined	X	Field	d Var	ne &	Sens	itivity		w	ATER	CON	TENT	(%)	∣≯	(%)
(11)		STR	NN	TYP	z.	GRO	Е	<b>•</b> •	2010k	) )	a d 4(	) )	6 6	0	8	uan v	ane	1	0 2	20 3	30 ·	40	N N	GR SA SI
0.0	TOPSOIL: (120 mm)	<u>× 1/2</u>																						
L 0.1	FILL: silty fine sand, organic	$\mathbb{X}$	1	60	11																			
-	brown, moist, compact		1	00	' '				ΓΙ															
-		$\otimes$																						
0.7	<b>PROBABLE FILL:</b> silty fine sand,	$\mathbb{K}$																						
-	brown, moist, loose	$\otimes$																						
1		$\otimes$	2	SS	6			0																
-			<u> </u>			4																		
ţ.			]																					
F		$\otimes$	}—			{																		
F		$\otimes$	2	22	6																			
È.								ľ																
2		$\mathbb{X}$	}			1																		
- 2.1	FINE SANDY SILT: trace clay,																							
-	containing cobbles and boulders,																							
-	blown, moist to wet, very dense		4	SS	65									0										
-																								
-						1																		
3	auger gripding																							
-			·																					
-			5	SS	70									(	Þ									
-																								
-																								
-																								
4			·																					
- 4.0	SILTY FINE SAND: grey, wet,		-																					
F																								
7-																								
- 10:0																								
÷			6	SS	43							0												
5022-		분분	1																					
5.0	END OF BOREHOLE																						1	
DX.G	Notes:																							
- 9	1) Motor oncountered at a local of																							
	3.0 m below ground surface																							
18-1	(mBGS) during drilling.																							
2111	2) vvater was at a depth of 3.2 mBGS upon completion of drilling.																							
6.20	3) Borehole caved at a depth of 4.2																							
Н	mBGS upon completion of drilling.																							
HE3 E																								
80Gt																								
1/-1/																								
2 Y																								
CE CE																								
2																								
NHO NHO																								
G																								
5	1	1			1															1	1		1	1

▲ <sup>8=3%</sup> Strain at Failure



	PRO	IECT: Supplementray Geotechnical Inv	vestig	ation	for F	Propo	osed Resi	idential D	eve	lopn	nent	t				I	DRI	LLI	NG D	ATA							
	CLIEN	NT: 869547 Ontario Inc.						Μ	ETH	IOD	: Co	ntinu	lous	s Flig	ght /	Aug	er	Auto	Ham	mer	[	DIAM	ETER	: 155	mm		
	PRO	IECT LOCATION: Parts of Lots 3 and	4, Coi	nces	sion	5, Pi	ckering, C	ON FI	ELD	) EN	GIN	EER	t: JF								[	DATE	: 202	1-08-	-29		
	DATU	JM: N/A						SA	۹MF	PLEF	REV	'IEW	: CL	-							I	REF.	NO.: 1	17-17	'80GHI	Ξ3	
Ļ	BH LO	OCATION: See Borehole Plan Location	n					CI	HEC	CKED	): D	X									[	ENCL	NO.:	: 3			
╞		SOIL PROFILE	⊢	SA	MPL	ES ES	TER			DYN os 2	AMI SPT 20	C PE	ENE ≥ C 0	TR/ one 6	АТІС 0	- NC wold 8	ΓES /s/0.3 0	T Im	Plas Limi	tic I	Natura Moistu Conter	al re nt	Liquid Limit	V/m <sup>3</sup> )	REN A	MARKS	;
Ē	ELEV EPTH	DESCRIPTION	TA PLO	ER		0/S/NO	4W UNI	ATION		S	HEA	AR S		ENG Id Vai	GTH	(kP Sens	a) itivitv	,			W 		WL (9/)	WT (kh	DISTR	IN SIZI (IBUTI( (%)	= DN
	(m)		STRA	NUME	ТҮРЕ	"N" BL	GROL	ELEV,	<b>A</b> (	Quick	Tria: 20	xial 🛛 4	1 Per 0	netror 6	netei 0	r + l 8	.ab v 0	'ane	1	0 2	20 3	30 ·	40	UNIT	GR SA	A SI	CL
E	0.0	<b>TOPSOIL:</b> (300 mm)	<u></u>	1																							
-	0.3	<b>REWORKED SILTY FINE SAND:</b> rootlet inclusions, brown, moist, very loose to loose		1	SS	4			0																		
F			$\bigotimes$	<u> </u>																							
ļ				2A	SS	4			0																		
-	1.1	SILTY FINE SAND: pockets of sandy silt, brown, moist, very loose to dense		· 2B	SS																						
-				. 3	ss	21					0																
-				. 4	ss	45							0														
-	<u>.</u>																										
-		layers of fine sandy silt		5	SS	46							0														
-																											
-	4.0	SILTY SAND: brown, wet, compact																									
-11-18 10:34				6	SS	28					c	>															
2022	E O			<u> </u>																	<u> </u>						_
GPJ	5.0								1																		
XO - S		Notes:							1																		
17-1780GHE3 BH LOG 20211118 - NT - NG		<ol> <li>Water encountered at a depth of 4.6 m below ground surface (mBGS) during drilling.</li> <li>Water was at a depth of 4.4 mBGS upon completion of drilling.</li> <li>Borehole caved at a depth of 4.6 mBGS upon completion of drilling.</li> </ol>																									
01 - GEOPRO SOIL LOG GEOPRC																											



	PRO	IECT: Supplementray Geotechnical Inv	vestiga	ation	for F	Propo	osed Resi	dential D	)eve	lopn	nent	t					DRIL	LIN	NG D	ATA						
	CLIEN	NT: 869547 Ontario Inc.						М	ET⊦	IOD	: Co	ntin	uous	s Fli	ght /	Aug	er - A	Auto	Ham	mer	[	DIAM	ETER	: 155	mm	
	PRO	IECT LOCATION: Parts of Lots 3 and	4, Cor	nces	sion	5, Pi	ckering, C	DN FI	ELC	) EN	GIN	EEF	R: JF	-							[	DATE	: 202	1-08-	27	
	DATU	JM: N/A						S	۹MF	PLE	REV	'IEW	/: Cl	L							F	REF.	NO.: 1	17-17	80GHE	3
╞	BH LO	DCATION: See Borehole Plan Location	n					С	HEC		D: D	X									E	ENCL	NO.:	: 4		
		SOIL PROFILE		SA	MPL	ES	с.		'	DYN OS	iami Spt	СР	ENE Z C	:IR/ Cone	AII	NC blov	IESI vs/0.3r	n	Plas	tic M	Natura /loistu	l e l	Liquid	n <sup>3</sup> )	REM	ARKS
			01			i/0.3r	VATE	7		2	20	4	10	6	50 	8	30		Limi	t	Conter	nt	Limit w.	KN/n	GRAI	ND N SIZE
		DESCRIPTION	A PL	н Ш		SWC	> QN	OF		S	HE/	AR S	STR	ENG	GTH	(kP	a)		₩P 		_~~			۲ ۲	DISTRI	
ľ	(m)		RAT	IMBI	Щ	"BLC	NOS	EVA		Quick	Tria	xial 🛛	Pie Pe	netro	mete	r +	Lab Va	ane	WA	ATER	CONT	ENT	(%)	Ξ,	(	70)
╞	0.0	<b>TOPSOIL</b> : (300 mm)	5	ž	1 È	Ŗ	ö	Ш	-	1	20	4	10	6	50 	3	30 	_	1	0 2	0 3	0 4	40	5	GR SA	SI CL
ļ	0.0																									
t	0.3	REWORKED SILTY FINE SAND:	ŔŻ	1	SS	2			þ																	
┢	-	organic inclusions, rootlet	$\mathbb{X}$																							
F			$\bigotimes$				1																			
ţ			$\otimes$	24	SS																					
þ	1	CIL TV FINE CAND, containing	××		00	2			þ																	
╞	1.1	cobbles and boulders, brown,		28	SS																					
F		moist, very loose to dense																								
ţ	-																									
ŀ			出出	3	ss	11				þ																
ŀ	2																									
F	_	auger grinding																								
ţ																										
ŀ					00	22																				
ŀ				4	33	32																				
F				-																						
ļ	<u>3</u> 2.9	FINE SAND AND SILT TO FINE																								
ŀ		of silty sand, brown, moist to wet,					1																			
ŀ		compact		5	SS	25					0															
F	-																									
ţ				·																						
ŀ																										
F	4			-																						
Ē	4.0	of sandy silt, brown, wet, compact	[] 귀																							
ţ																										
34	-																									
-18																										
11-22	_			6	SS	27					0															
Ĭ	<u>°</u> 5.0	END OF BOREHOLE	11.55			-	$\vdash$		┢	-	+						$\left  \right $									
X.GP,		Notes:																								
G - D																										
ž		1) Water encountered at a depth of 3.0 m below ground surface																								
18 - N		(mBGS) during drilling.																								
2111		mBGS upon completion of drilling.																								
0G 2(		3) Borehole caved at a depth of 4.3																								
BHL		mbee upon completion of drining.																								
3HE3																										
17800									1																	
0 17-																										
OPR																										
B									1																	
-LoG																										
SOIL									1																	
DRO									1																	
- GEC									1																	
ъL						I I			1														1	1		

▲ <sup>8=3%</sup> Strain at Failure



PRO.	IECT: Supplementray Geotechnical In	vestiga	ation	for F	Propo	osed	Residential	I D	evelo	opm	nent					0	DRI	LLI	NG D	ATA	4							
CLIEN	NT: 869547 Ontario Inc.		ME	ETHC	DD:	Cor	ntinu	ious	Flig	ght A	luge	er - /	Auto	Ham	mer		DI	AME	TER:	: 155	mm							
PRO	IECT LOCATION: Parts of Lots 3 and	ckeri	ng, ON	FIE	ELD I	EN	GINE	EER	t: JF									D	ATE:	202	1-08-	27						
DATU	JM: N/A			SA	AMPL	E F	REV	IEW	: CL	•								R	EF. N	NO.: 1	7-17	80Gł	IE3					
BH LO	OCATION: See Borehole Plan Location	OCATION: See Borehole Plan Location										< <u> </u>										E١	NCL.	NO.:	5			
	SOIL PROFILE	F	SA	MPL	ES ES	TER				YN/ SSI 2	<b>АМІ(</b> РТ 0	2 PI 2 4	ENE z Ci 0	TRA one 6	ATIC D	N T blow: 8	ES s/0.3 0	T Im	Plas Lim	tic t	Natu Mois Cont	iral ture ent	L	iquid Limit	الاm <sup>3</sup> )	RE	MAF ANE	RKS
ELEV	DESCRIPTION	PLO	ſ		WS/0	D WA		NOI		SI	HEA	RS	TRE	ENG	ΤН	(kPa	a)		W <sub>P</sub>		w 0			WL	T (kh	GR DIST	ain : Ribl	SIZE JTION
DEPTH (m)	DESCRIPTION	RATA	MBEI	Щ	BLO	NNO		EVAT	● Ur	ncon uick	fined Triax	ial 🛛	K Fiel	d Var etror	ne & S neter	Sensi + L	itivity ab V	, /ane	W	ATEF	CO	NTE	ENT (	%)	Τ		(%)	
		ST	Ŋ	Ě	ŗ	GR В		Ш		2	0	4	0	6	0	8	0		1	0	20	30	4	0	Ŋ	GR S	SA S	SI CL
0.0	T <b>OPSOIL:</b> (250 mm)	<u></u>																										
- 0.3 - -	REWORKED SILTY FINE SAND: some silt, organic inclusions, rootlet inclusions, brown, moist, loose		1	SS	7				0																			
-		$\mathbb{X}$																										
- <u>1</u>			2A	SS	5				0																			
1.1	SILTY FINE SAND: brown, moist		2B	SS																								
-																												
-																												
-			3	ss	20					¢																		
2																												
- 21	FINE SANDY SILT: trace clay																											
	grey, moist to wet, dense																											
-			4	SS	31						4	С																
-		[:]].																										
3 29	SILT: trace clay some sand grey																											
- 2.0	wet, dense																											
-			5	SS	43								0															
-																												
-																												
-																												
<u>4</u> - 4.0	FINE SANDY SILT: some clay,																											
-	grey, wet, very dense																											
-																												
-		:] !				1																						
_			6	SS	58									о														
50									$\vdash$						_							_						
0.0	Notoo																											
	<ol> <li>Water encountered at a depth of</li> <li>4 m below ground surface</li> </ol>																											
	(mBGS) during drilling. 2) Water was at a depth of 2.0																											
	mBGS upon completion of drilling.																											
	mBGS upon completion of drilling.																											

▲ <sup>8=3%</sup> Strain at Failure



PRO	JECT: Supplementray Geotechnical In	vestig	atior	for F	Propo	osed Resident	tial D	eve	lopn	nent	t					DRI	LLI	NG D	ATA						
CLIE	NT: 869547 Ontario Inc.						ME	TH	IOD:	Co	ntin	uou	s Fli	ght /	Aug	er	Auto	o Harr	mer	I	DIAN	IETER	: 155	mm	
PRO	JECT LOCATION: Parts of Lots 3 and	4, Co	nces	sion	5, Pi	ckering, ON	FIE	ELD	) EN	GIN	EEF	R: JF	=							l	DATE	E: 202	1-08	27	_
DAT	UM: N/A						SA	MP	PLE F	REV	'IEV	/: C	L							I	REF.	NO.: '	17-17	80GHE	3
BHL	OCATION: See Borehole Plan Locatio	n				1	CH	IEC	KED	D: D	X			A T 1/	211		<del></del>				ENCI	NO.	:6		
	SOIL PROFILE	0T	SA		ES <sup>m</sup> ES	ATER			0 S 2 2	AMI SPT 20	СР 2	ENE Z ( 10	= I R. Cone 6	AT 10	DN blov 8	TES vs/0.3 30	l Bm	Plas Lim	tic I	Natura Moistu Conter	al re nt	Liquid Limit	¢N/m³)	REM/ AN GRAIN	ARKS ID I SIZE
ELEV DEPTH (m)		RATA PL	MBER	H	BLOWS	M GNNO	EVATION	● l	S Jncor Quick	HE/ fine	AR S d X xial [	STR K Fie Pe	ENC eld Va netro	GTH ine & mete	(kF Sens r +	<b>'a)</b> sitivity Lab V	/ /ane	w <sub>P</sub> ⊢ ₩	ATER		TENT	w∟ (%)	IIT WT (I	DISTRIE (%	BUTIOI 6)
0.0		ST ST	<u></u>	∠	ŗ	в 10 10	Ш		2	20	4	10	6	50 	8	30	-	1	0 2	20 3	30	40	5	GR SA	SI C
- 0.0		· <u>·</u> ···	,																						
- 0.3	FILL: silty fine sand, trace gravel, organic inclusions, rootlet inclusions, containing rock fragments, brown, moist, loose to	$\bigotimes$	1	SS	13				0																
Ę	compact																								
-				55	6																				
-																									
-			3A	SS	5			0																	
- 1.8 _2 _	B SILTY FINE SAND: layers of silt, containing cobbles and boulders, brown, wet, loose to compact		· 3B	SS																					
-	auger grinding																								
-				SS	26					0															
<u> </u>	FINE SAND AND SILT TO SILTY																								
-	dense		5	SS	43							0													
-																									
- 4																									
- 4.0 -	SILT: trace to some clay, trace sand, interlayers of clayey silt, grey, moist to wet, dense																								
			6	ss	33						0														
, 5.0	END OF BOREHOLE		$\vdash$										1												
	Notes:																								
	<ol> <li>Water encountered at a depth of 1.8 m below ground surface (mBGS) during drilling.</li> <li>Water was at a depth of 2.2 mBGS upon completion of drilling.</li> <li>Borehole caved at a depth of 3.4 mBGS upon completion of drilling.</li> </ol>																								

▲ <sup>8=3%</sup> Strain at Failure



	PRO	IECT: Supplementray Geotechnical Inv	/estig	ation	for F	Propo	osed Resider	ntial D	eve	lopn	nent						DRI	LLI	NG D	ATA						
	CLIE	NT: 869547 Ontario Inc.						ME	ΞTΗ	OD	Co	ntinu	lous	s Fli	ght	Aug	er -	Auto	Ham	mer	[	DIAM	ETER	: 155	mm	
	PRO	IECT LOCATION: Parts of Lots 3 and	4, Cor	nces	sion	5, Pi	ckering, ON	FI	ELD	EN	GIN	EEF	R: JF	=							[	DATE	: 202	1-08-	27	
	DATU	JM: N/A						SA	MP	LE F	REV	ΊEW	/: Cl	L							F	REF.	NO.: 1	17-17	80GHE	3
	BH LO	DCATION: See Borehole Plan Location	٦					CH	IEC	KED	): D	х									I	ENCL	NO.:	: 7		
F		SOIL PROFILE		SA	MPL	ES				DYN	AMI	СP	ENE	TR	ATI	ON	TES	т			Natura	ıl		_	REM	ARKS
┢			F			3m 3m	TER			o s	SPT	1	z C	one ¢	30	blov	vs/0.3	3m	Plas Limi	tic M t	Moistu Conter	re L nt	Liquid Limit	/m <sup>3</sup>	A	ND
			-O1			/S/0.	WA	N	-			- 			<u>~</u> тц				Wp		w		WL	X¥.	GRAI	
Ē	ELEV EPTH	DESCRIPTION	TAF	BER		ŏ	DNC NC	ATIC	• ı	Jncor	nfine	d S	K Fie	eld Va	ane &	Sen	sitivity	<i>,</i>				FNT	(%)	۲V	0131 Ki	50 HON %)
	(m)		TRA	ШШ	ΥPΕ	- -	ROI	LEV	<b>A</b> (	Quick	Tria	kial 🛛	Pe	netro	mete	r +	Lab \	/ane		0 3		10	10	l		, 81 (1
⊢	0.0	<b>TOPSOIL:</b> (350 mm)	N 1.		-	-	0	ш		2		4			1		1		' '	0 2		-	+0		GR SA	31 UL
Ē			· //																							
F	0.4	FILL: silty fine sand organic		1	SS	3			0																	
⊢	0.4	matters, rootlet inclusions, dark	$\bigotimes$																							
Ē	0.7	brown, moist, very loose	XX																							
E	0.7	gravel, interlayers of silt, layers of																								
- [-1		fine sand and silt, seams of sand,		2	SS	22					þ															
Ē		brown, moist, very stin																								
F																										
-	1.4	sandy silt: some clay, trace gravel, lavers of clavey silt, brown.																								
ţ		moist, compact				00																				
ŀ				3	SS	22					ρ															
2	2			-																						
Ē																										
ŀ																										
F				4	ss	20					6															
t																										
ŀ							1																			
3	2.9	SANDY SILT TILL: some clay,	[																							
E		containing cobbles and boulders.																								
F		grey, moist, dense	.	5	SS	33						0														
Ē			[]]];																							
ŀ																										
F																										
4	<u>l</u>																									
ŀ		auger grinding																								
Ē																										
4			<b>†</b>																							
3 10:3																										
11-18			<b> </b>	6	ss	50								6												
2022																										
	5.0	END OF BOREHOLE																								
DX.G		Note:																								
- bN		1) Borehole caved at a depth of 4.5																								
- F		m below ground surface (mBGS)																								
18-1		upon completion of drilling.																								
02111																										
<u> 2</u> 6 2(																										
BHL																										
HE31																										
780G																										
17-1																										
PRO																										
GEO																										
g																										
OILL																										
SO S(																										
EOPF																										
11 - G																										



### LIMITATIONS TO THE REPORT

This report is intended solely for the Client named. The report is prepared based on the work has been undertaken in accordance with normally accepted geotechnical engineering practices in Ontario.

The comments and recommendations given in this report are based on information determined at the limited number of the test hole and test pit locations. The boundaries between the various strata as shown on the borehole logs are based on non-continuous sampling and represent an inferred transition between the various strata and their lateral continuation rather than a precise plane of geological change. Subsurface and groundwater conditions between and beyond the test holes and test pits may differ significantly from those encountered at the test hole and test pit locations. The benchmark and elevations used in this report are primarily to establish relative elevation differences between the test hole and test pit locations and should not be used for other purposes, such as grading, excavating, planning, development, etc.

It should be noted that the results of the designated substance and chemical analysis refer only to the sample analyzed which was obtained from specific sampling location and sampling depth, and the presence of designated substance and soil chemistry may vary between and beyond the location and depth of the sample taken. Please note that the level of chemical testing outlined herein is meant to provide a broad indication of soil quality based on the limited soil samples tested. The analytical results contained in this report should not be considered a warranty with respect to the soil quality or the use of the soil for any specific purpose or the acceptability of the soils for any excess soil receiving sites.

The report reflects our best judgment based on the information available to GeoPro Consulting Limited at the time of preparation. Unless otherwise agreed in writing by GeoPro Consulting Limited, it shall not be used to express or imply warranty as to any other purposes. No portion of this report shall be used as a separate entity, it is written to be read in its entirety. The information contained herein in no way reflects on the environment aspects of the project, unless otherwise stated.

The design recommendations given in this report are applicable only to the project designed and constructed completely in accordance with the details stated in this report. Otherwise, our responsibility is limited to interpreting the subsurface information at the borehole or test pit locations.

Should any comments and recommendations provided in this report be made on any construction related issues, they are intended only for the guidance of the designers. The number of test holes and test pits may not be sufficient to determine all the factors that may affect construction activities, methods and costs. Such as, the thickness of surficial topsoil or fill layers may vary significantly and unpredictably; the amount of the cobbles and boulders may vary significantly than what described in the report; unexpected water bearing zones/layers with various thickness and extent may be encountered in the fill and native soils. The contractors bidding on this project or undertaking the construction should, therefore, make their own interpretation of the factual information presented and make their own conclusions as to how the subsurface conditions may affect their work and determine the proper construction methods.

Any use which a third party makes of this report, or any reliance on or decisions to be made based on it, are the responsibility of such third parties. GeoPro Consulting Limited accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions based on this report.

We accept no responsibility for any decisions made or actions taken as a result of this report unless we are specifically advised of and participate in such action, in which case our responsibility will be as agreed to at that time.