



V. A. WOOD ASSOCIATES LIMITED

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***GEOTECHNICAL INVESTIGATION
PROPOSED CONDOMINIUM
79 COLLIER STREET
BARRIE, ONTARIO***

Ref. No. 6862-16-02

Revised January 2021

Prepared for:

*Vitmont Holdings (Barrie) Inc.
100 Caster Avenue
Woodbridge, ON
L4L 5Y9*

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1.0 **INTRODUCTION**

V.A. Wood Associates Limited was retained by Edgecon Inc. to carry out a preliminary geotechnical investigation for the proposed condominium at No. 36 Mulcaster Street in Barrie, Ontario. The site was subsequently sold and this report is for the new proposal by Vitmont Holdings (Barrie) Inc. For this new proposal Vitmont Holdings uses the street address of 79 Collier Street for this site.

The L-shaped $1,700\pm m^2$ property is presently a paved parking area and a sodded lot (north side). There is a concrete retaining wall on the south side and part of the west side. The development will include an 18 storey condominium with one level of underground parking and three levels of above grade parking.

The purpose of the investigation was to reveal the subsurface conditions and to determine the relevant soil properties for the design and construction of the foundation of the building, the underground parking and the associated site services.

2.0 **FIELD WORK**

The field work was carried out on March 28 to 30, 2016 and consisted of six boreholes at the locations shown on Enclosure 1. The boreholes were advanced to the sampling depths by means of a power-auger machine equipped for soil sampling. Standard Penetration tests were carried out at frequent intervals of depth and the results are shown on the Borehole Logs as N-values.

The field work was supervised by a soils technician and the soil samples were transported to our soils laboratory for further examination, classification and testing. The ground surface at each borehole location was referred to the finished floor of the adjacent building (museum) which has a geodetic elevation of 230.86 m.

3.0 SUBSURFACE CONDITIONS

Full details of the soils encountered in each borehole are given on the Borehole Logs, Enclosures 2 to 7 inclusive, and the following notes are intended to summarize this data.

All of the boreholes encountered a pavement comprised of $75 \pm$ mm thick asphalt on a 225 to $325 \pm$ mm thick granular base.

The pavement was underlain by fill which extended to a depth of between 1.4 and $4 \pm$ m below grade. This fill is comprised generally of well graded gravelly sand with organics, cinders and brick fragments in places. Standard Penetration tests in the fill gave N-values between 3 and 43 blows/300mm, and its moisture content varied between 5 and 17%.

Based on the test results, the fill is considered to be in a generally very loose to compact condition.

The fill in Boreholes 3, 4, 5 and 6 was underlain by a native deposit of sand which extended to a depth of between 2.1 and $4 \pm$ m below grade. This deposit is comprised of fine to medium sand with some fine gravel. Standard Penetration tests in this deposit gave N-values between 7 and 60 blows/300mm, and its moisture content varied between 4 and 9%.

Based on the test results, the sand is considered to have a loose to very dense relative density.

*The fill in Boreholes 1 and 2, and the sand in Boreholes 3, 4, 5 and 6 were underlain by a native deposit of **fine sand** which extended to a depth of between 3.5 and 7±m below grade. This deposit contained traces of silt. Standard Penetration tests in this deposit gave N-values between 4 and 38 blows/300mm (78 blows/300mm at the bottom of Borehole 5), and its moisture content varied between 4 and 18%.*

Based on the test results, the fine sand is considered to have a generally loose to dense relative density.

*The fine sand in Borehole 6 was underlain by a deposit of **silty sand till** which extended to a depth of 7±m below grade. This glacial deposit is comprised of a silty sand matrix, which contained traces of fine gravel and seams of sand. A Standard Penetration test in this deposit gave an N-value of 56 blows/300mm.*

Based on the test results, the silty sand till is considered to have a very dense relative density.

*The fine sand in Borehole 1 and the silty sand till in Borehole 6 were underlain by a deposit of **gravelly sand** which extended to a depth of 8.5±m below grade. This deposit is comprised of well graded sand with fine to medium gravel. Standard Penetration tests in this deposit gave N-values between 95 and more than 100 blows/300mm, and its moisture content was of the order of 4%.*

Based on the test results, the gravelly sand is considered to have a very dense relative density.

The gravelly sand in Borehole 1 was underlain by a deposit of sandy silt till which extended to a depth of $10 \pm m$ below grade. This deposit is comprised of a sandy silt matrix which contained traces of gravel and seams of sand. A Standard Penetration test in this deposit gave an N-value of 38 blows/300mm, and its moisture content was of the order of 13%.

Based on the test results, the sandy silt till is considered to have a dense relative density.

The gravelly sand in Borehole 6 and the sandy silt till in Borehole 1 were underlain by a deposit of fine sand which extended to a depth of between 12.6 and 13 m below grade. Standard Penetration tests in this deposit gave N-values between 64 and more than 100 blows/300mm, and its moisture content was of the order of 16%.

Based on the test results, the fine sand is considered to have a very dense relative density.

The fine sand in Borehole 6 was underlain by a deposit of silt till which extended to a depth of more than 15.7 m (maximum depth investigated). This deposit is comprised of a silt matrix which contained fine gravel. Standard Penetration tests in this deposit gave N-values between 23 and 28 blows/300mm, and its moisture content was of the order of 18%.

Based on the test results, the silt till is considered to have a compact relative density.

4.0 **GROUNDWATER CONDITIONS**

No free water was encountered in any of the boreholes, as the shallower boreholes were dry and open to the full depth, and the deep boreholes (Boreholes 1 and 6) cave in at a depth of between 9 and 10.4 m. It is noted that the water level measurement was carried out immediately after completion of drilling, and it is likely that the ground water had not yet stabilized in the boreholes.

An examination of the soil samples revealed that they were generally damp to moist at the top and started to become with wet at a depth of between 5.5 and 6 m below grade. A change in the colour of the native subsoils from brown to grey was observed at a depth of between 5.5 and 8.5 m.

Based on the findings, the groundwater table is considered to be located at least 5.5 m below grade. However, perched water conditions may occur on top of possible silt seams within the sand deposits.

5.0 **DISCUSSION AND RECOMMENDATIONS**

5.1 **General**

The boreholes encountered a pavement 300 to 400 mm thick, followed by 1 to 3.7 m of loose to compact gravelly sand fill, then generally competent native deposits of sand, gravelly sand glacial till. The groundwater table is considered to be located at least 5.5 m below grade, although perched water conditions may occur on top of possible silt seams within the sand deposits.

The proposed structure will have 18 storeys and one level of underground parking. It is anticipated that the structure will have reinforced concrete shear walls and load bearing walls supported on strip and isolated footings or deep foundations.

Full details of the proposed structure were not available at the time of this report and, therefore, the following recommendations should be reviewed when these details are available.

5.2 **Foundations**

It is anticipated that the underside of the footings will be located at a depth of 0.3 to 2.5 m below existing grade for the underground parking level and at a depth of 3.5 m in the loading area. Based on the Borehole data, the foundation subgrade will likely be generally

comprised of compact to dense to very dense gravelly sand, sandy silt till, or fine sand. These strata are considered capable of supporting normal footings (not more than 2.5 m wide) designed to an SLS bearing pressure of up to 300 kPa (450 kPa ULS).

There is a problem in the loading area, however, where Borehole 1 encountered fill and loose wet sand to a depth of 7 metres (3m below the loading area floor). These conditions are not suitable supporting normal spread foundations and deep foundations will probably be required. Consideration should be given to the use of steel tube piles driven to 'refusal' in the very dense sand and gravel. The piles can be designed based on an allowable stress of 70MPa over the net steel cross-sectional area.

It is noted that, due to the preponderance of wet sands, the use of caissons is not recommended.

It is estimated that the total and differential settlements of footings or driven piles designed to the above bearing pressures will be less than 25 and 20 mm respectively. These are normally considered to be acceptable for the proposed structure.

All exterior footings or footings in unheated areas should be located at least 1.2 m below finished grade for adequate frost protection. The minimum footing sizes should not be less than those specified in the Ontario Building Code. The slopes between footings should be inclined such that elevation differences between adjacent footings are not more than one half of the horizontal distance between them.

All foundation excavations should be inspected by geotechnical personnel from V.A. Wood Associates Limited to ensure that the founding soils are similar to those identified in the Borehole Logs and that they are capable of supporting the design loads.

Based on the Ontario Building Code of 2012, the site classification for seismic design should be based on the average soil properties of the top 30 m of the soil profile. The deep boreholes were only 12 to 13 m deep, and encountered dense to very dense sands and glacial till deposits. It is expected that the very dense deposits will extend to depth and, in this case, a Site Class 'C' classification may be used for this site.

For the design of members resisting lateral loads and for lateral load design the recommended soil parameters are as follows:

<i>Soil Parameters</i>	<i>Loose-Compact Gravelly Sand Fill and Fine Sand</i>	<i>Compact Sand and Fine Sand</i>	<i>Dense to Very Dense Till, Gravelly Sand and Fine Sand</i>
<i>Unit Weight</i>	<i>19-20 kN/m³</i>	<i>21 kN/m³</i>	<i>21.5 kN/m³</i>
<i>Friction Angle</i>	<i>28° to 30°</i>	<i>30°</i>	<i>35°</i>
<i>Cohesion</i>	<i>0</i>	<i>0</i>	<i>0</i>
<i>Coeff. of Earth Pressure At Rest</i>	<i>0.5 to 0.53</i>	<i>0.5</i>	<i>0.43</i>
<i>Coeff. of Active Earth Pressure</i>	<i>0.33 to 0.36</i>	<i>0.33</i>	<i>0.27</i>
<i>Coeff. of Passive Earth Pressure</i>	<i>2.8 to 3.0</i>	<i>3</i>	<i>3.7</i>
<i>Coefficient of Friction</i>	<i>--</i>	<i>0.4</i>	<i>0.4 to 0.45</i>

We recommend that a detailed borehole investigation be carried out for detailed design.

5.3 Basement Walls

The basement walls and other earth retaining structures should be designed to resist lateral earth pressures, the magnitude of which can be determined from:

$$p = K (\gamma d + q)$$

where	p	=	earth pressure, kN/m ²
	K	=	earth pressure coefficient, 0.5 for sand fill
	γ	=	unit weight of backfill, 20 kN/m ³ for sand
	d	=	depth below finished grade, metres
	q	=	surcharge on backfill, kN/m ²

Any surcharge loads from adjacent structures and roads should be included in the analysis.

A perimeter drainage system is recommended, which should be connected to the local storm drainage system either by gravity or by permanent sump pump(s).

5.4 Basement Slab

The subgrade of the basement slab will generally be comprised of compact to dense sand, gravelly sand or till, which are suitable subgrade materials. The floor subgrade in the loading area is likely to consist of compact fill or loose sand. In this case the subgrade should be compacted from the surface to at least 95% of the Standard Proctor maximum dry density.

A layer of well-graded free-draining granular material, at least 150 mm thick and compacted to 98% SPMDD, should be placed under the floor slab to provide a uniform bearing surface and to act as a vapour barrier.

5.5 Excavation, Shoring and Groundwater Control

The shoring may be comprised of soldier piles and timber lagging. The soldier piles will consist of steel I-beams embedded in concrete caissons. The soil parameters given on the table in page 8 may be used for preliminary design of the shoring system.

A pre-construction survey of the adjacent structures is recommended prior to any excavation.

5.6 Soil Analytical Testing

Samples of the fill were submitted to ALS Environmental for analytical testing for PAH's, Petrohydrocarbons and Metals and Inorganic parameters for disposal purposes.

The test results are given in Appendix 'B', and reference to this shows that the SAR and electrical conductivity in the samples tested exceed Table 1 site condition standards of the current guidelines of O/Reg 153/04. In addition, two of the samples tested gave high concentrations of some metals (copper, lead, zinc) and PAH's

6.0 STATEMENT OF LIMITATIONS

The Statement of Limitations presented on Appendix 'A' is an integral part of this report.

V.A. WOOD ASSOCIATES LIMITED



V. Wood, M.Eng., P.Eng.,

APPENDICES

STATEMENT OF LIMITATIONS

The conclusions and recommendations in this report are based on information determined at the borehole locations and on geological data of a general nature which may be available for the area investigated. Soil and groundwater conditions between and beyond the boreholes may differ from those encountered at the borehole locations and conditions may become apparent during construction which would not be detected or anticipated at the time of the soil investigation.

We recommend that we be retained to ensure that all necessary stripping, subgrade preparation and compaction requirements are met, and to confirm that the soil conditions do not deviate materially from those encountered in the boreholes. In cases where this recommendation is not followed, the company's responsibility is limited to interpreting accurately the information encountered at the borehole locations.

This report is applicable only to the project described in the introduction, constructed substantially in accordance with details of alignment and elevations quoted in the text.

A P P E N D I X 'B'

Analytical Test Results



V.A. WOOD ASSOCIATES LIMITED
ATTN: Vic Wood
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Unit 24
Scarborough ON M1X 1E7

Date Received: 31-MAR-16
Report Date: 07-APR-16 10:37 (MT)
Version: FINAL

Client Phone: 416-292-2868

Certificate of Analysis

Lab Work Order #: L1750651
Project P.O. #: NOT SUBMITTED
Job Reference: 6862
C of C Numbers: 14-465890
Legal Site Desc:

Emerson Perez, B.S.E
Account Manager

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ANALYTICAL REPORT

SOIL - Ontario Regulation 153/04 - April 15, 2011 Standards

			ALS ID		L1750651-1	L1750651-2	L1750651-3	L1750651-4	L1750651-5	L1750651-6
			Sampled Date		29-MAR-16	29-MAR-16	28-MAR-16	30-MAR-16	30-MAR-16	30-MAR-16
			Sampled Time		-	-	-	-	-	-
			Sample ID		6862-BH1/2+3	6862-BH1/5	6862-BH2/1	6862-BH4/1	6862-BH5/2	6862-BH6/1
			Guide Limits							
Grouping	Analyte	Unit	#1	#2						
Physical Tests	Conductivity	mS/cm	0.57	-	3.18		0.651		2.41	1.19
	% Moisture	%	-	-	16.8	10.6	7.41	11.0	6.99	6.95
	pH	pH units	-	-	8.80		8.12		8.04	7.96
Cyanides	Cyanide, Weak Acid Diss	ug/g	0.051	-	<0.050		<0.050		<0.050	<0.050
Saturated Paste Extractables	SAR	SAR	2.4	-	SAR:Q 45.7		SAR:Q 15.3		SAR:Q 55.5	SAR:Q 27.8
Metals	Calcium (Ca)	mg/L	-	-	14.6		7.6		6.0	6.7
	Magnesium (Mg)	mg/L	-	-	<1.0		<1.0		<1.0	<1.0
	Sodium (Na)	mg/L	-	-	635		153		494	260
	Antimony (Sb)	ug/g	1.3	-	1.2		<1.0		<1.0	<1.0
	Arsenic (As)	ug/g	18	-	6.5		1.6		1.1	1.2
	Barium (Ba)	ug/g	220	-	183		48.5		25.4	25.4
	Beryllium (Be)	ug/g	2.5	-	<0.50		<0.50		<0.50	<0.50
	Boron (B)	ug/g	36	-	<5.0		<5.0		<5.0	<5.0
	Boron (B), Hot Water Ext.	ug/g	36	-	0.17		0.17		0.18	0.12
	Cadmium (Cd)	ug/g	1.2	-	0.99		<0.50		<0.50	<0.50
	Chromium (Cr)	ug/g	70	-	17.3		11.3		8.6	11.0
	Cobalt (Co)	ug/g	21	-	5.6		2.5		2.4	2.9
	Copper (Cu)	ug/g	92	-	214		128		6.1	9.0
	Lead (Pb)	ug/g	120	-	136		66.9		7.5	11.0
	Mercury (Hg)	ug/g	0.27	-	0.187		0.226		0.0564	0.0576
	Molybdenum (Mo)	ug/g	2	-	1.2		<1.0		<1.0	<1.0
	Nickel (Ni)	ug/g	82	-	13.9		14.1		4.5	5.0

Guide Limit #1: T1-Soil-Res/Park/Inst/Ind/Com/Commu Property Use

- Detection Limit for result exceeds Guideline Limit. Assessment against Guideline Limit cannot be made.
- Analytical result for this parameter exceeds Guide Limits listed. See Summary of Guideline Exceedances.

* Please refer to the Reference Information section for an explanation of any qualifiers noted.



ANALYTICAL REPORT

SOIL - Ontario Regulation 153/04 - April 15, 2011 Standards

			ALS ID		L1750651-1	L1750651-2	L1750651-3	L1750651-4	L1750651-5	L1750651-6
			Sampled Date		29-MAR-16	29-MAR-16	28-MAR-16	30-MAR-16	30-MAR-16	30-MAR-16
			Sampled Time		-	-	-	-	-	-
			Sample ID		6862-BH1/2+3	6862-BH1/5	6862-BH2/1	6862-BH4/1	6862-BH5/2	6862-BH6/1
Grouping	Analyte	Unit	Guide Limits							
			#1	#2						
Metals	Selenium (Se)	ug/g	1.5	-	<1.0		<1.0		<1.0	<1.0
	Silver (Ag)	ug/g	0.5	-	<0.20		<0.20		<0.20	<0.20
	Thallium (Tl)	ug/g	1	-	<0.50		<0.50		<0.50	<0.50
	Uranium (U)	ug/g	2.5	-	<1.0		<1.0		<1.0	<1.0
	Vanadium (V)	ug/g	86	-	24.2		22.1		19.7	28.3
	Zinc (Zn)	ug/g	290	-	300		243		27.3	29.5
Speciated Metals	Chromium, Hexavalent	ug/g	0.66	-	0.35		0.55		0.42	0.47
Volatile Organic Compounds	Benzene	ug/g	0.02	-				<0.0068		
	Ethylbenzene	ug/g	0.05	-				<0.018		
	Toluene	ug/g	0.2	-				<0.080		
	o-Xylene	ug/g	-	-				<0.020		
	m+p-Xylenes	ug/g	-	-				<0.030		
	Xylenes (Total)	ug/g	0.05	-				<0.050		
	Surrogate: 4-Bromofluorobenzene	%	-	-				98.2		
	Surrogate: 1,4-Difluorobenzene	%	-	-				99.2		
Hydrocarbons	F1 (C6-C10)	ug/g	25	-				<5.0		
	F1-BTEX	ug/g	25	-				<5.0		
	F2 (C10-C16)	ug/g	10	-				<10		
	F3 (C16-C34)	ug/g	240	-				<50		
	F4 (C34-C50)	ug/g	120	-				<50		
	Total Hydrocarbons (C6-C50)	ug/g	-	-				<72		
	Chrom. to baseline at nC50		-	-				YES		

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			ALS ID		L1750651-1	L1750651-2	L1750651-3	L1750651-4	L1750651-5	L1750651-6
			Sampled Date		29-MAR-16	29-MAR-16	28-MAR-16	30-MAR-16	30-MAR-16	30-MAR-16
			Sampled Time		-	-	-	-	-	-
			Sample ID		6862-BH1/2+3	6862-BH1/5	6862-BH2/1	6862-BH4/1	6862-BH5/2	6862-BH6/1
Grouping	Analyte	Unit	Guide Limits							
			#1	#2						
Hydrocarbons	Surrogate: 2-Bromobenzotrifluoride	%	-	-				88.1		
	Surrogate: 3,4-Dichlorotoluene	%	-	-				96.7		
Polycyclic Aromatic Hydrocarbons	Acenaphthene	ug/g	0.072	-	<0.050	<0.050	<0.050		<0.050	
	Acenaphthylene	ug/g	0.093	-	0.076	<0.050	0.352		<0.050	
	Anthracene	ug/g	0.16	-	0.060	<0.050	0.222		<0.050	
	Benzo(a)anthracene	ug/g	0.36	-	0.305	<0.050	2.10		<0.050	
	Benzo(a)pyrene	ug/g	0.3	-	0.305	<0.050	2.59		<0.050	
	Benzo(b)fluoranthene	ug/g	0.47	-	0.506	<0.050	3.45		<0.050	
	Benzo(g,h,i)perylene	ug/g	0.68	-	0.221	<0.050	1.77		<0.050	
	Benzo(k)fluoranthene	ug/g	0.48	-	0.146	<0.050	1.27		<0.050	
	Chrysene	ug/g	2.8	-	0.329	<0.050	2.03		<0.050	
	Dibenzo(ah)anthracene	ug/g	0.1	-	<0.050	<0.050	0.422		<0.050	
	Fluoranthene	ug/g	0.56	-	0.639	<0.050	2.83		<0.050	
	Fluorene	ug/g	0.12	-	<0.050	<0.050	<0.050		<0.050	
	Indeno(1,2,3-cd)pyrene	ug/g	0.23	-	0.212	<0.050	2.12		<0.050	
	1+2-Methylnaphthalenes	ug/g	0.59	-	<0.042	<0.042	<0.042		<0.042	
	1-Methylnaphthalene	ug/g	0.59	-	<0.030	<0.030	<0.030		<0.030	
	2-Methylnaphthalene	ug/g	0.59	-	<0.030	<0.030	<0.030		<0.030	
	Naphthalene	ug/g	0.09	-	<0.050	<0.050	<0.050		<0.050	
	Phenanthrene	ug/g	0.69	-	0.297	<0.050	0.621		<0.050	
	Pyrene	ug/g	1	-	0.555	<0.050	2.74		<0.050	
	Surrogate: 2-Fluorobiphenyl	%	-	-	94.7	97.0	93.1		92.9	

Guide Limit #1: T1-Soil-Res/Park/Inst/Ind/Com/Commu Property Use

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SOIL - Ontario Regulation 153/04 - April 15, 2011 Standards

			ALS ID	L1750651-1	L1750651-2	L1750651-3	L1750651-4	L1750651-5	L1750651-6
			Sampled Date	29-MAR-16	29-MAR-16	28-MAR-16	30-MAR-16	30-MAR-16	30-MAR-16
			Sampled Time	-	-	-	-	-	-
			Sample ID	6862-BH1/2+3	6862-BH1/5	6862-BH2/1	6862-BH4/1	6862-BH5/2	6862-BH6/1
			Guide Limits						
Grouping	Analyte	Unit	#1	#2					
Polycyclic Aromatic Hydrocarbons	Surrogate: p-Terphenyl d14	%	-	-	91.4	94.0	93.7	90.5	

Guide Limit #1: T1-Soil-Res/Park/Inst/Ind/Com/Commu Property Use

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ANALYTICAL REPORT

Summary of Guideline Exceedances

Guideline		Grouping	Analyte	Result	Guideline Limit	Unit
ALS ID	Client ID					
Ontario Regulation 153/04 - April 15, 2011 Standards - T1-Soil-Res/Park/Inst/Ind/Com/Commu Property Use						
L1750651-1	6862-BH1/2+3	Physical Tests	Conductivity	3.18	0.57	mS/cm
		Saturated Paste Extractables	SAR	45.7	2.4	SAR
		Metals	Copper (Cu)	214	92	ug/g
			Lead (Pb)	136	120	ug/g
			Zinc (Zn)	300	290	ug/g
		Polycyclic Aromatic Hydrocarbons	Benzo(a)pyrene	0.305	0.3	ug/g
			Benzo(b)fluoranthene	0.506	0.47	ug/g
			Fluoranthene	0.639	0.56	ug/g
L1750651-3	6862-BH2/1	Physical Tests	Conductivity	0.651	0.57	mS/cm
		Saturated Paste Extractables	SAR	15.3	2.4	SAR
		Metals	Copper (Cu)	128	92	ug/g
		Polycyclic Aromatic Hydrocarbons	Acenaphthylene	0.352	0.093	ug/g
			Anthracene	0.222	0.16	ug/g
			Benzo(a)anthracene	2.10	0.36	ug/g
			Benzo(a)pyrene	2.59	0.3	ug/g
			Benzo(b)fluoranthene	3.45	0.47	ug/g
			Benzo(g,h,i)perylene	1.77	0.68	ug/g
			Benzo(k)fluoranthene	1.27	0.48	ug/g
			Dibenzo(ah)anthracene	0.422	0.1	ug/g
			Fluoranthene	2.83	0.56	ug/g
			Indeno(1,2,3-cd)pyrene	2.12	0.23	ug/g
		Pyrene	2.74	1	ug/g	
L1750651-5	6862-BH5/2	Physical Tests	Conductivity	2.41	0.57	mS/cm
		Saturated Paste Extractables	SAR	55.5	2.4	SAR
L1750651-6	6862-BH6/1	Physical Tests	Conductivity	1.19	0.57	mS/cm
		Saturated Paste Extractables	SAR	27.8	2.4	SAR

* Please refer to the Reference Information section for an explanation of any qualifiers noted.

Reference Information

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Qualifiers for Individual Parameters Listed:

Qualifier	Description
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SAR:Q Qualified SAR value: actual SAR is lower but is incalculable due to Na, Ca or Mg below detection limit.

Methods Listed (if applicable):

ALS Test Code	Matrix	Test Description	Method Reference**
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B-HWS-R511-WT Soil Boron-HWE-O.Reg 153/04 (July 2011) HW EXTR, EPA 6010B

A dried solid sample is extracted with calcium chloride, the sample undergoes a heating process. After cooling the sample is filtered and analyzed by ICP/OES.

Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011).

BTX-511-HS-WT Soil BTEX-O.Reg 153/04 (July 2011) SW846 8260

BTX is determined by extracting a soil or sediment sample as received with methanol, then analyzing by headspace-GC/MS.

Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011).

CN-WAD-R511-WT Soil Cyanide (WAD)-O.Reg 153/04 (July 2011) MOE 3015/APHA 4500CN I-WAD

The sample is extracted with a strong base for 16 hours, and then filtered. The filtrate is then distilled where the cyanide is converted to cyanogen chloride by reacting with chloramine-T, the cyanogen chloride then reacts with a combination of barbituric acid and isonicotinic acid to form a highly colored complex.

Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011).

CR-CR6-IC-WT Soil Hexavalent Chromium in Soil SW846 3060A/7199

This analysis is carried out using procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846, Method 7199, published by the United States Environmental Protection Agency (EPA). The procedure involves analysis for chromium (VI) by ion chromatography using diphenylcarbazide in a sulphuric acid solution.

Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011).

EC-R511-WT Soil Conductivity-O.Reg 153/04 (July 2011) MOEE E3138

A representative subsample is tumbled with de-ionized (DI) water. The ratio of water to soil is 2:1 v/w. After tumbling the sample is then analyzed by a conductivity meter.

Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011).

F1-F4-511-CALC-WT Soil F1-F4 Hydrocarbon Calculated Parameters CCME CWS-PHC, Pub #1310, Dec 2001-S

Analytical methods used for analysis of CCME Petroleum Hydrocarbons have been validated and comply with the Reference Method for the CWS PHC.

Hydrocarbon results are expressed on a dry weight basis.

In cases where results for both F4 and F4G are reported, the greater of the two results must be used in any application of the CWS PHC guidelines and the gravimetric heavy hydrocarbons cannot be added to the C6 to C50 hydrocarbons.

In samples where BTEX and F1 were analyzed , F1-BTEX represents a value where the sum of Benzene, Toluene, Ethylbenzene and total Xylenes has been subtracted from F1.

In samples where PAHs, F2 and F3 were analyzed, F2-Naphth represents the result where Naphthalene has been subtracted from F2. F3-PAH represents a result where the sum of Benzo(a)anthracene, Benzo(a)pyrene, Benzo(b)fluoranthene, Benzo(k)fluoranthene, Dibenzo(a,h)anthracene, Fluoranthene, Indeno(1,2,3-cd)pyrene, Phenanthrene, and Pyrene has been subtracted from F3.

Reference Information

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Methods Listed (if applicable):

ALS Test Code	Matrix	Test Description	Method Reference**
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Unless otherwise qualified, the following quality control criteria have been met for the F1 hydrocarbon range:

1. All extraction and analysis holding times were met.
2. Instrument performance showing response factors for C6 and C10 within 30% of the response factor for toluene.
3. Linearity of gasoline response within 15% throughout the calibration range.

Unless otherwise qualified, the following quality control criteria have been met for the F2-F4 hydrocarbon ranges:

1. All extraction and analysis holding times were met.
2. Instrument performance showing C10, C16 and C34 response factors within 10% of their average.
3. Instrument performance showing the C50 response factor within 30% of the average of the C10, C16 and C34 response factors.
4. Linearity of diesel or motor oil response within 15% throughout the calibration range.

F1-HS-511-WT	Soil	F1-O.Reg 153/04 (July 2011)	E3398/CCME TIER 1-HS
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Fraction F1 is determined by extracting a soil or sediment sample as received with methanol, then analyzing by headspace-GC/FID.

Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011), unless a subset of the Analytical Test Group (ATG) has been requested (the Protocol states that all analytes in an ATG must be reported).

F2-F4-511-WT	Soil	F2-F4-O.Reg 153/04 (July 2011)	MOE DECPH-E3398/CCME TIER 1
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Fractions F2, F3 and F4 are determined by extracting a soil sample with a solvent mix. The solvent recovered from the extracted soil sample is dried and treated to remove polar material. The extract is analyzed by GC/FID.

Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011), unless a subset of the Analytical Test Group (ATG) has been requested (the Protocol states that all analytes in an ATG must be reported).

HG-200.2-CVAA-WT	Soil	Mercury in Soil by CVAAS	EPA 200.2/1631E (mod)
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Soil samples are digested with nitric and hydrochloric acids, followed by analysis by CVAAS.

Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011).

MET-200.2-CCMS-WT	Soil	Metals in Soil by CRC ICPMS	EPA 200.2/6020A (mod)
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Soil samples are digested with nitric and hydrochloric acids, followed by analysis by CRC ICPMS.

Method Limitation: This method is not a total digestion technique. It is a very strong acid digestion that is intended to dissolve those metals that may be environmentally available. This method does not dissolve all silicate materials and may result in a partial extraction. depending on the sample matrix, for some metals, including, but not limited to Al, Ba, Be, Cr, Sr, Ti, Tl, and V.

Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011), unless a subset of the Analytical Test Group (ATG) has been requested (the Protocol states that all analytes in an ATG must be reported).

METHYLNAPS-CALC-WT	Soil	ABN-Calculated Parameters	SW846 8270
MOISTURE-WT	Soil	% Moisture	Gravimetric: Oven Dried
PAH-511-WT	Soil	PAH-O.Reg 153/04 (July 2011)	SW846 3510/8270

A representative sub-sample of soil is fortified with deuterium-labelled surrogates and a mechanical shaking technique is used to extract the sample with a mixture of methanol and toluene. The extracts are concentrated and analyzed by GC/MS. Depending on the analytical GC/MS column used benzo(j)fluoranthene may chromatographically co-elute with benzo(b)fluoranthene or benzo(k)fluoranthene.

Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011), unless a subset of the Analytical Test Group (ATG) has been requested (the Protocol states that all analytes in an ATG must be reported).

PH-R511-WT	Soil	pH-O.Reg 153/04 (July 2011)	MOEE E3137A
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Reference Information

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Methods Listed (if applicable):

ALS Test Code	Matrix	Test Description	Method Reference**
A minimum 10g portion of the sample is extracted with 20mL of 0.01M calcium chloride solution by shaking for at least 30 minutes. The aqueous layer is separated from the soil and then analyzed using a pH meter and electrode.			
Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011).			
SAR-R511-WT	Soil	SAR-O.Reg 153/04 (July 2011)	SW846 6010C
A dried, disaggregated solid sample is extracted with deionized water, the aqueous extract is separated from the solid, acidified and then analyzed using a ICP/OES. The concentrations of Na, Ca and Mg are reported as per CALA requirements for calculated parameters. These individual parameters are not for comparison to any guideline.			
Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011).			
XYLENES-SUM-CALC-WT	Soil	Sum of Xylene Isomer Concentrations	CALCULATION
Total xylenes represents the sum of o-xylene and m&p-xylene.			

**ALS test methods may incorporate modifications from specified reference methods to improve performance.

Chain of Custody Numbers:

14-465890

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
WT	ALS ENVIRONMENTAL - WATERLOO, ONTARIO, CANADA

GLOSSARY OF REPORT TERMS

Surrogates are compounds that are similar in behaviour to target analyte(s), but that do not normally occur in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery. In reports that display the D.L. column, laboratory objectives for surrogates are listed there.

mg/kg - milligrams per kilogram based on dry weight of sample

mg/kg ww - milligrams per kilogram based on wet weight of sample

mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight

mg/L - unit of concentration based on volume, parts per million.

< - Less than.

D.L. - The reporting limit.

N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.

UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

Application of guidelines is provided "as is" without warranty of any kind, either expressed or implied, including, but not limited to fitness for a particular purpose, or non-infringement. ALS assumes no responsibility for errors or omissions in the information.



Environmental

Quality Control Report

Workorder: L1750651

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Client: V.A. WOOD ASSOCIATES LIMITED
1080 Tapscott Rd Unit 24
Scarborough ON M1X 1E7

Contact: Vic Wood

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
B-HWS-R511-WT		Soil						
Batch	R3429746							
WG2285241-4	DUP	L1750648-2						
Boron (B), Hot Water Ext.		0.17	0.17		ug/g	0.2	30	04-APR-16
WG2285241-2	IRM	HOTB-SAL_SOIL5						
Boron (B), Hot Water Ext.			112.6		%		70-130	04-APR-16
WG2285241-3	LCS							
Boron (B), Hot Water Ext.			99.4		%		70-130	04-APR-16
WG2285241-1	MB							
Boron (B), Hot Water Ext.			<0.10		ug/g		0.1	04-APR-16
BTX-511-HS-WT		Soil						
Batch	R3429478							
WG2284245-4	DUP	WG2284245-3						
Benzene		<0.0068	<0.0068	RPD-NA	ug/g	N/A	40	04-APR-16
Ethylbenzene		<0.018	<0.018	RPD-NA	ug/g	N/A	40	04-APR-16
m+p-Xylenes		<0.030	<0.030	RPD-NA	ug/g	N/A	40	04-APR-16
o-Xylene		<0.020	<0.020	RPD-NA	ug/g	N/A	40	04-APR-16
Toluene		<0.080	<0.080	RPD-NA	ug/g	N/A	40	04-APR-16
WG2284245-2	LCS							
Benzene			105.2		%		70-130	04-APR-16
Ethylbenzene			103.1		%		70-130	04-APR-16
m+p-Xylenes			100.2		%		70-130	04-APR-16
o-Xylene			98.4		%		70-130	04-APR-16
Toluene			99.5		%		70-130	04-APR-16
WG2284245-1	MB							
Benzene			<0.0068		ug/g		0.0068	04-APR-16
Ethylbenzene			<0.018		ug/g		0.018	04-APR-16
m+p-Xylenes			<0.030		ug/g		0.03	04-APR-16
o-Xylene			<0.020		ug/g		0.02	04-APR-16
Toluene			<0.080		ug/g		0.08	04-APR-16
Surrogate: 1,4-Difluorobenzene			102.1		%		70-130	04-APR-16
Surrogate: 4-Bromofluorobenzene			95.3		%		70-130	04-APR-16
WG2284245-5	MS	WG2284245-3						
Benzene			111.7		%		60-140	04-APR-16
Ethylbenzene			107.3		%		60-140	04-APR-16
m+p-Xylenes			104.9		%		60-140	04-APR-16
o-Xylene			103.6		%		60-140	04-APR-16
Toluene			103.9		%		60-140	04-APR-16



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Client: V.A. WOOD ASSOCIATES LIMITED
1080 Tapscott Rd Unit 24
Scarborough ON M1X 1E7

Contact: Vic Wood

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
CN-WAD-R511-WT		Soil						
Batch	R3430044							
WG2284258-3	DUP	L1750648-1						
Cyanide, Weak Acid Diss		<0.050	<0.050	RPD-NA	ug/g	N/A	35	04-APR-16
WG2284258-2	LCS							
Cyanide, Weak Acid Diss			94.9		%		80-120	04-APR-16
WG2284258-1	MB							
Cyanide, Weak Acid Diss			<0.050		ug/g		0.05	04-APR-16
WG2284258-4	MS	L1750648-1						
Cyanide, Weak Acid Diss			97.7		%		70-130	04-APR-16
CR-CR6-IC-WT		Soil						
Batch	R3433231							
WG2284257-3	CRM	WT-SQC012						
Chromium, Hexavalent			99.2		%		70-130	05-APR-16
WG2284257-4	DUP	L1750648-1						
Chromium, Hexavalent		<0.20	<0.20	RPD-NA	ug/g	N/A	35	05-APR-16
WG2284257-2	LCS							
Chromium, Hexavalent			91.7		%		80-120	05-APR-16
WG2284257-1	MB							
Chromium, Hexavalent			<0.20		ug/g		0.2	05-APR-16
EC-R511-WT		Soil						
Batch	R3430350							
WG2285243-4	DUP	WG2285243-3						
Conductivity		1.14	1.16		mS/cm	1.2	20	05-APR-16
WG2286029-1	LCS							
Conductivity			99.2		%		90-110	05-APR-16
WG2285243-1	MB							
Conductivity			<0.0040		mS/cm		0.044	05-APR-16
F1-HS-511-WT		Soil						
Batch	R3429478							
WG2284245-4	DUP	WG2284245-3						
F1 (C6-C10)		<5.0	<5.0	RPD-NA	ug/g	N/A	50	04-APR-16
WG2284245-2	LCS							
F1 (C6-C10)			103.6		%		80-120	04-APR-16
WG2284245-1	MB							
F1 (C6-C10)			<5.0		ug/g		5	04-APR-16
Surrogate: 3,4-Dichlorotoluene			103.3		%		60-140	04-APR-16
WG2284245-7	MS	WG2284245-6						
F1 (C6-C10)			107.5		%		60-140	04-APR-16

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Client: V.A. WOOD ASSOCIATES LIMITED
1080 Tapscott Rd Unit 24
Scarborough ON M1X 1E7

Contact: Vic Wood

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
F2-F4-511-WT		Soil						
Batch	R3429521							
WG2283799-4	CRM	ALS PHC2 IRM						
F2 (C10-C16)			94.1		%		70-130	01-APR-16
F3 (C16-C34)			108.7		%		70-130	01-APR-16
F4 (C34-C50)			113.9		%		70-130	01-APR-16
WG2283799-3	DUP	WG2283799-5						
F2 (C10-C16)		<10	<10	RPD-NA	ug/g	N/A	40	01-APR-16
F3 (C16-C34)		<50	<50	RPD-NA	ug/g	N/A	40	01-APR-16
F4 (C34-C50)		<50	<50	RPD-NA	ug/g	N/A	40	01-APR-16
WG2283799-2	LCS							
F2 (C10-C16)			94.1		%		80-120	01-APR-16
F3 (C16-C34)			106.2		%		80-120	01-APR-16
F4 (C34-C50)			103.9		%		80-120	01-APR-16
WG2283799-1	MB							
F2 (C10-C16)			<10		ug/g		10	01-APR-16
F3 (C16-C34)			<50		ug/g		50	01-APR-16
F4 (C34-C50)			<50		ug/g		50	01-APR-16
Surrogate: 2-Bromobenzotrifluoride			93.9		%		60-140	01-APR-16
HG-200.2-CVAA-WT		Soil						
Batch	R3429636							
WG2285245-2	CRM	WT-CANMET-TILL1						
Mercury (Hg)			99.2		%		70-130	04-APR-16
WG2285245-6	DUP	WG2285245-5						
Mercury (Hg)		0.226	0.187		ug/g	19	40	04-APR-16
WG2285245-3	LCS							
Mercury (Hg)			100.0		%		80-120	04-APR-16
WG2285245-1	MB							
Mercury (Hg)			<0.0050		mg/kg		0.005	04-APR-16
MET-200.2-CCMS-WT		Soil						
Batch	R3430208							
WG2285245-2	CRM	WT-CANMET-TILL1						
Antimony (Sb)			103.6		%		70-130	04-APR-16
Arsenic (As)			112.5		%		70-130	04-APR-16
Barium (Ba)			107.9		%		70-130	04-APR-16
Beryllium (Be)			94.4		%		70-130	04-APR-16
Cadmium (Cd)			100.2		%		70-130	04-APR-16
Chromium (Cr)			110.3		%		70-130	04-APR-16



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Client: V.A. WOOD ASSOCIATES LIMITED
1080 Tapscott Rd Unit 24
Scarborough ON M1X 1E7

Contact: Vic Wood

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-200.2-CCMS-WT		Soil						
Batch	R3430208							
WG2285245-2	CRM	WT-CANMET-TILL1						
Cobalt (Co)			100.7		%		70-130	04-APR-16
Copper (Cu)			100.3		%		70-130	04-APR-16
Lead (Pb)			92.6		%		70-130	04-APR-16
Molybdenum (Mo)			94.1		%		70-130	04-APR-16
Nickel (Ni)			107.1		%		70-130	04-APR-16
Selenium (Se)			93.5		%		70-130	04-APR-16
Silver (Ag)			110.0		%		70-130	04-APR-16
Thallium (Tl)			103.3		%		70-130	04-APR-16
Uranium (U)			115.5		%		70-130	04-APR-16
Vanadium (V)			113.2		%		70-130	04-APR-16
Zinc (Zn)			107.8		%		70-130	04-APR-16
WG2285245-6	DUP	WG2285245-5						
Antimony (Sb)		0.37	0.37		ug/g	1.0	30	04-APR-16
Arsenic (As)		1.61	1.88		ug/g	16	30	04-APR-16
Barium (Ba)		48.5	53.2		ug/g	9.3	40	04-APR-16
Beryllium (Be)		0.15	0.16		ug/g	2.7	30	04-APR-16
Boron (B)		<5.0	<5.0	RPD-NA	ug/g	N/A	30	04-APR-16
Cadmium (Cd)		0.401	0.409		ug/g	1.9	30	04-APR-16
Chromium (Cr)		11.3	12.1		ug/g	7.2	30	04-APR-16
Cobalt (Co)		2.53	2.51		ug/g	0.8	30	04-APR-16
Copper (Cu)		128	146		ug/g	14	30	04-APR-16
Lead (Pb)		66.9	68.5		ug/g	2.3	40	04-APR-16
Molybdenum (Mo)		0.41	0.42		ug/g	1.1	40	04-APR-16
Nickel (Ni)		14.1	17.8		ug/g	24	30	04-APR-16
Selenium (Se)		<0.20	<0.20	RPD-NA	ug/g	N/A	30	04-APR-16
Silver (Ag)		<0.10	<0.10	RPD-NA	ug/g	N/A	40	04-APR-16
Thallium (Tl)		0.066	0.065		ug/g	0.3	30	04-APR-16
Uranium (U)		0.254	0.265		ug/g	4.1	30	04-APR-16
Vanadium (V)		22.1	24.4		ug/g	9.8	30	04-APR-16
Zinc (Zn)		243	261		ug/g	7.0	30	04-APR-16
WG2285245-4	LCS							
Antimony (Sb)			100.9		%		80-120	04-APR-16
Arsenic (As)			98.8		%		80-120	04-APR-16



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Client: V.A. WOOD ASSOCIATES LIMITED
1080 Tapscott Rd Unit 24
Scarborough ON M1X 1E7

Contact: Vic Wood

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-200.2-CCMS-WT		Soil						
Batch	R3430208							
WG2285245-4	LCS							
Barium (Ba)			96.1		%		80-120	04-APR-16
Beryllium (Be)			90.5		%		80-120	04-APR-16
Boron (B)			88.9		%		80-120	04-APR-16
Cadmium (Cd)			98.2		%		80-120	04-APR-16
Chromium (Cr)			95.9		%		80-120	04-APR-16
Cobalt (Co)			91.1		%		80-120	04-APR-16
Copper (Cu)			89.5		%		80-120	04-APR-16
Lead (Pb)			96.6		%		80-120	04-APR-16
Molybdenum (Mo)			96.4		%		80-120	04-APR-16
Nickel (Ni)			95.8		%		80-120	04-APR-16
Selenium (Se)			97.1		%		80-120	04-APR-16
Silver (Ag)			100.7		%		80-120	04-APR-16
Thallium (Tl)			93.9		%		80-120	04-APR-16
Uranium (U)			90.3		%		80-120	04-APR-16
Vanadium (V)			98.1		%		80-120	04-APR-16
Zinc (Zn)			89.5		%		80-120	04-APR-16
WG2285245-1	MB							
Antimony (Sb)			<0.10		mg/kg		0.1	04-APR-16
Arsenic (As)			<0.10		mg/kg		0.1	04-APR-16
Barium (Ba)			<0.50		mg/kg		0.5	04-APR-16
Beryllium (Be)			<0.10		mg/kg		0.1	04-APR-16
Boron (B)			<5.0		mg/kg		5	04-APR-16
Cadmium (Cd)			<0.020		mg/kg		0.02	04-APR-16
Chromium (Cr)			<0.50		mg/kg		0.5	04-APR-16
Cobalt (Co)			<0.10		mg/kg		0.1	04-APR-16
Copper (Cu)			<0.50		mg/kg		0.5	04-APR-16
Lead (Pb)			<0.50		mg/kg		0.5	04-APR-16
Molybdenum (Mo)			<0.10		mg/kg		0.1	04-APR-16
Nickel (Ni)			<0.50		mg/kg		0.5	04-APR-16
Selenium (Se)			<0.20		mg/kg		0.2	04-APR-16
Silver (Ag)			<0.10		mg/kg		0.1	04-APR-16
Thallium (Tl)			<0.050		mg/kg		0.05	04-APR-16
Uranium (U)			<0.050		mg/kg		0.05	04-APR-16
Vanadium (V)			<0.20		mg/kg		0.2	04-APR-16

Quality Control Report

Workorder: L1750651

Report Date: 07-APR-16

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Client: V.A. WOOD ASSOCIATES LIMITED
1080 Tapscott Rd Unit 24
Scarborough ON M1X 1E7

Contact: Vic Wood

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-200.2-CCMS-WT								
Soil								
Batch	R3430208							
WG2285245-1	MB							
Zinc (Zn)			<2.0		mg/kg		2	04-APR-16
MOISTURE-WT								
Soil								
Batch	R3428516							
WG2283838-3	DUP	L1750321-10						
% Moisture		7.20	7.30		%	1.4	20	01-APR-16
WG2283838-2	LCS							
% Moisture			101.7		%		90-110	01-APR-16
WG2283838-1	MB							
% Moisture			<0.10		%		0.1	01-APR-16
Batch	R3429099							
WG2284312-3	DUP	L1750665-13						
% Moisture		8.48	8.18		%	3.6	20	02-APR-16
WG2284312-2	LCS							
% Moisture			99.1		%		90-110	02-APR-16
WG2284312-1	MB							
% Moisture			<0.10		%		0.1	02-APR-16
PAH-511-WT								
Soil								
Batch	R3430217							
WG2284282-5	DUP	WG2284282-4						
1-Methylnaphthalene		<0.030	<0.030	RPD-NA	ug/g	N/A	40	05-APR-16
2-Methylnaphthalene		<0.030	<0.030	RPD-NA	ug/g	N/A	40	05-APR-16
Acenaphthene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	05-APR-16
Acenaphthylene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	05-APR-16
Anthracene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	05-APR-16
Benzo(a)anthracene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	05-APR-16
Benzo(a)pyrene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	05-APR-16
Benzo(b)fluoranthene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	05-APR-16
Benzo(g,h,i)perylene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	05-APR-16
Benzo(k)fluoranthene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	05-APR-16
Chrysene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	05-APR-16
Dibenzo(ah)anthracene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	05-APR-16
Fluoranthene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	05-APR-16
Fluorene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	05-APR-16
Indeno(1,2,3-cd)pyrene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	05-APR-16

Quality Control Report

Workorder: L1750651

Report Date: 07-APR-16

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Client: V.A. WOOD ASSOCIATES LIMITED
1080 Tapscott Rd Unit 24
Scarborough ON M1X 1E7

Contact: Vic Wood

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PAH-511-WT		Soil						
Batch	R3430217							
WG2284282-5	DUP	WG2284282-4						
Naphthalene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	05-APR-16
Phenanthrene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	05-APR-16
Pyrene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	05-APR-16
WG2284282-3	IRM	ALS PAH1 RM						
1-Methylnaphthalene			94.7		%		50-140	05-APR-16
2-Methylnaphthalene			99.0		%		50-140	05-APR-16
Acenaphthene			71.9		%		50-140	05-APR-16
Acenaphthylene			100.8		%		50-140	05-APR-16
Anthracene			64.2		%		50-140	05-APR-16
Benzo(a)anthracene			107.1		%		50-140	05-APR-16
Benzo(a)pyrene			86.2		%		50-140	05-APR-16
Benzo(b)fluoranthene			102.4		%		50-140	05-APR-16
Benzo(g,h,i)perylene			90.8		%		50-140	05-APR-16
Benzo(k)fluoranthene			97.4		%		50-140	05-APR-16
Chrysene			115.4		%		50-140	05-APR-16
Dibenzo(ah)anthracene			113.3		%		50-140	05-APR-16
Fluoranthene			109.8		%		50-140	05-APR-16
Fluorene			58.8		%		50-140	05-APR-16
Indeno(1,2,3-cd)pyrene			89.1		%		50-140	05-APR-16
Naphthalene			97.6		%		50-140	05-APR-16
Phenanthrene			103.5		%		50-140	05-APR-16
Pyrene			104.8		%		50-140	05-APR-16
WG2284282-2	LCS							
1-Methylnaphthalene			91.4		%		50-140	05-APR-16
2-Methylnaphthalene			90.9		%		50-140	05-APR-16
Acenaphthene			90.4		%		50-140	05-APR-16
Acenaphthylene			84.7		%		50-140	05-APR-16
Anthracene			84.5		%		50-140	05-APR-16
Benzo(a)anthracene			88.4		%		50-140	05-APR-16
Benzo(a)pyrene			88.9		%		50-140	05-APR-16
Benzo(b)fluoranthene			89.3		%		50-140	05-APR-16
Benzo(g,h,i)perylene			77.3		%		50-140	05-APR-16
Benzo(k)fluoranthene			91.3		%		50-140	05-APR-16
Chrysene			98.0		%		50-140	05-APR-16



Quality Control Report

Workorder: L1750651

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Client: V.A. WOOD ASSOCIATES LIMITED
1080 Tapscott Rd Unit 24
Scarborough ON M1X 1E7

Contact: Vic Wood

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PAH-511-WT		Soil						
Batch	R3430217							
WG2284282-2	LCS							
Dibenzo(ah)anthracene			74.0		%		50-140	05-APR-16
Fluoranthene			85.8		%		50-140	05-APR-16
Fluorene			89.4		%		50-140	05-APR-16
Indeno(1,2,3-cd)pyrene			78.6		%		50-140	05-APR-16
Naphthalene			93.4		%		50-140	05-APR-16
Phenanthrene			95.2		%		50-140	05-APR-16
Pyrene			90.7		%		50-140	05-APR-16
WG2284282-1	MB							
1-Methylnaphthalene			<0.030		ug/g		0.03	05-APR-16
2-Methylnaphthalene			<0.030		ug/g		0.03	05-APR-16
Acenaphthene			<0.050		ug/g		0.05	05-APR-16
Acenaphthylene			<0.050		ug/g		0.05	05-APR-16
Anthracene			<0.050		ug/g		0.05	05-APR-16
Benzo(a)anthracene			<0.050		ug/g		0.05	05-APR-16
Benzo(a)pyrene			<0.050		ug/g		0.05	05-APR-16
Benzo(b)fluoranthene			<0.050		ug/g		0.05	05-APR-16
Benzo(g,h,i)perylene			<0.050		ug/g		0.05	05-APR-16
Benzo(k)fluoranthene			<0.050		ug/g		0.05	05-APR-16
Chrysene			<0.050		ug/g		0.05	05-APR-16
Dibenzo(ah)anthracene			<0.050		ug/g		0.05	05-APR-16
Fluoranthene			<0.050		ug/g		0.05	05-APR-16
Fluorene			<0.050		ug/g		0.05	05-APR-16
Indeno(1,2,3-cd)pyrene			<0.050		ug/g		0.05	05-APR-16
Naphthalene			<0.050		ug/g		0.05	05-APR-16
Phenanthrene			<0.050		ug/g		0.05	05-APR-16
Pyrene			<0.050		ug/g		0.05	05-APR-16
Surrogate: 2-Fluorobiphenyl			96.4		%		50-140	05-APR-16
Surrogate: p-Terphenyl d14			89.3		%		50-140	05-APR-16
PH-R511-WT		Soil						
Batch	R3429352							
WG2284256-1	DUP	L1750648-1						
pH		8.01	8.02	J	pH units	0.01	0.3	03-APR-16
WG2285094-1	LCS							
pH			7.04		pH units		6.7-7.3	03-APR-16



Quality Control Report

Workorder: L1750651

Report Date: 07-APR-16

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Client: V.A. WOOD ASSOCIATES LIMITED
1080 Tapscott Rd Unit 24
Scarborough ON M1X 1E7

Contact: Vic Wood

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
SAR-R511-WT	Soil							
Batch	R3430221							
WG2285243-4	DUP	WG2285243-3						
Calcium (Ca)		225	226		mg/L	0.4	30	05-APR-16
Sodium (Na)		12.4	12.4		mg/L	0.4	30	05-APR-16
Magnesium (Mg)		12.8	12.9		mg/L	0.8	30	05-APR-16
WG2285243-2	IRM	WT SAR1						
Calcium (Ca)			99.4		%		70-130	05-APR-16
Sodium (Na)			95.8		%		70-130	05-APR-16
Magnesium (Mg)			95.5		%		70-130	05-APR-16
WG2285243-1	MB							
Calcium (Ca)			<1.0		mg/L		1	05-APR-16
Sodium (Na)			<1.0		mg/L		1	05-APR-16
Magnesium (Mg)			<1.0		mg/L		1	05-APR-16

Quality Control Report

Workorder: L1750651

Report Date: 07-APR-16

Client: V.A. WOOD ASSOCIATES LIMITED
1080 Tapscott Rd Unit 24
Scarborough ON M1X 1E7
Contact: Vic Wood

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Legend:

Limit	ALS Control Limit (Data Quality Objectives)
DUP	Duplicate
RPD	Relative Percent Difference
N/A	Not Available
LCS	Laboratory Control Sample
SRM	Standard Reference Material
MS	Matrix Spike
MSD	Matrix Spike Duplicate
ADE	Average Desorption Efficiency
MB	Method Blank
IRM	Internal Reference Material
CRM	Certified Reference Material
CCV	Continuing Calibration Verification
CVS	Calibration Verification Standard
LCSD	Laboratory Control Sample Duplicate

Sample Parameter Qualifier Definitions:

Qualifier	Description
J	Duplicate results and limits are expressed in terms of absolute difference.
RPD-NA	Relative Percent Difference Not Available due to result(s) being less than detection limit.

Hold Time Exceedances:

All test results reported with this submission were conducted within ALS recommended hold times.

ALS recommended hold times may vary by province. They are assigned to meet known provincial and/or federal government requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by the US EPA, APHA Standard Methods, or Environment Canada (where available). For more information, please contact ALS.

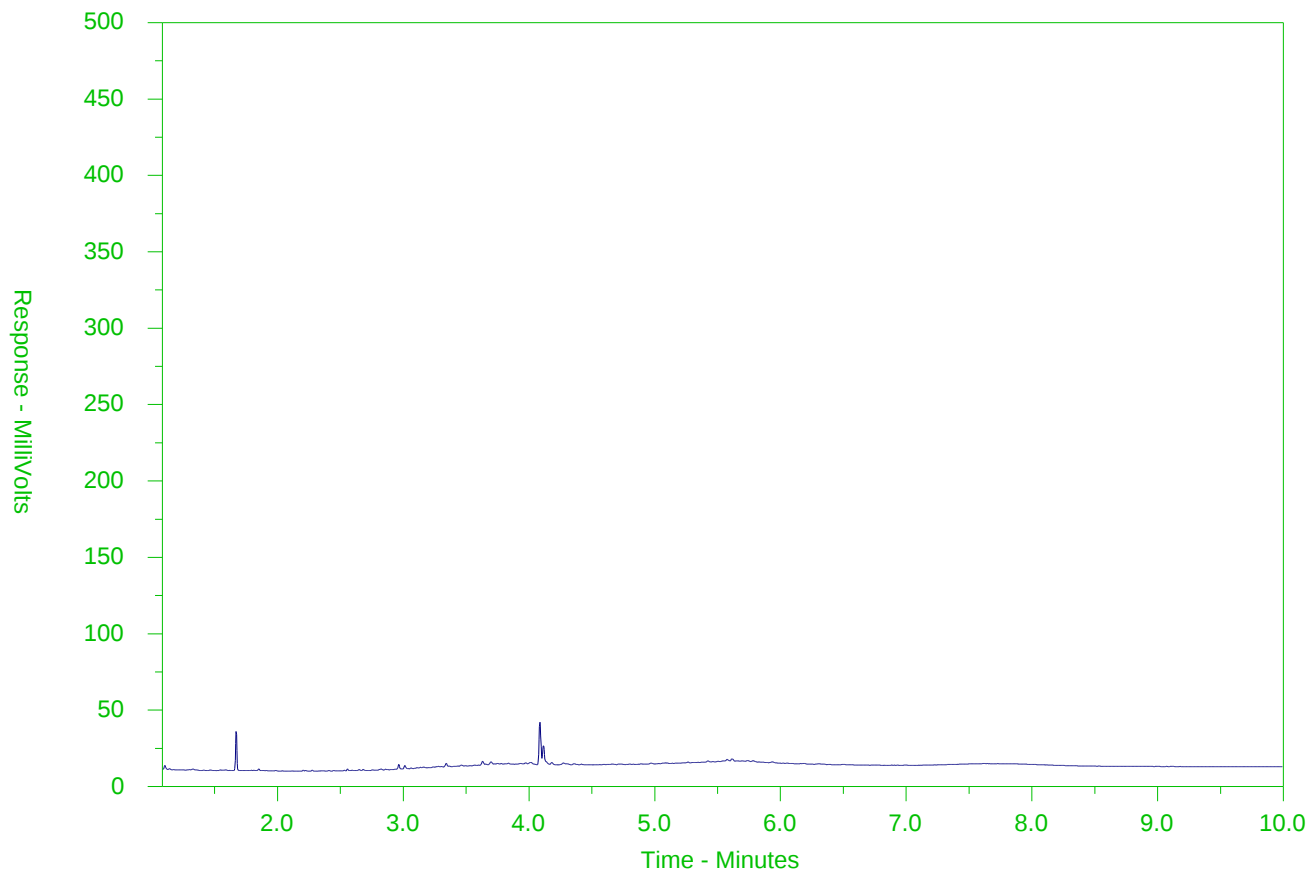
The ALS Quality Control Report is provided to ALS clients upon request. ALS includes comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against pre-determined data quality objectives to provide confidence in the accuracy of associated test results.

Please note that this report may contain QC results from anonymous Sample Duplicates and Matrix Spikes that do not originate from this Work Order.

CCME F2-F4 HYDROCARBON DISTRIBUTION REPORT



ALS Sample ID: L1750651-4
Client Sample ID: 6862-BH4/1



← F2 →		← F3 →		← F4 →	
nC10	nC16	nC34	nC50		
174°C	287°C	481°C	575°C		
346°F	549°F	898°F	1067°F		
← Gasoline →		← Motor Oils/ Lube Oils/ Grease →			
← Diesel/ Jet Fuels →					

The CCME F2-F4 Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

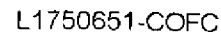
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor and the scale at the left.

Note: This chromatogram was produced using GC conditions that are specific to ALS Canada CCME F2-F4 method. Refer to the ALS Canada CCME F2-F4 Hydrocarbon Library for a collection of chromatograms from common reference samples (fuels, oils, etc.). The HDR Library can be found at www.alsglobal.com.



Canada Toll Free: 1 800 668 9878



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REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

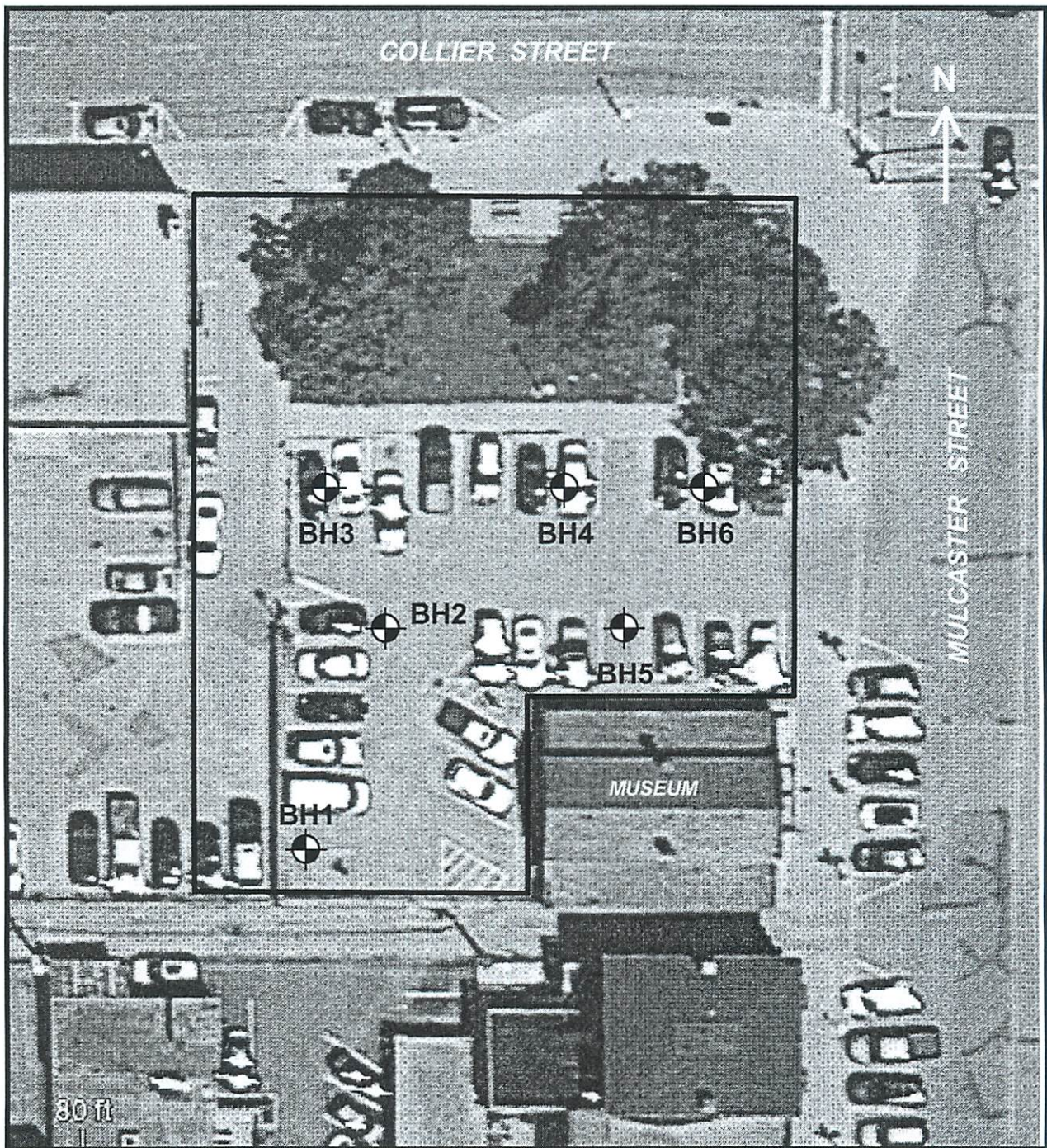
Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY. By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

1. If any water samples are taken from a **Regulated Drinking Water (DW) System**, please submit using an **Authorized DW COC form**.

WHITE - LABORATORY COPY YELLOW - CLIENT COPY

NA-FM-0328a v09 Erosion, January 2011

ENCLOSURES



BOREHOLE LOCATION PLAN

Reference No : 6862-16-02

Borehole No : 1

Enclosure No : 2

Client : Edgecon Inc.

Project : Proposed Condominium

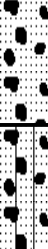
Method : Auger

Location : 79 Collier Street, Barrie, ON

Diameter : 110 mm

Datum Elevation : Geodetic

Date : March 29, 2016

SUBSURFACE PROFILE					SAMPLE								Water % Plastic Limit Liquid Limit Wp ----0---- Wl 10 20 30 40 50					Remarks
Elevation m	Depth m	Description	Symbol	Water	Number	Type	N-Value											
230.5	0	Ground Surface																
	1	Asphalt 75 mm Granular Base 250 mm		dry to cave in level	1	SS	17											
	2	SS			8													
	3	SS			3													
	4	AS			14													
	5	SS			8													
226.5	4	FINE SAND																
	5	Loose, fine sand, trace to some silt, brown, moist to wet			6	SS	4											
	6																	
	7																	
223.5	7																	
222	8	GRAVELLY SAND Very dense, well graded sand with fine to medium gravel, brown, wet	8			SS	100+											
	9	SANDY SILT TILL Dense, trace fine gravel, some seams of fine sand, brownish grey, moist	9	SS		38												
220.5	10																	
	11	FINE SAND Very dense, fine sand, some silt, some gravel at the bottom, grey, wet		10		SS	96											
	11	AS		100+														
	217.85	13	End of Borehole															

V.A. WOOD ASSOCIATES LIMITED

Disk No :

Sheet : 1 of 1

Reference No : 6862-16-02

Borehole No : 2

Enclosure No : 3

Client : Edgecon Inc.

Project : Proposed Condominium

Method : Auger

Location : 79 Collier Street, Barrie, ON

Diameter : 110 mm

Datum Elevation : Geodetic

Date : March 28, 2016

SUBSURFACE PROFILE					SAMPLE								Water % Plastic Limit Liquid Limit Wp ----0---- Wl 10 20 30 40 50					Remarks
Elevation m	Depth m	Description	Symbol	Water	Number	Type	N-Value											
230.9	0	Ground Surface															Borehole open and dry on completion	
229.5	1	Asphalt 75 mm Granular Base 325 mm		D R Y	1	SS	15											
		2			SS	9												
		3			SS	4												
228.8	2	FILL Fine to medium sand, trace topsoil, brown, moist, loose		D R Y	4	SS	14											
227.4	3	FINE SAND Compact, trace silt, brown, damp to moist			5	SS	18											
		End of Borehole																
		4																
	5																	
	6																	
	7																	

V.A. WOOD ASSOCIATES LIMITED

Disk No :

Sheet : 1 of 1

Reference No : 6862-16-02

Borehole No : 3

Enclosure No : 4

Client : Edgecon Inc.

Project : Proposed Condominium

Method : Auger

Location : 79 Collier Street, Barrie, ON

Diameter : 110 mm

Datum Elevation : Geodetic

Date : March 28, 2016

SUBSURFACE PROFILE					SAMPLE			Standard Penetration 20 40 60 80 100	Water % Plastic Limit Liquid Limit Wp----0---- Wl	Remarks
Elevation m	Depth m	Description	Symbol	Water	Number	Type	N-Value			
231.7	0	Ground Surface								
		Asphalt 75 mm								
		Granular Base 275 mm								
		FILL								
		Gravelly well graded sand, trace brick								
		fragments, dark grey, moist, compact								
		then loose								
230.3	1				1	SS	29			
					2	SS	8			
					3	SS	24			
	2									
		SAND			4	SS	44			
		Compact to dense, fine to medium sand,								
		trace silt and fine gravel, brown, damp to								
		moist			5	SS	45			
227.7	4									
		FINE SAND								
		Compact, trace silt, greyish brown, moist			6	SS	30			
		then wet								
	5									
		moist								
		wet								
	6									
225.15					7	SS	17			
		End of Borehole								
	7									
	8									

V.A. WOOD ASSOCIATES LIMITED

Disk No :

Sheet : 1 of 1

Reference No : 6862-16-02

Borehole No : 4

Enclosure No : 5

Client : Edgecon Inc.

Project : Proposed Condominium

Method : Auger

Location : 79 Collier Street, Barrie, ON

Diameter : 110 mm

Datum Elevation : Geodetic

Date : March 30, 2016

SUBSURFACE PROFILE					SAMPLE								Water % Plastic Limit Liquid Limit Wp ----0---- Wl 10 20 30 40 50					Remarks
Elevation m	Depth m	Description	Symbol	Water	Number	Type	N-Value											
231.7	0	Ground Surface		D R Y													Borehole open and dry on completion	
		Asphalt 75 mm Granular Base 225 mm			1	SS	8											
	1	FILL Fine sand, then gravelly sand, dark brown, moist, loose then compact			2	SS	15											
230.3																		
		SAND Dense, fine to medium sand, trace fine gravel, brown, damp			3	SS	42											
229.6	2																	
		FINE SAND Compact to dense, trace silt, brown, damp			4	SS	38											
	3																	
228.2					5	SS	25											
		End of Borehole																
	4																	
	5																	
	6																	
	7																	

V.A. WOOD ASSOCIATES LIMITED

Disk No :

Sheet : 1 of 1

Enclosure No : 6

Method : Auger

Diameter : 110 mm

Date : March 30, 2016

Sheet : 1 of 1

Reference No : 6862-16-02

Borehole No : 6

Enclosure No : 7

Client : Edgecon Inc.

Project : Proposed Condominium

Method : Auger

Location : 79 Collier Street, Barrie, ON

Diameter : 110 mm

Datum Elevation : Geodetic

Date : March 30, 2016

SUBSURFACE PROFILE					SAMPLE								Remarks		
Elevation m	Depth m	Description	Symbol	Water	Number	Type	N-Value	Standard Penetration						Water % Plastic Limit Liquid Limit	
								20	40	60	80	100		Wp ----0---- Wl 10 20 30 40 50	
231.8	0	Ground Surface													
		Asphalt 75 mm			1	SS	12								
		Granular Base 300 mm			2	SS	43								
230.4	1	FILL													
		Gravelly well graded sand, brownish			3	SS	44								
	2	SAND													
228.9		Dense to very dense, fine to medium sand,			4	SS	60								
	3	some gravel, brown, damp			5	SS	38								
	4	FINE SAND													
		Compact to dense, fine sand, trace silt,			6	SS	21								
226.3	5	greyish brown, moist													
	6	SILTY SAND TILL			7	SS	56								
224.8		Very dense, trace fine gravel, some seams													
	7	of sand, brown, moist to wet													
		GRAVELLY SAND			8	SS	95								
223.3	8	Very dense, well graded sand with fine to													
		medium gravel, brown, moist													
	9				9	SS	84								
	10	FINE SAND													
		Very dense to dense, fine sand, trace to			10	SS	88								
	11	some silt, brown then grey, wet													
	12				11	SS	44								
218.8	13														
					12	SS	28								
	14	SILT TILL													
		Compact, trace fine gravel, grey, moist													
216.1	15				13	SS	23								
	16	End of Borehole													

V.A. WOOD ASSOCIATES LIMITED

Disk No :

Sheet : 1 of 1