



# Soil Engineers Ltd.

CONSULTING ENGINEERS

GEOTECHNICAL • ENVIRONMENTAL • HYDROGEOLOGICAL • BUILDING SCIENCE

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May 17, 2018

Reference No. 1803-E002

Page 1 of 4

Brock Road Duffins Forest Inc.  
24 Georgia Court  
Richmond Hill, Ontario  
L4E 0N7

Attention: Ms. Alison Lin

**Re: Phase Two Environmental Site Assessment Update  
Proposed Development  
2055 Brock Road  
City of Pickering**

Dear Madam:

Soil Engineers Ltd.(SEL) was retained to carry out a Phase Two Environmental Site Assessment Update (Phase Two ESA Update) for a property located at 2055 Brock Road in the City of Pickering (hereafter referred to as “subject site”), shown in Drawing No. 1.

The purpose of the Phase Two ESA Update is to further assess the soil condition at the northwestern portion of the subject site, as related to the potential environmental concerns identified in our Phase One Environmental Site Assessment Update (Phase One ESA Update). This Phase Two ESA Update should be read in conjunction with our original Phase Two Environmental Site Assessment (Phase Two ESA, Reference No. 1407-E106 dated December 18, 2014).

## **Background**

SEL recently conducted a Phase One ESA Update for the subject site and the findings of the Phase One ESA Update indicated the following items of environmental concern attendant to the subject site:

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- Presence of in-ground fill material at the location of the former residential building and at the gravel surface area to the south of the building, at the northwestern portion of the subject site.
- Presence of soil stockpiles (fill material) at the northwestern portion of the subject site.

It should be noted that the in-ground fill material at the gravel surface area to the south of the former residential building was identified as potential environmental concern in our 2014 Phase One Environmental Site Assessment (Phase One ESA) and, also it was assessed during our Phase Two Environmental Site Assessment (Phase Two ESA) indicated above.

A Phase Two Environmental Site Assessment Update (Phase Two ESA Update) was recommended to address the remaining items environmental concerns.

### **Field Work**

The fieldwork for the Phase Two ESA Update investigation was conducted on March 28, 2018 and March 29, 2018, and consisted of drilling three (3) boreholes (designated as BH1 to BH3) to a depth of 3.0 mbgs and nine (9) grab samples collected from soil stockpiles (designated as TP1 to TP9) using a backhoe. Sampling locations of this Phase Two ESA Update and the original Phase Two ESA are shown on appended Drawing No. 2.

Soil samples from the sampling locations were collected using an excavator for the test pits, and a track-mounted drill rig, equipped with a shelby tube soil sampler, for the boreholes. The sampling and decontamination procedures were conducted in accordance with the “Guidance on Sampling and Analytical Methods for Use at Contaminated Sites in Ontario”, May 1996, revised December 1996, as amended by O. Reg. 511/09.

The soil samples retrieved from the test pits and boreholes were examined for visual and olfactory evidence and logged in the field. No evidence of contamination was documented in any of the retrieved soil samples. In addition, head space vapour screening was conducted for all retrieved soil samples using a combustible gas detector (RKI Eagle) in methane elimination mode, calibrated with hexane and having a minimum detection level of 2ppmv (parts per million by volume). Soil vapour measurements ranged from non-detect to 5 ppmv were recorded for the soil samples, indicating insignificant combustible gases in the collected soil samples.



The fieldwork was conducted and the findings were documented by our representative.

### **Submission of Soil Samples for Analysis**

Soil samples from the sampling locations were submitted for chemical analysis of one or more of: Petroleum Hydrocarbons (PHCs), Volatile Organic Compounds (VOCs), Polyaromatic Hydrocarbons (PAHs), and Metals and Inorganics (M&I). As part of the Quality Assurance/Quality Control (QA/QC) program for the Phase Two ESA Update investigation, one (1) field duplicate soil sample (designated as DUP 1, original sample BH3/1B) was analysed for parameters of Metals.

In addition, based on the results of discrete soil sample TP 6 of the Phase Two ESA Update investigation, a composite sampling program which consisted of collecting new soil samples (designated as TP6-1, TP6-2, TP6-3, and TP6-4) retrieved from the same depth and placed within a 2 m radius of the original sampling point at TP6 location was conducted to verify the concentration of electrical conductivity parameter.

The soil samples were analysed by Maxxam Analytics (Maxxam) in Mississauga, Ontario. Maxxam is accredited by the Canadian Association for Laboratory Accreditation (CALA) in accordance with ISO/IEC 17025:2005 – “General Requirements for the Competence of Testing and Calibration Laboratories” for all the parameters analysed during this investigation. Copies of the laboratory Certificates of Analysis are enclosed in the Appendix.

### **Analytical Test Results**

Laboratory analytical methods, protocols and procedures were carried out in accordance with the “Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act”, dated March 9, 2004, amended as of July 1, 2011, in accordance with O. Reg. 511/09 and O. Reg. 269/11.



The soil test results were reviewed using the Table 8, Generic Site Condition Standards for Use within 30m of a Water Body in a Potable Groundwater Condition, for residential/parkland/institutional/industrial/commercial/community property use (Table 8 Standards), as published in the "Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act" (EPA), dated April 15, 2011.

The test results indicate that the concentrations of the tested parameters in soil at the test locations meet the Table 8 Standards. The result of the analysis of the field duplicate sample is similar to the results for the original sample and relative percent differences for the detectable tested parameters are within acceptable range. However, the relative percent differences could not be calculated between the original and duplicate samples in the situation where the original and/or duplicate samples were below the reported laboratory detection limits.

### **Conclusion and Recommendation**

A review of the analytical test results of soil samples indicates the tested parameters at the test locations meet the Table 8 Standards. Consequently, there are no contaminants identified at the test locations at a concentration above the applicable site condition standards (Table 8 Standards) during the Phase Two ESA Update.

Based on the findings of the original Phase Two ESA and this Phase Two ESA Update, it is our opinion that the property is suitable for the proposed development. No further environmental investigation is recommended at this time.

Yours very truly,

**SOIL ENGINEERS LTD.**

Zoë Hawkes, B.Sc.

Eleni Girma Beyene, P.Eng., QP<sub>ESA</sub>  
ZH/EGB:zh





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## DRAWINGS

**REFERENCE NO. 1803-E002**

**Subject Site**

Phase One Study Area

Waterbody

Major Road

Local Road


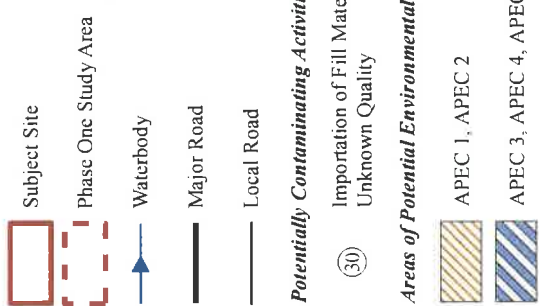
**Potentially Contaminating Activities**

Importation of Fill Material of Unknown Quality

**Areas of Potential Environmental Concern (APEC)**

APEC 1, APEC 2

APEC 3, APEC 4, APEC 5

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**Soil Engineers Ltd.**

Title: Site Location Plan

Project:


Proposed Development  
2055 Brock Road  
City of Pickering

Reference No. 1803-E002

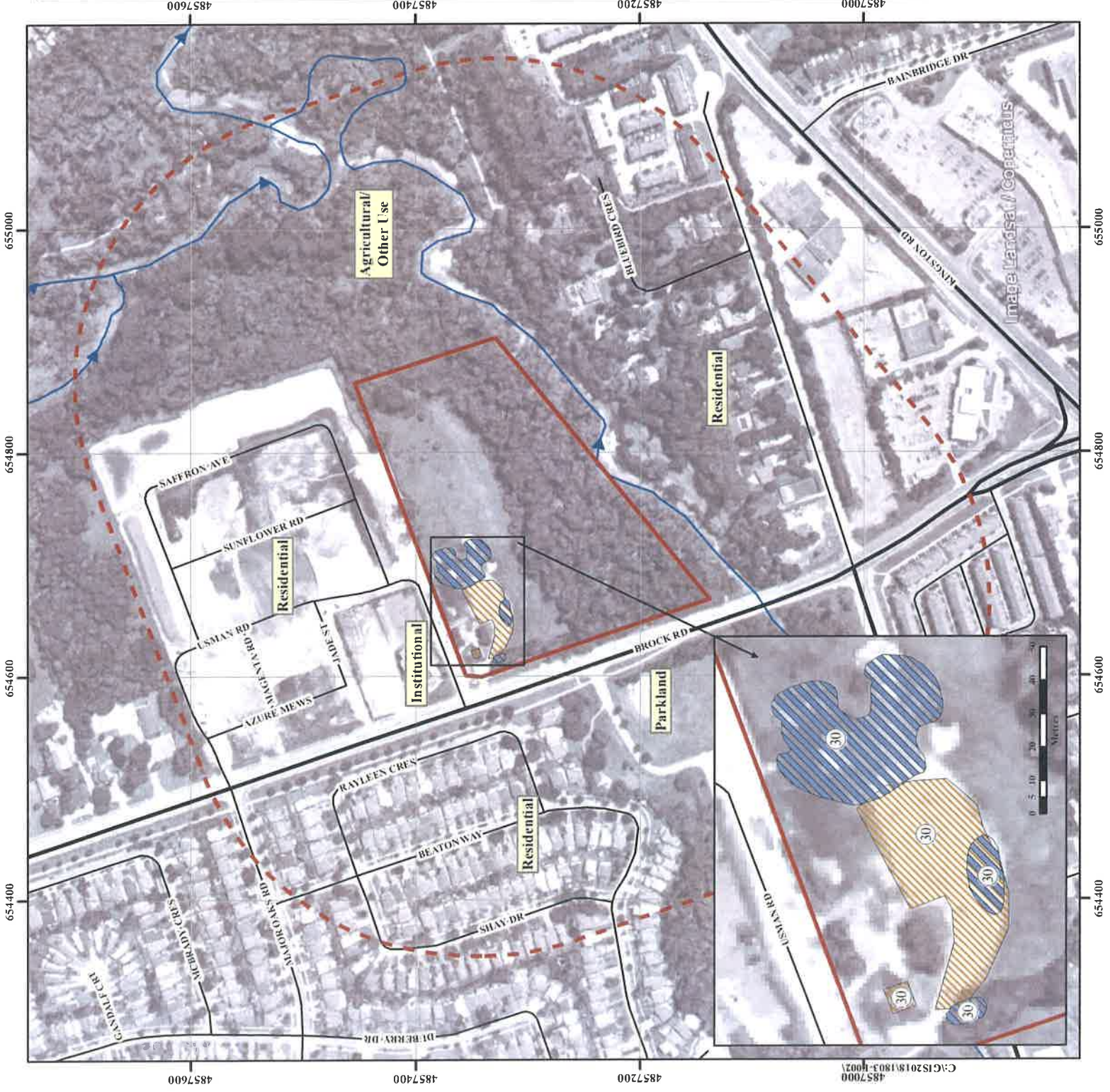
Date: March 1, 2018

Scale: 0 25 50 100 150 200 250  
Metres

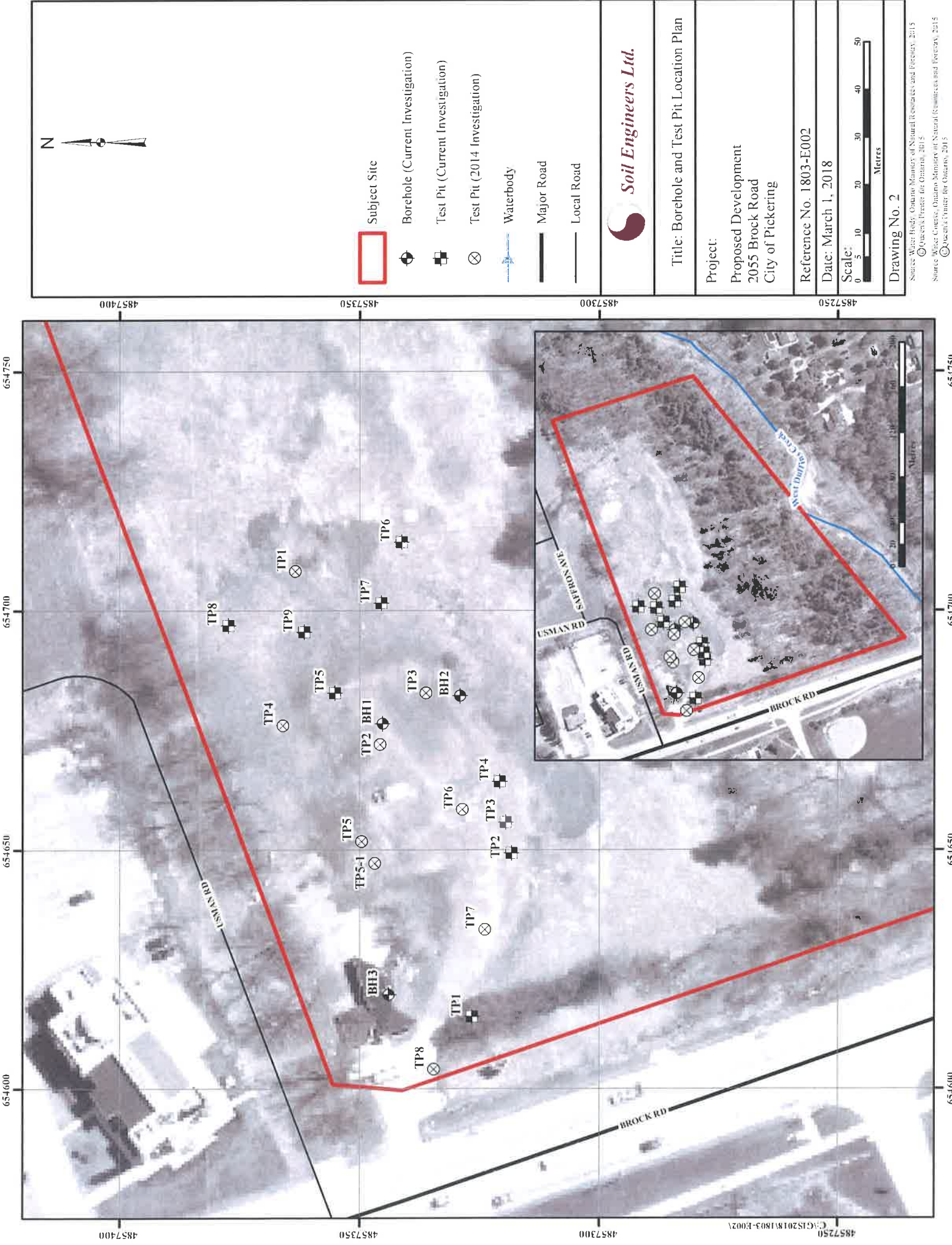
Drawing No. 1



Source: Water Body, Ontario Ministry of Natural Resources and Forestry, 2015  
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 Source: Water Course, Ontario Ministry of Natural Resources and Forestry, 2015  
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- Subject Site
- Borehole (Current Investigation)
- Test Pit (Current Investigation)
- Test Pit (2014 Investigation)
- Waterbody
- Major Road
- Local Road



<b>Soil Engineers Ltd.</b>
Title: Borehole and Test Pit Location Plan
Project: Proposed Development 2055 Brock Road City of Pickering
Reference No. 1803-E002
Date: March 1, 2018
Scale: 0 5 10 20 30 40 50 Metres
<b>Drawing No. 2</b>

Source: Water Body, Ontario Ministry of Natural Resources and Forestry, 2015  
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 Source: Water Course, Ontario Ministry of Natural Resources and Forestry, 2015  
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## **TABLES**

**REFERENCE NO. 1803-E002**





**Table I: Soil Data - Inorganic Parameters**

Sample ID	Sample Depth (mboqs*)	BH1/1	BH1/5	BH2/1	BH3/1B	DUP-S1	TP-1	TP-2	TP-3	TP-4	Table 8 Standards**
		29-Mar-18	29-Mar-18	29-Mar-18	29-Mar-18	29-Mar-18	28-Mar-18	28-Mar-18	28-Mar-18	28-Mar-18	
Laboratory ID		GIZ285	GIZ289	GIZ290	GIZ217	GIZ321	GIS070	GIS071	GIS072	GIS073	
Antimony		<0.20			<0.20	<0.20	<0.20	<0.20	<0.20	<0.25	1.3
Arsenic		2.3		1.5	<1.0	<1.0	2.6	2.7	1.6	3	18
Barium		61		51	20	19	65	90	58	98	220
Beryllium		0.43		0.35	0.22	0.2	0.56	0.54	0.33	0.57	2.5
Boron (Hot Water Soluble)		0.29		0.19	0.08	0.06	0.36	0.44	0.15	0.4	1.5
Cadmium		0.12		<0.10	<0.10	<0.10	0.16	0.13	<0.10	0.24	1.2
Chromium		20		15	6.3	6	20	19	12	21	70
Chromium VI		<0.2		<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	0.66
Cobalt		7.1		5.7	2.4	2.3	7.6	9.9	4.6	9.6	22
Copper		19		12	2.6	2.5	17	21	9.7	21	92
Lead		12		8.5	4.4	4.2	19	20	7	29	120
Mercury		<0.050		<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	0.054	0.27
Molybdenum		0.57		<0.50	<0.50	<0.50	<0.50	0.56	<0.50	<0.50	2
Nickel		16		12	4.5	4.5	18	23	9.5	22	82
Selenium		<0.50		<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	1.5
Silver		<0.20		<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	0.5
Thallium		0.15		0.094	<0.050	<0.050	0.14	0.23	0.1	0.21	1
Vanadium		28		23	14	12	29	27	19	30	86
Zinc		45		33	16	16	57	57	31	81	290
pH		7.66		7.79	7.56	-	7.65	7.76	7.66	7.75	NV
Conductivity		-		-	-	-	0.34	0.32	0.16	0.23	0.7
Sodium Adsorption Ratio		-		-	-	-	0.39	3.7	0.84	0.98	5
Cyanide, Free		<0.01		<0.01	<0.01	-	<0.01	<0.01	<0.01	<0.01	0.051
Boron (Total)		6.4		5.7	<5.0	<5.0	5.2	7.7	5.4	8.4	36
Uranium		0.55		0.49	0.35	0.32	0.53	0.59	0.46	0.6	2.5

**Table I: Soil Data - Inorganic Parameters**

Sample ID	Sample Depth (mboqs*)	TP-5	TP-6	TP-6-1	TP-6-2	TP-6-3	TP-6-4	TP-7	TP-8	TP-9	Table 8 Standards**
		28-Mar-18	28-Mar-18	28-Mar-18	28-Mar-18	28-Mar-18	28-Mar-18	28-Mar-18	28-Mar-18	28-Mar-18	
Laboratory ID		GIS074	GIS075	GIL1491	GMGS47	GMGS48	GMGS49	GIS07E	GIS077	GIS078	
Antimony		<0.20						<0.20	<0.20	<0.20	1.3
Arsenic		1.9		1.7				1.9	1.8	1.5	18
Barium		67		67				50	42	52	220
Beryllium		0.4		0.37				0.36	0.27	0.31	2.5
Boron (Hot Water Soluble)		0.28		0.3				0.25	0.33	0.35	1.5
Cadmium		0.12		<0.10				<0.10	<0.10	<0.10	1.2
Chromium		16		16				13	11	13	70
Chromium VI		<0.2		<0.2				<0.2	<0.2	<0.2	0.66
Cobalt		6		6				5.3	4.5	4.8	22
Copper		12		13				10	9.9	9.6	52
Lead		8.5		8.5				8.5	7.6	6.6	120
Mercury		<0.050		<0.050				<0.050	<0.050	<0.050	0.27
Molybdenum		<0.50		<0.50				<0.50	<0.50	<0.50	2
Nickel		13		13				11	9.5	10	82
Selenium		<0.50		<0.50				<0.50	<0.50	<0.50	1.5
Silver		<0.20		<0.20				<0.20	<0.20	<0.20	0.5
Thallium		0.12		0.087				0.098	0.083	0.073	1
Vanadium		27		23				25	20	21	86
Zinc		7.8		7.78				7.7	26	31	290
pH		0.68		0.78	0.61	0.6	0.45	0.61	0.54	0.47	NV
Conductivity		3.4		0.99				2.6	1.6	2.6	0.7
Sodium Adsorption Ratio		<0.01		<0.01				<0.01	<0.01	<0.01	0.051
Cyanide, Free		6.3		5.7				<5.0	<5.0	5.2	36
Boron (Total)		0.52		0.55				0.51	0.46	0.42	2.5
Uranium											

\* metres below ground surface

\*\* Table 8, Generic Site Condition Standards for Use within 30 m of a Water Body in a Potable Groundwater Condition



Reference No. 1803-E002

**Table I: Soil Data - Petroleum Hydrocarbon Compounds (PHCs)**

Sample ID	BH1/5	Table B Standards**
Depth (mbsg)*	2.4 - 3.0	
Sample Date	29-Mar-18	
Laboratory ID	GIZ289	
Benzene	<0.020	0.02
Toluene	<0.020	0.2
Ethylbenzene	<0.020	0.05
Total Xylenes	<0.040	0.05
F1 (C6-C10)	<10	25
F2 (C10-C16)	<10	10
F3 (C18-C34)	<50	240
F4 (C34-C50)	<50	120

\* metres below ground surface

\*\* Table B, Generic Site Condition Standards for Use within 30 m of a Water Body in a Potable Groundwater Condition

**Table III: Soil Data - Volatile Organic Compounds (VOCs)**

Sample ID	BH2/5	Table B Standards**
Depth (mbsg*)	2.4 - 3.0	
Sample Date	29-Mar-18	
Laboratory ID	GIZ293	
Acetone	<0.50	16
Benzene	<0.020	0.21
Bromodichloromethane	<0.050	1.5
Bromoform	<0.050	0.27
Bromomethane	<0.050	0.05
Carbon Tetrachloride	<0.050	0.05
Chlorobenzene	<0.050	2.4
Chloroform	<0.050	0.05
Dibromochloromethane	<0.050	2.3
1,2-Dichlorobenzene	<0.050	1.2
1,3-Dichlorobenzene	<0.050	4.8
1,4-Dichlorobenzene	<0.050	0.083
1,1-Dichloroethane	<0.050	0.47
1,2-Dichloroethane	<0.050	0.05
1,1-Dichloroethylene	<0.050	0.05
Cis-1,2-Dichloroethylene	<0.050	1.9
Trans-1,2-Dichloroethylene	<0.050	0.084
1,2-Dichloropropane	<0.050	0.05
Ethylbenzene	<0.020	1.1
Ethylene Dibromide	<0.050	0.05
Methyl Ethyl Ketone	<0.50	16
Methylene Chloride	<0.050	0.1
Methyl Isobutyl Ketone	<0.50	1.7
Methyl-t-Butyl Ether	<0.050	0.75
Styrene	<0.050	0.7
1,1,1,2-Tetrachloroethane	<0.050	0.058
1,1,1,2,2-Tetrachloroethane	<0.050	0.05
Toluene	<0.020	2.3
Tetrachloroethylene	<0.050	0.28
1,1,1-Trichloroethane	<0.050	0.38
1,1,2-Trichloroethane	<0.050	0.05
Trichloroethylene	<0.050	0.061
Vinyl Chloride	<0.020	0.02
Total Xylenes	<0.020	3.1
Dichlorodifluoromethane	<0.050	16
Hexamethylenimine	<0.050	2.8
1,3-Dichloropropane (cis + trans)	<0.050	4
	<0.050	0.05

\* metres below ground surface

\*\* Table B, Generic Site Condition Standards for Use within 30 m of a Water Body in a Potable Groundwater Condition



**Table 1: Soil Data - Polycyclic Aromatic Hydrocarbons (PAHs)**

Sample ID	Depth (mbs)*	Sample Date	Laboratory ID	Table B Standards**
BH3/1A	G12794	0 - 0.3	3/29/2018	
Acenaphthene	<0.0050			0.072
Acenaphthylene	<0.0050			0.053
Anthracene	<0.0050			0.22
Benzo(a)anthracene	<0.0050			0.36
Benzo(a)pyrene	<0.0050			0.3
Benzo(b)fluoranthene	<0.0050			0.47
Benzo(k)fluoranthene	<0.0050			0.58
Chrysene	<0.0050			2.8
Dibenz(a,h)anthracene	<0.0050			0.1
Fluoranthene	<0.0050			0.69
Fluorene	<0.0050			0.19
Indeno(1,2,3-cd)pyrene	<0.0050			0.23
Naphthalene	<0.0050			0.09
Phenanthrene	<0.0050			0.69
Pyrene	<0.0050			1
Methylnaphthalene, 2-(1-)				0.59

\* metres below ground surface

\*\* Table B, Generic Site Condition Standards for Use within 30 m of a Water Body in a Polluted Groundwater Condition



**Table II – Maximum Concentration (Soil)**

Summary of Inorganics

Parameter	Unit	Max. Conc. *	Sample ID	Sampling Depth (m)
Antimony	ug/g	0.25	TP-4	0 - 0.3
Arsenic	ug/g	3	TP-4	0 - 0.3
Barium	ug/g	98	TP-4	0 - 0.3
Beryllium	ug/g	0.57	TP-4	0 - 0.3
Boron (Hot Water Soluble)	ug/g	0.44	TP-2	0 - 0.3
Cadmium	ug/g	0.24	TP-4	0 - 0.3
Chromium	ug/g	21	TP-4	0 - 0.3
Chromium VI	ug/g	<0.02	-	-
Cobalt	ug/g	9.9	TP-2	0 - 0.3
Copper	ug/g	21	TP-2	0 - 0.3
Lead	ug/g	29	TP-4	0 - 0.3
Mercury	ug/g	0.054	TP-4	0 - 0.3
Molybdenum	ug/g	0.57	BH-1/1	0 - 0.6
Nickel	ug/g	23	TP-2	0 - 0.3
Selenium	ug/g	<0.05	-	-
Silver	ug/g	<0.02	-	-
Thallium	ug/g	0.23	TP-2	0 - 0.3
Vanadium	ug/g	50	TP-4	0 - 0.3
Zinc	ug/g	81	TP-4	0 - 0.3
Conductivity	ms/cm	0.97	TP-6	0 - 1.3
Sodium Adsorption Ratio	-	3.7	TP-2	0 - 0.3
Cyanide, Free	ug/g	<0.01	-	-
Boron (Total)	ug/g	8.4	TP-4	0 - 0.3
Uranium	ug/g	0.6	TP-4	0 - 0.3

\*Max. Conc. - Maximum Concentration

**Summary of CCME F1-F4**

Parameter	Unit	Max. Conc. *	Sample ID	Sampling Depth (m)
F1 (C6-C10)	ug/g	<10	-	-
F2 (C10-C16)	ug/g	<10	-	-
F3 (C16-C34)	ug/g	<50	-	-
F4 (C34-C50)	ug/g	<50	-	-

\*Max. Conc. - Maximum Concentration



Reference No. 1803-E002

**Table II – Maximum Concentration (Soil)**

Parameter	Unit	Max. Conc. *	Sample ID	Sampling Depth (m)
Acetone	µg/g	<0.50	-	-
Benzene	µg/g	<0.020	-	-
Bromodichloromethane	µg/g	<0.050	-	-
Bromoform	µg/g	<0.050	-	-
Bromomethane	µg/g	<0.050	-	-
Carbor. Tetrachloride	µg/g	<0.050	-	-
Chlorobenzene	µg/g	<0.050	-	-
Chloroform	µg/g	<0.050	-	-
Dibromochloromethane	µg/g	<0.050	-	-
1,2-Dichlorobenzene	µg/g	<0.050	-	-
1,3-Dichlorobenzene	µg/g	<0.050	-	-
1,4-Dichlorobenzene	µg/g	<0.050	-	-
1,1-Dichloroethane	µg/g	<0.050	-	-
1,2-Dichloroethane	µg/g	<0.050	-	-
1,1-Dichloroethylene	µg/g	<0.050	-	-
Cis-1,2-Dichloroethylene	µg/g	<0.050	-	-
Trans-1,2-Dichloroethylene	µg/g	<0.050	-	-
1,2-Dichloropropane	µg/g	<0.050	-	-
Ethylbenzene	µg/g	<0.020	-	-
Ethylene Dibromide	µg/g	<0.050	-	-
Methyl Ethyl Ketone	µg/g	<0.50	-	-
Methylene Chloride	µg/g	<0.050	-	-
Methyl Isobutyl Ketone	µg/g	<0.50	-	-
Methyl-t-Butyl Ether	µg/g	<0.050	-	-
Styrene	µg/g	<0.050	-	-
1,1,1,2-Tetrachloroethane	µg/g	<0.050	-	-
1,1,2,2-Tetrachloroethane	µg/g	<0.050	-	-
Toluene	µg/g	<0.020	-	-
Tetrachloroethylene	µg/g	<0.050	-	-
1,1,1-Trichloroethane	µg/g	<0.050	-	-
1,1,2-Trichloroethane	µg/g	<0.050	-	-
Trichloroethylene	µg/g	<0.050	-	-
Vinyl Chloride	µg/g	<0.020	-	-
Total Xylenes	µg/g	<0.020	-	-
Dichlorodifluoromethane	µg/g	<0.050	-	-
Hexane(n)	µg/g	<0.050	-	-
Trichlorofluoromethane	µg/g	<0.050	-	-
1,3-Dichloropropene (cis + trans)	µg/g	<0.050	-	-

\*Max. Conc. - Maximum Concentration

**Table V – Maximum Concentration (Soil)**

Parameter	Unit	Max. Conc. *	Sample ID	Sampling Depth (m)
Acenaphthene	µg/g	<0.0050	-	-
Acenaphthylene	µg/g	<0.0050	-	-
Anthracene	µg/g	<0.0050	-	-
Benzo(a)anthracene	µg/g	<0.0050	-	-
Benzo(a)pyrene	µg/g	<0.0050	-	-
Benzo(b)fluoranthene	µg/g	<0.0050	-	-
Benzo(g)hperylene	µg/g	<0.0050	-	-
Benzo(k)fluoranthene	µg/g	<0.0050	-	-
Chrysene	µg/g	<0.0050	-	-
Dibenz(a,h)anthracene	µg/g	<0.0050	-	-
Fluoranthene	µg/g	<0.0050	-	-
Fluorene	µg/g	<0.0050	-	-
Indeno(1,2,3-cd)pyrene	µg/g	<0.0050	-	-
Naphthalene	µg/g	<0.0050	-	-
Phenanthrene	µg/g	<0.0050	-	-
Pyrene	µg/g	<0.0050	-	-
Methylnaphthalene, 2-(1-)	µg/g	-	-	-

\*Max. Conc. - Maximum Concentration



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## **APPENDIX 'A'**

### **BOREHOLE LOGS**

**REFERENCE NO. 1803-E002**

JOB NO.: 1803-E002

# LOG OF BOREHOLE NO.: 1

FIGURE NO.: 1

**PROJECT DESCRIPTION:** Proposed Mixed Residential and Commercial Development

**METHOD OF BORING:** Direct Push

**PROJECT LOCATION:** 2055 Brock Road  
City of Pickering

**DRILLING DATE:** March 29, 2018

El. (masl) Depth (mbgs)	SOIL DESCRIPTION	SAMPLES			Depth Scale (mbgs)	REMARKS	WATER LEVEL
		Number	Type	Gas Reading			
93.40	Ground Surface						
0.0	Brown  SILTY CLAY, Fill some sand and gravel	1	DO	0	0	BH1/1: M&I	
	--- topsoil inclusions	2	DO	0	1		
		3	DO	0	2		
		4	DO	0	3		
91.0	Grey, wet SILTY CLAY	5	DO	0	3.4		
90.4	END OF BOREHOLE				3.0		



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JOB NO.: 1803-E002

# LOG OF BOREHOLE NO.: 2

FIGURE NO.: 2

**PROJECT DESCRIPTION:** Proposed Mixed Residential and Commercial Development

**METHOD OF BORING:** Direct Push

**PROJECT LOCATION:** 2055 Brock Road  
City of Pickering

**DRILLING DATE:** March 29, 2018

El. (masl) Depth (mbgs)	SOIL DESCRIPTION	SAMPLES			Depth Scale (mbgs)	REMARKS	WATER LEVEL
		Number	Type	Gas Reading			
93.40	Ground Surface						
0.0	Brown  SILTY CLAY, Fill some sand and gravel	1	DO	0	0	BH2/1: M&I	
		2	DO	0	1		
		3	DO	0	2		
	topsoil inclusions	4	DO	0	2		
91.0 2.4	Grey  SANDY SILT trace of clay	5	DO	0	3	BH2/5: VOC	
90.4 3.0	END OF BOREHOLE				3		
					4		
					5		
					6		



**Soil Engineers Ltd.**



JOB NO.: 1803-E002

# LOG OF BOREHOLE NO.: 3

FIGURE NO.: 3

**PROJECT DESCRIPTION:** Proposed Mixed Residential and Commercial Development

**METHOD OF BORING:** Direct Push

**PROJECT LOCATION:** 2055 Brock Road  
City of Pickering

**DRILLING DATE:** March 29, 2018

El. (masl) Depth (mbgs)	SOIL DESCRIPTION	SAMPLES			Depth Scale (mbgs)	REMARKS	WATER LEVEL
		Number	Type	Gas Reading			
93.20	Ground Surface						
0.0	Brown SILTY SAND, Fill	1A	DO	0	0	BH3/1A: PAH	
92.9	Brown  SAND, Fill with gravel trace of clay	1B	DO	0	0	BH3/1B: M&I + Dup	
0.3		2	DO	0	0		
92.0	Brown  SILTY CLAY with sand and topsoil inclusions	3A	DO	0	0		
1.2		3B	DO	0	0		
		4	DO	0	0		
		5	DO	0	0		
90.2	END OF BOREHOLE				3		
3.0					4		
					5		
					6		



**Soil Engineers Ltd.**

JOB NO.: 1803-E002

# LOG OF TEST PIT NO.: 1

FIGURE NO.: 1

**PROJECT DESCRIPTION:** Proposed Mixed Residential and Commercial Development

**METHOD OF BORING:**

**PROJECT LOCATION:** 2055 Brock Road  
City of Pickering

**DRILLING DATE:** March 28, 2018

El. (masl) Depth (mbgs)	SOIL DESCRIPTION	SAMPLES			Depth Scale (mbgs)	REMARKS	WATER LEVEL
		Number	Type	Gas Reading			
0.00 0.0							
0.5	SILTY CLAY, FIII	1	CS	0	0	TP1: M&I	
	END OF TEST PIT				1		
					2		
					3		
					4		
					5		
					6		



**Soil Engineers Ltd.**

JOB NO.: 1803-E002

# LOG OF TEST PIT NO.: 2

FIGURE NO.: 2

PROJECT DESCRIPTION: Proposed Mixed Residential and Commercial Development

METHOD OF BORING:

PROJECT LOCATION: 2055 Brock Road  
City of Pickering

DRILLING DATE: March 28, 2018

El. (masl) Depth (mbgs)	SOIL DESCRIPTION	SAMPLES			Depth Scale (mbgs)	● Gas Reading (ppm) 20 60 100 140 180	REMARKS	WATER LEVEL
		Number	Type	Gas Reading				
0.00 0.0								
0.3	SILTY CLAY, Fill	1	CS	0	0		TP2: M&I	
	END OF TEST PIT				1			
					2			
					3			
					4			
					5			
					6			



Soil Engineers Ltd.

JOB NO.: 1803-E002

# LOG OF TEST PIT NO.: 3

FIGURE NO.: 3

**PROJECT DESCRIPTION:** Proposed Mixed Residential and Commercial Development

**METHOD OF BORING:**

**PROJECT LOCATION:** 2055 Brock Road  
City of Pickering

**DRILLING DATE:** March 28, 2018

El. (masl) Depth (mbgs)	SOIL DESCRIPTION	SAMPLES			Depth Scale (mbgs)	REMARKS	WATER LEVEL
		Number	Type	Gas Reading			
0.00							
0.0	SILTY CLAY, Fill	1	CS	0	0	TP3: M&I	
0.3	END OF TEST PIT						
					1		
					2		
					3		
					4		
					5		
					6		



**Soil Engineers Ltd.**

JOB NO.: 1803-E002

# LOG OF TEST PIT NO.: 4

FIGURE NO.: 4

PROJECT DESCRIPTION: Proposed Mixed Residential and Commercial Development

METHOD OF BORING:

PROJECT LOCATION: 2055 Brock Road  
City of Pickering

DRILLING DATE: March 28, 2018

El. (masl) Depth (mbgs)	SOIL DESCRIPTION	SAMPLES			Depth Scale (mbgs)	REMARKS	WATER LEVEL
		Number	Type	Gas Reading			
0.00							
0.0	SILTY CLAY, Fill	1	CS	0	0	TP4: M&I	
0.3	END OF TEST PIT						
					1		
					2		
					3		
					4		
					5		
					6		



Soil Engineers Ltd.

JOB NO.: 1803-E002

# LOG OF TEST PIT NO.: 5

FIGURE NO.: 5

PROJECT DESCRIPTION: Proposed Mixed Residential and Commercial Development

METHOD OF BORING:

PROJECT LOCATION: 2055 Brock Road  
City of Pickering

DRILLING DATE: March 28, 2018

El. (masl) Depth (mbgs)	SOIL DESCRIPTION	SAMPLES			Depth Scale (mbgs)	REMARKS	WATER LEVEL
		Number	Type	Gas Reading			
0.00 0.0	SILTY CLAY, Fill	1	CS	0	0	TP5: M&I	
1.5	END OF TEST PIT				2		
					3		
					4		
					5		
					6		



Soil Engineers Ltd.

JOB NO.: 1803-E002

# LOG OF TEST PIT NO.: 6

FIGURE NO.: 6

PROJECT DESCRIPTION: Proposed Mixed Residential and Commercial Development

METHOD OF BORING:

PROJECT LOCATION: 2055 Brock Road  
City of Pickering

DRILLING DATE: March 28, 2018

El. (masl) Depth (mbgs)	SOIL DESCRIPTION	SAMPLES			Depth Scale (mbgs)	REMARKS	WATER LEVEL
		Number	Type	Gas Reading			
0.00 0.0	SILTY CLAY, Fill	1	CS	0	0	TP6: M&I	
1.3	END OF TEST PIT				2		
					3		
					4		
					5		
					6		



**Soil Engineers Ltd.**

JOB NO.: 1803-E002

# LOG OF TEST PIT NO.: 7

FIGURE NO.: 7

**PROJECT DESCRIPTION:** Proposed Mixed Residential and Commercial Development

**METHOD OF BORING:**

**PROJECT LOCATION:** 2055 Brock Road  
City of Pickering

**DRILLING DATE:** March 28, 2018

El. (masl) Depth (mbgs)	SOIL DESCRIPTION	SAMPLES			Depth Scale (mbgs)	REMARKS	WATER LEVEL
		Number	Type	Gas Reading			
0.00							
0.0	SILTY CLAY, Fill	1	CS	0	0	TP7: M&I	
1.0	END OF TEST PIT				1		
					2		
					3		
					4		
					5		
					6		



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JOB NO.: 1803-E002

# LOG OF TEST PIT NO.: 8

FIGURE NO.: 8

**PROJECT DESCRIPTION:** Proposed Mixed Residential and Commercial Development

**METHOD OF BORING:**

**PROJECT LOCATION:** 2055 Brock Road  
City of Pickering

**DRILLING DATE:** March 28, 2018

El. (masl) Depth (mbgs)	SOIL DESCRIPTION	SAMPLES			Depth Scale (mbgs)	REMARKS	WATER LEVEL
		Number	Type	Gas Reading			
0.00 0.0	SILTY CLAY, Fill	1	CS	0	0	TP8: M&I	
1.5	END OF TEST PIT				2		
					3		
					4		
					5		
					6		



**Soil Engineers Ltd.**

JOB NO.: 1803-E002

# LOG OF TEST PIT NO.: 9

FIGURE NO.: 9

**PROJECT DESCRIPTION:** Proposed Mixed Residential and Commercial Development

**METHOD OF BORING:**

**PROJECT LOCATION:** 2055 Brock Road  
City of Pickering

**DRILLING DATE:** March 28, 2018

El. (masl) Depth (mbgs)	SOIL DESCRIPTION	SAMPLES			Depth Scale (mbgs)	REMARKS	WATER LEVEL
		Number	Type	Gas Reading			
0.00 0.0	SILTY CLAY, Fill	1	CS	0	● Gas Reading (ppm) 20 60 100 140 180	TP9: M&I	
2.5							



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## **APPENDIX 'B'**

### **CERTIFICATE OF ANALYSIS (SOIL SAMPLES)**

**REFERENCE NO. 1803-E002**

Your Project #: 1803-E002  
Your C.O.C. #: 656459-01-01, 652037-33-01

**Attention: Zoe Hawkes**

Soil Engineers Ltd  
90 West Beaver Creek Road  
Unit 100  
Richmond Hill, ON  
CANADA L4B 1E7

**Report Date: 2018/04/06**  
Report #: R5067436  
Version: 1 - Final

**CERTIFICATE OF ANALYSIS**

**MAXXAM JOB #: B870888**

**Received: 2018/03/29, 15:00**

Sample Matrix: Soil  
# Samples Received: 7

Analyses	Quantity	Date		Laboratory Method	Reference
		Extracted	Analyzed		
Methylnaphthalene Sum	1	N/A	2018/04/06	CAM SOP-00301	EPA 8270D m
Hot Water Extractable Boron	4	2018/04/03	2018/04/03	CAM SOP-00408	R153 Ana. Prot. 2011
1,3-Dichloropropene Sum	1	N/A	2018/04/05		EPA 8260C m
Free (WAD) Cyanide	3	2018/04/03	2018/04/04	CAM SOP-00457	OMOE E3015 m
Hexavalent Chromium in Soil by IC (1)	4	2018/04/04	2018/04/05	CAM SOP-00436	EPA 3060/7199 m
Petroleum Hydro. CCME F1 & BTEX in Soil (2)	1	N/A	2018/04/04	CAM SOP-00315	CCME PHC-CWS m
Petroleum Hydrocarbons F2-F4 in Soil (3)	1	2018/04/02	2018/04/03	CAM SOP-00316	CCME CWS m
Strong Acid Leachable Metals by ICPMS	3	2018/04/03	2018/04/03	CAM SOP-00447	EPA 6020B m
Strong Acid Leachable Metals by ICPMS	1	2018/04/03	2018/04/04	CAM SOP-00447	EPA 6020B m
Moisture	6	N/A	2018/04/03	CAM SOP-00445	Carter 2nd ed 51.2 m
Moisture	1	N/A	2018/04/05	CAM SOP-00445	Carter 2nd ed 51.2 m
PAH Compounds in Soil by GC/MS (SIM)	1	2018/04/04	2018/04/04	CAM SOP-00318	EPA 8270D m
pH CaCl2 EXTRACT	1	2018/04/03	2018/04/03	CAM SOP-00413	EPA 9045 D m
pH CaCl2 EXTRACT	3	2018/04/04	2018/04/04	CAM SOP-00413	EPA 9045 D m
Volatile Organic Compounds in Soil	1	N/A	2018/04/04	CAM SOP-00228	EPA 8260C m

**Remarks:**

Maxxam Analytics' laboratories are accredited to ISO/IEC 17025:2005 for specific parameters on scopes of accreditation. Unless otherwise noted, procedures used by Maxxam are based upon recognized Provincial, Federal or US method compendia such as CCME, MDDELCC, EPA, APHA.

All work recorded herein has been done in accordance with procedures and practices ordinarily exercised by professionals in Maxxam's profession using accepted testing methodologies, quality assurance and quality control procedures (except where otherwise agreed by the client and Maxxam in writing). All data is in statistical control and has met quality control and method performance criteria unless otherwise noted. All method blanks are reported; unless indicated otherwise, associated sample data are not blank corrected.

Maxxam Analytics' liability is limited to the actual cost of the requested analyses, unless otherwise agreed in writing. There is no other warranty expressed or implied. Maxxam has been retained to provide analysis of samples provided by the Client using the testing methodology referenced in this report. Interpretation and use of test results are the sole responsibility of the Client and are not within the scope of services provided by Maxxam, unless otherwise agreed in writing.

Solid sample results, except biota, are based on dry weight unless otherwise indicated. Organic analyses are not recovery corrected except for isotope dilution methods.

Your Project #: 1803-E002  
Your C.O.C. #: 656459-01-01, 652037-33-01

**Attention: Zoe Hawkes**

Soil Engineers Ltd  
90 West Beaver Creek Road  
Unit 100  
Richmond Hill, ON  
CANADA L4B 1E7

**Report Date: 2018/04/06**  
Report #: R5067436  
Version: 1 - Final

**CERTIFICATE OF ANALYSIS**

**MAXXAM JOB #: B870888**

**Received: 2018/03/29, 15:00**

Results relate to samples tested.

This Certificate shall not be reproduced except in full, without the written approval of the laboratory.

Reference Method suffix "m" indicates test methods incorporate validated modifications from specific reference methods to improve performance.

\* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.

(1) Soils are reported on a dry weight basis unless otherwise specified.

(2) No lab extraction date is given for F1BTEX & VOC samples that are field preserved with methanol. Extraction date is the date sampled unless otherwise stated.

(3) All CCME PHC results met required criteria unless otherwise stated in the report. The CWS PHC methods employed by Maxxam conform to all prescribed elements of the reference method and performance based elements have been validated. All modifications have been validated and proven equivalent following "Alberta Environment's Interpretation of the Reference Method for the Canada-Wide Standard for Petroleum Hydrocarbons in Soil Validation of Performance-Based Alternative Methods September 2003". Documentation is available upon request. Modifications from Reference Method for the Canada-wide Standard for Petroleum Hydrocarbons in Soil-Tier 1 Method: F2/F3/F4 data reported using validated cold solvent extraction instead of Soxhlet extraction.

Encryption Key



Maxxam

06 Apr 2018 14:07:21

Please direct all questions regarding this Certificate of Analysis to your Project Manager.

Antonella Brasil, Senior Project Manager

Email: ABrasil@maxxam.ca

Phone# (905)817-5817

=====  
This report has been generated and distributed using a secure automated process.

Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

**O.REG 153 METALS PACKAGE (SOIL)**

Maxxam ID		GIZ285	GIZ290		GIZ317			GIZ317		
Sampling Date		2018/03/29	2018/03/29		2018/03/29			2018/03/29		
COC Number		656459-01-01	656459-01-01		652037-33-01			652037-33-01		
	UNITS	BH1/1	BH2/1	QC Batch	BH3/1B	RDL	QC Batch	BH3/1B Lab-Dup	RDL	QC Batch

Inorganics										
Moisture	%	8.0	12	5467099	5.4	1.0	5467099	5.8	1.0	5467099
Chromium (VI)	ug/g	<0.2	<0.2	5469665	<0.2	0.2	5469665			

Metals										
Hot Water Ext. Boron (B)	ug/g	0.29	0.19	5467094	0.080	0.050	5467094			
Acid Extractable Antimony (Sb)	ug/g	<0.20	<0.20	5467210	<0.20	0.20	5467295			
Acid Extractable Arsenic (As)	ug/g	2.3	1.5	5467210	<1.0	1.0	5467295			
Acid Extractable Barium (Ba)	ug/g	61	51	5467210	20	0.50	5467295			
Acid Extractable Beryllium (Be)	ug/g	0.43	0.35	5467210	0.22	0.20	5467295			
Acid Extractable Boron (B)	ug/g	6.4	5.7	5467210	<5.0	5.0	5467295			
Acid Extractable Cadmium (Cd)	ug/g	0.12	<0.10	5467210	<0.10	0.10	5467295			
Acid Extractable Chromium (Cr)	ug/g	20	15	5467210	6.3	1.0	5467295			
Acid Extractable Cobalt (Co)	ug/g	7.1	5.7	5467210	2.4	0.10	5467295			
Acid Extractable Copper (Cu)	ug/g	19	12	5467210	2.6	0.50	5467295			
Acid Extractable Lead (Pb)	ug/g	12	8.5	5467210	4.4	1.0	5467295			
Acid Extractable Molybdenum (Mo)	ug/g	0.57	<0.50	5467210	<0.50	0.50	5467295			
Acid Extractable Nickel (Ni)	ug/g	16	12	5467210	4.5	0.50	5467295			
Acid Extractable Selenium (Se)	ug/g	<0.50	<0.50	5467210	<0.50	0.50	5467295			
Acid Extractable Silver (Ag)	ug/g	<0.20	<0.20	5467210	<0.20	0.20	5467295			
Acid Extractable Thallium (Tl)	ug/g	0.15	0.094	5467210	<0.050	0.050	5467295			
Acid Extractable Uranium (U)	ug/g	0.56	0.49	5467210	0.35	0.050	5467295			
Acid Extractable Vanadium (V)	ug/g	28	23	5467210	14	5.0	5467295			
Acid Extractable Zinc (Zn)	ug/g	45	33	5467210	16	5.0	5467295			
Acid Extractable Mercury (Hg)	ug/g	<0.050	<0.050	5467210	<0.050	0.050	5467295			

RDL = Reportable Detection Limit  
QC Batch = Quality Control Batch  
Lab-Dup = Laboratory Initiated Duplicate

**O.REG 153 METALS PACKAGE (SOIL)**

Maxxam ID		GIZ321		
Sampling Date		2018/03/29		
COC Number		652037-33-01		
	UNITS	DUP-S1	RDL	QC Batch
<b>Inorganics</b>				
Moisture	%	5.2	1.0	5467099
Chromium (VI)	ug/g	<0.2	0.2	5469665
<b>Metals</b>				
Hot Water Ext. Boron (B)	ug/g	0.060	0.050	5467094
Acid Extractable Antimony (Sb)	ug/g	<0.20	0.20	5467210
Acid Extractable Arsenic (As)	ug/g	<1.0	1.0	5467210
Acid Extractable Barium (Ba)	ug/g	19	0.50	5467210
Acid Extractable Beryllium (Be)	ug/g	0.20	0.20	5467210
Acid Extractable Boron (B)	ug/g	<5.0	5.0	5467210
Acid Extractable Cadmium (Cd)	ug/g	<0.10	0.10	5467210
Acid Extractable Chromium (Cr)	ug/g	6.0	1.0	5467210
Acid Extractable Cobalt (Co)	ug/g	2.3	0.10	5467210
Acid Extractable Copper (Cu)	ug/g	2.5	0.50	5467210
Acid Extractable Lead (Pb)	ug/g	4.2	1.0	5467210
Acid Extractable Molybdenum (Mo)	ug/g	<0.50	0.50	5467210
Acid Extractable Nickel (Ni)	ug/g	4.5	0.50	5467210
Acid Extractable Selenium (Se)	ug/g	<0.50	0.50	5467210
Acid Extractable Silver (Ag)	ug/g	<0.20	0.20	5467210
Acid Extractable Thallium (Tl)	ug/g	<0.050	0.050	5467210
Acid Extractable Uranium (U)	ug/g	0.32	0.050	5467210
Acid Extractable Vanadium (V)	ug/g	12	5.0	5467210
Acid Extractable Zinc (Zn)	ug/g	16	5.0	5467210
Acid Extractable Mercury (Hg)	ug/g	<0.050	0.050	5467210
RDL = Reportable Detection Limit				
QC Batch = Quality Control Batch				

**O.REG 153 PAHS (SOIL)**

Maxxam ID		GIZ294			GIZ294		
Sampling Date		2018/03/29			2018/03/29		
COC Number		656459-01-01			656459-01-01		
	UNITS	BH3/1A	RDL	QC Batch	BH3/1A Lab-Dup	RDL	QC Batch
<b>Inorganics</b>							
Moisture	%	9.8	1.0	5469094	9.8	1.0	5469094
<b>Calculated Parameters</b>							
Methylnaphthalene, 2-(1-)	ug/g	<0.0071	0.0071	5465375			
<b>Polyaromatic Hydrocarbons</b>							
Acenaphthene	ug/g	<0.0050	0.0050	5469511			
Acenaphthylene	ug/g	<0.0050	0.0050	5469511			
Anthracene	ug/g	<0.0050	0.0050	5469511			
Benzo(a)anthracene	ug/g	<0.0050	0.0050	5469511			
Benzo(a)pyrene	ug/g	<0.0050	0.0050	5469511			
Benzo(b/j)fluoranthene	ug/g	<0.0050	0.0050	5469511			
Benzo(g,h,i)perylene	ug/g	<0.0050	0.0050	5469511			
Benzo(k)fluoranthene	ug/g	<0.0050	0.0050	5469511			
Chrysene	ug/g	<0.0050	0.0050	5469511			
Dibenz(a,h)anthracene	ug/g	<0.0050	0.0050	5469511			
Fluoranthene	ug/g	<0.0050	0.0050	5469511			
Fluorene	ug/g	<0.0050	0.0050	5469511			
Indeno(1,2,3-cd)pyrene	ug/g	<0.0050	0.0050	5469511			
1-Methylnaphthalene	ug/g	<0.0050	0.0050	5469511			
2-Methylnaphthalene	ug/g	<0.0050	0.0050	5469511			
Naphthalene	ug/g	<0.0050	0.0050	5469511			
Phenanthrene	ug/g	<0.0050	0.0050	5469511			
Pyrene	ug/g	<0.0050	0.0050	5469511			
<b>Surrogate Recovery (%)</b>							
D10-Anthracene	%	87		5469511			
D14-Terphenyl (FS)	%	89		5469511			
D8-Acenaphthylene	%	83		5469511			
RDL = Reportable Detection Limit QC Batch = Quality Control Batch Lab-Dup = Laboratory Initiated Duplicate							



**O.REG 153 PETROLEUM HYDROCARBONS (SOIL)**

<b>Maxxam ID</b>		GIZ289		
<b>Sampling Date</b>		2018/03/29		
<b>COC Number</b>		656459-01-01		
	<b>UNITS</b>	<b>BH1/5</b>	<b>RDL</b>	<b>QC Batch</b>
<b>Inorganics</b>				
Moisture	%	19	1.0	5467274
<b>BTEX &amp; F1 Hydrocarbons</b>				
Benzene	ug/g	<0.020	0.020	5466683
Toluene	ug/g	<0.020	0.020	5466683
Ethylbenzene	ug/g	<0.020	0.020	5466683
o-Xylene	ug/g	<0.020	0.020	5466683
p+m-Xylene	ug/g	<0.040	0.040	5466683
Total Xylenes	ug/g	<0.040	0.040	5466683
F1 (C6-C10)	ug/g	<10	10	5466683
F1 (C6-C10) - BTEX	ug/g	<10	10	5466683
<b>F2-F4 Hydrocarbons</b>				
F2 (C10-C16 Hydrocarbons)	ug/g	<10	10	5466678
F3 (C16-C34 Hydrocarbons)	ug/g	<50	50	5466678
F4 (C34-C50 Hydrocarbons)	ug/g	<50	50	5466678
Reached Baseline at C50	ug/g	Yes		5466678
<b>Surrogate Recovery (%)</b>				
1,4-Difluorobenzene	%	104		5466683
4-Bromofluorobenzene	%	96		5466683
D10-Ethylbenzene	%	90		5466683
D4-1,2-Dichloroethane	%	104		5466683
o-Terphenyl	%	87		5466678
RDL = Reportable Detection Limit QC Batch = Quality Control Batch				

**O.REG 153 VOCS BY HS (SOIL)**

Maxxam ID		GIZ293			GIZ293		
Sampling Date		2018/03/29			2018/03/29		
COC Number		656459-01-01			656459-01-01		
	UNITS	BH2/5	RDL	QC Batch	BH2/5 Lab-Dup	RDL	QC Batch
<b>Inorganics</b>							
Moisture	%	13	1.0	5467243	13	1.0	5467243
<b>Calculated Parameters</b>							
1,3-Dichloropropene (cis+trans)	ug/g	<0.050	0.050	5465383			
<b>Volatile Organics</b>							
Acetone (2-Propanone)	ug/g	<0.50	0.50	5467202	<0.50	0.50	5467202
Benzene	ug/g	<0.020	0.020	5467202	<0.020	0.020	5467202
Bromodichloromethane	ug/g	<0.050	0.050	5467202	<0.050	0.050	5467202
Bromoform	ug/g	<0.050	0.050	5467202	<0.050	0.050	5467202
Bromomethane	ug/g	<0.050	0.050	5467202	<0.050	0.050	5467202
Carbon Tetrachloride	ug/g	<0.050	0.050	5467202	<0.050	0.050	5467202
Chlorobenzene	ug/g	<0.050	0.050	5467202	<0.050	0.050	5467202
Chloroform	ug/g	<0.050	0.050	5467202	<0.050	0.050	5467202
Dibromochloromethane	ug/g	<0.050	0.050	5467202	<0.050	0.050	5467202
1,2-Dichlorobenzene	ug/g	<0.050	0.050	5467202	<0.050	0.050	5467202
1,3-Dichlorobenzene	ug/g	<0.050	0.050	5467202	<0.050	0.050	5467202
1,4-Dichlorobenzene	ug/g	<0.050	0.050	5467202	<0.050	0.050	5467202
Dichlorodifluoromethane (FREON 12)	ug/g	<0.050	0.050	5467202	<0.050	0.050	5467202
1,1-Dichloroethane	ug/g	<0.050	0.050	5467202	<0.050	0.050	5467202
1,2-Dichloroethane	ug/g	<0.050	0.050	5467202	<0.050	0.050	5467202
1,1-Dichloroethylene	ug/g	<0.050	0.050	5467202	<0.050	0.050	5467202
cis-1,2-Dichloroethylene	ug/g	<0.050	0.050	5467202	<0.050	0.050	5467202
trans-1,2-Dichloroethylene	ug/g	<0.050	0.050	5467202	<0.050	0.050	5467202
1,2-Dichloropropane	ug/g	<0.050	0.050	5467202	<0.050	0.050	5467202
cis-1,3-Dichloropropene	ug/g	<0.030	0.030	5467202	<0.030	0.030	5467202
trans-1,3-Dichloropropene	ug/g	<0.040	0.040	5467202	<0.040	0.040	5467202
Ethylbenzene	ug/g	<0.020	0.020	5467202	<0.020	0.020	5467202
Ethylene Dibromide	ug/g	<0.050	0.050	5467202	<0.050	0.050	5467202
Hexane	ug/g	<0.050	0.050	5467202	<0.050	0.050	5467202
Methylene Chloride(Dichloromethane)	ug/g	<0.050	0.050	5467202	<0.050	0.050	5467202
Methyl Ethyl Ketone (2-Butanone)	ug/g	<0.50	0.50	5467202	<0.50	0.50	5467202
Methyl Isobutyl Ketone	ug/g	<0.50	0.50	5467202	<0.50	0.50	5467202
Methyl t-butyl ether (MTBE)	ug/g	<0.050	0.050	5467202	<0.050	0.050	5467202
Styrene	ug/g	<0.050	0.050	5467202	<0.050	0.050	5467202
1,1,1,2-Tetrachloroethane	ug/g	<0.050	0.050	5467202	<0.050	0.050	5467202
1,1,2,2-Tetrachloroethane	ug/g	<0.050	0.050	5467202	<0.050	0.050	5467202
RDL = Reportable Detection Limit QC Batch = Quality Control Batch Lab-Dup = Laboratory Initiated Duplicate							

**O.REG 153 VOCS BY HS (SOIL)**

Maxxam ID		GIZ293			GIZ293		
Sampling Date		2018/03/29			2018/03/29		
COC Number		656459-01-01			656459-01-01		
	UNITS	BH2/5	RDL	QC Batch	BH2/5 Lab-Dup	RDL	QC Batch
Tetrachloroethylene	ug/g	<0.050	0.050	5467202	<0.050	0.050	5467202
Toluene	ug/g	<0.020	0.020	5467202	<0.020	0.020	5467202
1,1,1-Trichloroethane	ug/g	<0.050	0.050	5467202	<0.050	0.050	5467202
1,1,2-Trichloroethane	ug/g	<0.050	0.050	5467202	<0.050	0.050	5467202
Trichloroethylene	ug/g	<0.050	0.050	5467202	<0.050	0.050	5467202
Trichlorofluoromethane (FREON 11)	ug/g	<0.050	0.050	5467202	<0.050	0.050	5467202
Vinyl Chloride	ug/g	<0.020	0.020	5467202	<0.020	0.020	5467202
p+m-Xylene	ug/g	<0.020	0.020	5467202	<0.020	0.020	5467202
o-Xylene	ug/g	<0.020	0.020	5467202	<0.020	0.020	5467202
Total Xylenes	ug/g	<0.020	0.020	5467202	<0.020	0.020	5467202
<b>Surrogate Recovery (%)</b>							
4-Bromofluorobenzene	%	100		5467202	101		5467202
D10-o-Xylene	%	121		5467202	120		5467202
D4-1,2-Dichloroethane	%	96		5467202	95		5467202
D8-Toluene	%	98		5467202	96		5467202
RDL = Reportable Detection Limit QC Batch = Quality Control Batch Lab-Dup = Laboratory Initiated Duplicate							

**RESULTS OF ANALYSES OF SOIL**

Maxxam ID		GIZ285			:GIZ289		GIZ290	GIZ317		
Sampling Date		2018/03/29			2018/03/29		2018/03/29	2018/03/29		
COC Number		656459-01-01			656459-01-01		656459-01-01	652037-33-01		
	UNITS	BH1/1	RDL	QC Batch	BH1/5	QC Batch	BH2/1	BH3/1B	RDL	QC Batch
<b>Inorganics</b>										
Available (CaCl2) pH	pH	7.66		5467443	7.42	5466868	7.79	7.56		5467443
WAD Cyanide (Free)	ug/g	<0.01	0.01	5467248			<0.01	<0.01	0.01	5467248
RDL = Reportable Detection Limit										
QC Batch = Quality Control Batch										

**TEST SUMMARY**

**Maxxam ID:** GIZ285  
**Sample ID:** BH1/1  
**Matrix:** Soil

**Collected:** 2018/03/29  
**Shipped:**  
**Received:** 2018/03/29

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Hot Water Extractable Boron	ICP	5467094	2018/04/03	2018/04/03	Suban Kanapathipillai
Free (WAD) Cyanide	TECH	5467248	2018/04/03	2018/04/04	Louise Harding
Hexavalent Chromium in Soil by IC	IC/SPEC	5469665	2018/04/04	2018/04/05	Sally Coughlin
Strong Acid Leachable Metals by ICPMS	ICP/MS	5467210	2018/04/03	2018/04/03	Daniel Teclu
Moisture	BAL	5467099	N/A	2018/04/03	Prgya Panchal
pH CaCl2 EXTRACT	AT	5467443	2018/04/04	2018/04/04	Surinder Rai

**Maxxam ID:** GIZ289  
**Sample ID:** BH1/5  
**Matrix:** Soil

**Collected:** 2018/03/29  
**Shipped:**  
**Received:** 2018/03/29

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Petroleum Hydro. CCME F1 & BTEX in Soil	HSGC/MSFD	5466683	N/A	2018/04/04	Ravinder Gaidhu
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	5466678	2018/04/02	2018/04/03	Anna Stuglik Rolland
Moisture	BAL	5467274	N/A	2018/04/03	Gurpreet Kaur
pH CaCl2 EXTRACT	AT	5466868	2018/04/03	2018/04/03	Tahir Anwar

**Maxxam ID:** GIZ290  
**Sample ID:** BH2/1  
**Matrix:** Soil

**Collected:** 2018/03/29  
**Shipped:**  
**Received:** 2018/03/29

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Hot Water Extractable Boron	ICP	5467094	2018/04/03	2018/04/03	Suban Kanapathipillai
Free (WAD) Cyanide	TECH	5467248	2018/04/03	2018/04/04	Louise Harding
Hexavalent Chromium in Soil by IC	IC/SPEC	5469665	2018/04/04	2018/04/05	Sally Coughlin
Strong Acid Leachable Metals by ICPMS	ICP/MS	5467210	2018/04/03	2018/04/03	Daniel Teclu
Moisture	BAL	5467099	N/A	2018/04/03	Prgya Panchal
pH CaCl2 EXTRACT	AT	5467443	2018/04/04	2018/04/04	Surinder Rai

**Maxxam ID:** GIZ293  
**Sample ID:** BH2/5  
**Matrix:** Soil

**Collected:** 2018/03/29  
**Shipped:**  
**Received:** 2018/03/29

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
1,3-Dichloropropene Sum	CALC	5465383	N/A	2018/04/05	Automated Statchk
Moisture	BAL	5467243	N/A	2018/04/03	Gurpreet Kaur
Volatile Organic Compounds in Soil	GC/MS	5467202	N/A	2018/04/04	Juan Pangilinan

**Maxxam ID:** GIZ293 Dup  
**Sample ID:** BH2/5  
**Matrix:** Soil

**Collected:** 2018/03/29  
**Shipped:**  
**Received:** 2018/03/29

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Moisture	BAL	5467243	N/A	2018/04/03	Gurpreet Kaur
Volatile Organic Compounds in Soil	GC/MS	5467202	N/A	2018/04/04	Juan Pangilinan

**TEST SUMMARY**

**Maxxam ID:** GIZ294  
**Sample ID:** BH3/1A  
**Matrix:** Soil

**Collected:** 2018/03/29  
**Shipped:**  
**Received:** 2018/03/29

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Methylnaphthalene Sum	CALC	5465375	N/A	2018/04/06	Automated Statchk
Moisture	BAL	5469094	N/A	2018/04/05	Prgya Panchal
PAH Compounds in Soil by GC/MS (SIM)	GC/MS	5469511	2018/04/04	2018/04/04	Mitesh Raj

**Maxxam ID:** GIZ294 Dup  
**Sample ID:** BH3/1A  
**Matrix:** Soil

**Collected:** 2018/03/29  
**Shipped:**  
**Received:** 2018/03/29

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Moisture	BAL	5469094	N/A	2018/04/05	Prgya Panchal

**Maxxam ID:** GIZ317  
**Sample ID:** BH3/1B  
**Matrix:** Soil

**Collected:** 2018/03/29  
**Shipped:**  
**Received:** 2018/03/29

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Hot Water Extractable Boron	ICP	5467094	2018/04/03	2018/04/03	Suban Kanapathippilai
Free (WAD) Cyanide	TECH	5467248	2018/04/03	2018/04/04	Louise Harding
Hexavalent Chromium in Soil by IC	IC/SPEC	5469665	2018/04/04	2018/04/05	Sally Coughlin
Strong Acid Leachable Metals by ICPMS	ICP/MS	5467295	2018/04/03	2018/04/04	Daniel Teclu
Moisture	BAL	5467099	N/A	2018/04/03	Prgya Panchal
pH CaCl2 EXTRACT	AT	5467443	2018/04/04	2018/04/04	Surinder Rai

**Maxxam ID:** GIZ317 Dup  
**Sample ID:** BH3/1B  
**Matrix:** Soil

**Collected:** 2018/03/29  
**Shipped:**  
**Received:** 2018/03/29

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Moisture	BAL	5467099	N/A	2018/04/03	Prgya Panchal

**Maxxam ID:** GIZ321  
**Sample ID:** DUP-S1  
**Matrix:** Soil

**Collected:** 2018/03/29  
**Shipped:**  
**Received:** 2018/03/29

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Hot Water Extractable Boron	ICP	5467094	2018/04/03	2018/04/03	Suban Kanapathippilai
Hexavalent Chromium in Soil by IC	IC/SPEC	5469665	2018/04/04	2018/04/05	Sally Coughlin
Strong Acid Leachable Metals by ICPMS	ICP/MS	5467210	2018/04/03	2018/04/03	Daniel Teclu
Moisture	BAL	5467099	N/A	2018/04/03	Prgya Panchal

**GENERAL COMMENTS**

Each temperature is the average of up to three cooler temperatures taken at receipt

Package 1	-0.7°C
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**Results relate only to the items tested.**

**QUALITY ASSURANCE REPORT**

QC Batch	Parameter	Date	Matrix Spike		SPIKED BLANK		Method Blank		RPD	
			% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
5466678	o-Terphenyl	2018/04/03	88	60 - 130	87	60 - 130	90	%		
5466683	1,4-Difluorobenzene	2018/04/03	102	60 - 140	103	60 - 140	104	%		
5466683	4-Bromofluorobenzene	2018/04/03	97	60 - 140	96	60 - 140	97	%		
5466683	D10-Ethylbenzene	2018/04/03	98	60 - 140	95	60 - 140	93	%		
5466683	D4-1,2-Dichloroethane	2018/04/03	103	60 - 140	101	60 - 140	101	%		
5467202	4-Bromofluorobenzene	2018/04/04	101	60 - 140	103	60 - 140	101	%		
5467202	D10-o-Xylene	2018/04/04	128	60 - 130	120	60 - 130	118	%		
5467202	D4-1,2-Dichloroethane	2018/04/04	95	60 - 140	102	60 - 140	103	%		
5467202	D8-Toluene	2018/04/04	100	60 - 140	97	60 - 140	95	%		
5469511	D10-Anthracene	2018/04/04	89	50 - 130	89	50 - 130	90	%		
5469511	D14-Terphenyl (FS)	2018/04/04	87	50 - 130	91	50 - 130	93	%		
5469511	D8-Acenaphthylene	2018/04/04	84	50 - 130	86	50 - 130	86	%		
5466678	F2 (C10-C16 Hydrocarbons)	2018/04/03	88	50 - 130	87	80 - 120	<10	ug/g	NC	30
5466678	F3 (C16-C34 Hydrocarbons)	2018/04/03	86	50 - 130	84	80 - 120	<50	ug/g	NC	30
5466678	F4 (C34-C50 Hydrocarbons)	2018/04/03	83	50 - 130	80	80 - 120	<50	ug/g	NC	30
5466683	Benzene	2018/04/04	104	60 - 140	108	60 - 140	<0.020	ug/g	NC	50
5466683	Ethylbenzene	2018/04/04	94	60 - 140	100	60 - 140	<0.020	ug/g	NC	50
5466683	F1 (C6-C10) - BTEX	2018/04/04					<10	ug/g	NC	30
5466683	F1 (C6-C10)	2018/04/04	83	60 - 140	91	80 - 120	<10	ug/g	NC	30
5466683	o-Xylene	2018/04/04	100	60 - 140	103	60 - 140	<0.020	ug/g	NC	50
5466683	p+m-Xylene	2018/04/04	93	60 - 140	98	60 - 140	<0.040	ug/g	NC	50
5466683	Toluene	2018/04/04	100	60 - 140	105	60 - 140	<0.020	ug/g	NC	50
5466683	Total Xylenes	2018/04/04					<0.040	ug/g	NC	50
5466868	Available (CaCl2) pH	2018/04/03			99	97 - 103			0.20	N/A
5467094	Hot Water Ext. Boron (B)	2018/04/03	101	75 - 125	100	75 - 125	<0.050	ug/g	6.4	40
5467099	Moisture	2018/04/03							7.1	20
5467202	1,1,1,2-Tetrachloroethane	2018/04/04	103	60 - 140	100	60 - 130	<0.050	ug/g	NC	50
5467202	1,1,1-Trichloroethane	2018/04/04	103	60 - 140	97	60 - 130	<0.050	ug/g	NC	50
5467202	1,1,2,2-Tetrachloroethane	2018/04/04	100	60 - 140	107	60 - 130	<0.050	ug/g	NC	50
5467202	1,1,2-Trichloroethane	2018/04/04	98	60 - 140	102	60 - 130	<0.050	ug/g	NC	50
5467202	1,1-Dichloroethane	2018/04/04	100	60 - 140	98	60 - 130	<0.050	ug/g	NC	50



**QUALITY ASSURANCE REPORT(CONT'D)**

QC Batch	Parameter	Date	Matrix Spike		SPIKED BLANK		Method Blank		RPD	
			% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
5467202	1,1-Dichloroethylene	2018/04/04	100	60 - 140	93	60 - 130	<0.050	ug/g	NC	50
5467202	1,2-Dichlorobenzene	2018/04/04	103	60 - 140	99	60 - 130	<0.050	ug/g	NC	50
5467202	1,2-Dichloroethane	2018/04/04	97	60 - 140	103	60 - 130	<0.050	ug/g	NC	50
5467202	1,2-Dichloropropane	2018/04/04	99	60 - 140	100	60 - 130	<0.050	ug/g	NC	50
5467202	1,3-Dichlorobenzene	2018/04/04	104	60 - 140	96	60 - 130	<0.050	ug/g	NC	50
5467202	1,4-Dichlorobenzene	2018/04/04	104	60 - 140	97	60 - 130	<0.050	ug/g	NC	50
5467202	Acetone (2-Propanone)	2018/04/04	91	60 - 140	100	60 - 140	<0.50	ug/g	NC	50
5467202	Benzene	2018/04/04	100	60 - 140	98	60 - 130	<0.020	ug/g	NC	50
5467202	Bromodichloromethane	2018/04/04	99	60 - 140	102	60 - 130	<0.050	ug/g	NC	50
5467202	Bromoform	2018/04/04	99	60 - 140	107	60 - 130	<0.050	ug/g	NC	50
5467202	Bromomethane	2018/04/04	104	60 - 140	100	60 - 140	<0.050	ug/g	NC	50
5467202	Carbon Tetrachloride	2018/04/04	103	60 - 140	97	60 - 130	<0.050	ug/g	NC	50
5467202	Chlorobenzene	2018/04/04	102	60 - 140	99	60 - 130	<0.050	ug/g	NC	50
5467202	Chloroform	2018/04/04	102	60 - 140	102	60 - 130	<0.050	ug/g	NC	50
5467202	cis-1,2-Dichloroethylene	2018/04/04	102	60 - 140	101	60 - 130	<0.050	ug/g	NC	50
5467202	cis-1,3-Dichloropropene	2018/04/04	92	60 - 140	94	60 - 130	<0.030	ug/g	NC	50
5467202	Dibromochloromethane	2018/04/04	100	60 - 140	103	60 - 130	<0.050	ug/g	NC	50
5467202	Dichlorodifluoromethane (FREON 12)	2018/04/04	107	60 - 140	98	60 - 140	<0.050	ug/g	NC	50
5467202	Ethylbenzene	2018/04/04	99	60 - 140	92	60 - 130	<0.020	ug/g	NC	50
5467202	Ethylene Dibromide	2018/04/04	101	60 - 140	108	60 - 130	<0.050	ug/g	NC	50
5467202	Hexane	2018/04/04	99	60 - 140	91	60 - 130	<0.050	ug/g	NC	50
5467202	Methyl Ethyl Ketone (2-Butanone)	2018/04/04	87	60 - 140	100	60 - 140	<0.50	ug/g	NC	50
5467202	Methyl Isobutyl Ketone	2018/04/04	88	60 - 140	102	60 - 130	<0.50	ug/g	NC	50
5467202	Methyl t-butyl ether (MTBE)	2018/04/04	97	60 - 140	99	60 - 130	<0.050	ug/g	NC	50
5467202	Methylene Chloride(Dichloromethane)	2018/04/04	104	60 - 140	105	60 - 130	<0.050	ug/g	NC	50
5467202	o-Xylene	2018/04/04	99	60 - 140	93	60 - 130	<0.020	ug/g	NC	50
5467202	p+m-Xylene	2018/04/04	98	60 - 140	91	60 - 130	<0.020	ug/g	NC	50
5467202	Styrene	2018/04/04	100	60 - 140	97	60 - 130	<0.050	ug/g	NC	50
5467202	Tetrachloroethylene	2018/04/04	107	60 - 140	98	60 - 130	<0.050	ug/g	NC	50
5467202	Toluene	2018/04/04	100	60 - 140	95	60 - 130	<0.020	ug/g	NC	50
5467202	Total Xylenes	2018/04/04					<0.020	ug/g	NC	50

**QUALITY ASSURANCE REPORT (CONT'D)**

QC Batch	Parameter	Date	Matrix Spike		SPIKED BLANK		Method Blank		RPD	
			% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
5467202	trans-1,2-Dichloroethylene	2018/04/04	104	60 - 140	99	60 - 130	<0.050	ug/g	NC	50
5467202	trans-1,3-Dichloropropene	2018/04/04	92	60 - 140	93	60 - 130	<0.040	ug/g	NC	50
5467202	Trichloroethylene	2018/04/04	106	60 - 140	102	60 - 130	<0.050	ug/g	NC	50
5467202	Trichlorofluoromethane (FREON 11)	2018/04/04	103	60 - 140	95	60 - 130	<0.050	ug/g	NC	50
5467202	Vinyl Chloride	2018/04/04	100	60 - 140	94	60 - 130	<0.020	ug/g	NC	50
5467210	Acid Extractable Antimony (Sb)	2018/04/03	96	75 - 125	106	80 - 120	<0.20	ug/g	13	30
5467210	Acid Extractable Arsenic (As)	2018/04/03	102	75 - 125	106	80 - 120	<1.0	ug/g	8.7	30
5467210	Acid Extractable Barium (Ba)	2018/04/03	NC	75 - 125	100	80 - 120	<0.50	ug/g	28	30
5467210	Acid Extractable Beryllium (Be)	2018/04/03	96	75 - 125	101	80 - 120	<0.20	ug/g	NC	30
5467210	Acid Extractable Boron (B)	2018/04/03	94	75 - 125	98	80 - 120	<5.0	ug/g	12	30
5467210	Acid Extractable Cadmium (Cd)	2018/04/03	99	75 - 125	102	80 - 120	<0.10	ug/g	5.9	30
5467210	Acid Extractable Chromium (Cr)	2018/04/03	104	75 - 125	104	80 - 120	<1.0	ug/g	0.23	30
5467210	Acid Extractable Cobalt (Co)	2018/04/03	96	75 - 125	104	80 - 120	<0.10	ug/g	2.2	30
5467210	Acid Extractable Copper (Cu)	2018/04/03	NC	75 - 125	103	80 - 120	<0.50	ug/g	7.1	30
5467210	Acid Extractable Lead (Pb)	2018/04/03	98	75 - 125	104	80 - 120	<1.0	ug/g	4.2	30
5467210	Acid Extractable Mercury (Hg)	2018/04/03	91	75 - 125	99	80 - 120	<0.050	ug/g	13	30
5467210	Acid Extractable Molybdenum (Mo)	2018/04/03	99	75 - 125	102	80 - 120	<0.50	ug/g	7.0	30
5467210	Acid Extractable Nickel (Ni)	2018/04/03	98	75 - 125	107	80 - 120	<0.50	ug/g	3.5	30
5467210	Acid Extractable Selenium (Se)	2018/04/03	99	75 - 125	105	80 - 120	<0.50	ug/g	NC	30
5467210	Acid Extractable Silver (Ag)	2018/04/03	95	75 - 125	99	80 - 120	<0.20	ug/g	NC	30
5467210	Acid Extractable Thallium (Tl)	2018/04/03	98	75 - 125	103	80 - 120	<0.050	ug/g	10	30
5467210	Acid Extractable Uranium (U)	2018/04/03	98	75 - 125	102	80 - 120	<0.050	ug/g	11	30
5467210	Acid Extractable Vanadium (V)	2018/04/03	102	75 - 125	106	80 - 120	<5.0	ug/g	0.32	30
5467210	Acid Extractable Zinc (Zn)	2018/04/03	NC	75 - 125	107	80 - 120	<5.0	ug/g	3.8	30
5467243	Moisture	2018/04/03							3.9	20
5467248	WAD Cyanide (Free)	2018/04/04	100	75 - 125	100	80 - 120	<0.01	ug/g	NC	35
5467274	Moisture	2018/04/03							2.4	20
5467295	Acid Extractable Antimony (Sb)	2018/04/04	104	75 - 125	100	80 - 120	<0.20	ug/g	NC	30
5467295	Acid Extractable Arsenic (As)	2018/04/04	104	75 - 125	103	80 - 120	<1.0	ug/g	2.0	30
5467295	Acid Extractable Barium (Ba)	2018/04/04	91	75 - 125	99	80 - 120	<0.50	ug/g	6.3	30
5467295	Acid Extractable Beryllium (Be)	2018/04/04	104	75 - 125	97	80 - 120	<0.20	ug/g	NC	30

**QUALITY ASSURANCE REPORT(CONT'D)**

QC Batch	Parameter	Date	Matrix Spike		SPIKED BLANK		Method Blank		RPD	
			% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
5467295	Acid Extractable Boron (B)	2018/04/04	100	75 - 125	98	80 - 120	<5.0	ug/g	NC	30
5467295	Acid Extractable Cadmium (Cd)	2018/04/04	103	75 - 125	99	80 - 120	<0.10	ug/g	7.8	30
5467295	Acid Extractable Chromium (Cr)	2018/04/04	100	75 - 125	99	80 - 120	<1.0	ug/g	6.2	30
5467295	Acid Extractable Cobalt (Co)	2018/04/04	100	75 - 125	101	80 - 120	<0.10	ug/g	6.4	30
5467295	Acid Extractable Copper (Cu)	2018/04/04	100	75 - 125	100	80 - 120	<0.50	ug/g	3.5	30
5467295	Acid Extractable Lead (Pb)	2018/04/04	99	75 - 125	103	80 - 120	<1.0	ug/g	0.56	30
5467295	Acid Extractable Mercury (Hg)	2018/04/03	100	75 - 125	102	80 - 120	<0.050	ug/g		
5467295	Acid Extractable Molybdenum (Mo)	2018/04/04	101	75 - 125	99	80 - 120	<0.50	ug/g	NC	30
5467295	Acid Extractable Nickel (Ni)	2018/04/04	99	75 - 125	104	80 - 120	<0.50	ug/g	11	30
5467295	Acid Extractable Selenium (Se)	2018/04/04	107	75 - 125	104	80 - 120	<0.50	ug/g	NC	30
5467295	Acid Extractable Silver (Ag)	2018/04/04	101	75 - 125	100	80 - 120	<0.20	ug/g	NC	30
5467295	Acid Extractable Thallium (Tl)	2018/04/04	101	75 - 125	103	80 - 120	<0.050	ug/g	NC	30
5467295	Acid Extractable Uranium (U)	2018/04/04	102	75 - 125	102	80 - 120	<0.050	ug/g	5.7	30
5467295	Acid Extractable Vanadium (V)	2018/04/04	105	75 - 125	102	80 - 120	<5.0	ug/g	1.6	30
5467295	Acid Extractable Zinc (Zn)	2018/04/04	NC	75 - 125	99	80 - 120	<5.0	ug/g	6.2	30
5467443	Available (CaCl2) pH	2018/04/04			99	97 - 103			0.48	N/A
5469094	Moisture	2018/04/05							0	20
5469511	1-Methylnaphthalene	2018/04/04	107	50 - 130	105	50 - 130	<0.0050	ug/g	NC	40
5469511	2-Methylnaphthalene	2018/04/04	91	50 - 130	90	50 - 130	<0.0050	ug/g	NC	40
5469511	Acenaphthene	2018/04/04	89	50 - 130	88	50 - 130	<0.0050	ug/g	NC	40
5469511	Acenaphthylene	2018/04/04	90	50 - 130	88	50 - 130	<0.0050	ug/g	4.6	40
5469511	Anthracene	2018/04/04	88	50 - 130	87	50 - 130	<0.0050	ug/g	4.1	40
5469511	Benzo(a)anthracene	2018/04/04	92	50 - 130	89	50 - 130	<0.0050	ug/g	12	40
5469511	Benzo(a)pyrene	2018/04/04	86	50 - 130	86	50 - 130	<0.0050	ug/g	8.8	40
5469511	Benzo(b,f)fluoranthene	2018/04/04	87	50 - 130	90	50 - 130	<0.0050	ug/g	9.2	40
5469511	Benzo(g,h,i)perylene	2018/04/04	74	50 - 130	79	50 - 130	<0.0050	ug/g	15	40
5469511	Benzo(k)fluoranthene	2018/04/04	72	50 - 130	84	50 - 130	<0.0050	ug/g	3.2	40
5469511	Chrysene	2018/04/04	83	50 - 130	87	50 - 130	<0.0050	ug/g	5.4	40
5469511	Dibenz(a,h)anthracene	2018/04/04	79	50 - 130	80	50 - 130	<0.0050	ug/g	9.5	40
5469511	Fluoranthene	2018/04/04	91	50 - 130	90	50 - 130	<0.0050	ug/g	14	40
5469511	Fluorene	2018/04/04	94	50 - 130	91	50 - 130	<0.0050	ug/g	NC	40

**QUALITY ASSURANCE REPORT(CONT'D)**

QC Batch	Parameter	Date	Matrix Spike		SPIKED BLANK		Method Blank		RPD	
			% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
5469511	Indeno(1,2,3-cd)pyrene	2018/04/04	79	50 - 130	85	50 - 130	<0.0050	ug/g	10	40
5469511	Naphthalene	2018/04/04	86	50 - 130	88	50 - 130	<0.0050	ug/g	NC	40
5469511	Phenanthrene	2018/04/04	87	50 - 130	86	50 - 130	<0.0050	ug/g	15	40
5469511	Pyrene	2018/04/04	94	50 - 130	96	50 - 130	<0.0050	ug/g	16	40
5469665	Chromium (VI)	2018/04/05	65 (1)	75 - 125	89	80 - 120	<0.2	ug/g	NC	35

N/A = Not Applicable

Duplicate: Paired analysis of a separate portion of the same sample. Used to evaluate the variance in the measurement.

Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate sample matrix interference.

Spiked Blank: A blank matrix sample to which a known amount of the analyte, usually from a second source, has been added. Used to evaluate method accuracy.

Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.

Surrogate: A pure or isotopically labeled compound whose behavior mirrors the analytes of interest. Used to evaluate extraction efficiency.

NC (Matrix Spike): The recovery in the matrix spike was not calculated. The relative difference between the concentration in the parent sample and the spike amount was too small to permit a reliable recovery calculation (matrix spike concentration was less than the native sample concentration)

NC (Duplicate RPD): The duplicate RPD was not calculated. The concentration in the sample and/or duplicate was too low to permit a reliable RPD calculation (absolute difference <= 2x RDL).

(1) The matrix spike recovery was below the lower control limit. This may be due in part to the reducing environment of the sample. The matrix spike was reanalyzed and confirmed the low recovery at 73%

**VALIDATION SIGNATURE PAGE**

The analytical data and all QC contained in this report were reviewed and validated by the following individual(s).

*Cristina Carriere*

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Cristina Carriere, Scientific Service Specialist

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Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

Your Project #: 1803-E002  
Your C.O.C. #: C#656021-01-01

**Attention: Zoe Hawkes**

Soil Engineers Ltd  
90 West Beaver Creek Road  
Unit 100  
Richmond Hill, ON  
CANADA L4B 1E7

**Report Date: 2018/04/05**  
Report #: R5065521  
Version: 1 - Final

**CERTIFICATE OF ANALYSIS**

**MAXXAM JOB #: B869527**

**Received: 2018/03/28, 14:40**

Sample Matrix: Soil  
# Samples Received: 9

Analyses	Quantity	Date		Laboratory Method	Reference
		Extracted	Analyzed		
Hot Water Extractable Boron	1	2018/04/02	2018/04/02	CAM SOP-00408	R153 Ana. Prot. 2011
Hot Water Extractable Boron	8	2018/04/02	2018/04/03	CAM SOP-00408	R153 Ana. Prot. 2011
Free (WAD) Cyanide	9	2018/04/02	2018/04/03	CAM SOP-00457	OMOE E3015 m
Conductivity	9	2018/04/04	2018/04/04	CAM SOP-00414	OMOE E3530 v1 m
Hexavalent Chromium in Soil by IC (1)	9	2018/04/03	2018/04/04	CAM SOP-00436	EPA 3060/7199 m
Strong Acid Leachable Metals by ICPMS	9	2018/04/02	2018/04/02	CAM SOP-00447	EPA 6020B m
Moisture	8	N/A	2018/03/31	CAM SOP-00445	Carter 2nd ed 51.2 m
Moisture	1	N/A	2018/04/03	CAM SOP-00445	Carter 2nd ed 51.2 m
pH CaCl2 EXTRACT	9	2018/04/03	2018/04/03	CAM SOP-00413	EPA 9045 D m
Sodium Adsorption Ratio (SAR)	9	N/A	2018/04/04	CAM SOP-00102	EPA 6010C

**Remarks:**

Maxxam Analytics' laboratories are accredited to ISO/IEC 17025:2005 for specific parameters on scopes of accreditation. Unless otherwise noted, procedures used by Maxxam are based upon recognized Provincial, Federal or US method compendia such as CCME, MDDELCC, EPA, APHA.

All work recorded herein has been done in accordance with procedures and practices ordinarily exercised by professionals in Maxxam's profession using accepted testing methodologies, quality assurance and quality control procedures (except where otherwise agreed by the client and Maxxam in writing). All data is in statistical control and has met quality control and method performance criteria unless otherwise noted. All method blanks are reported; unless indicated otherwise, associated sample data are not blank corrected.

Maxxam Analytics' liability is limited to the actual cost of the requested analyses, unless otherwise agreed in writing. There is no other warranty expressed or implied. Maxxam has been retained to provide analysis of samples provided by the Client using the testing methodology referenced in this report. Interpretation and use of test results are the sole responsibility of the Client and are not within the scope of services provided by Maxxam, unless otherwise agreed in writing.

Solid sample results, except biota, are based on dry weight unless otherwise indicated. Organic analyses are not recovery corrected except for isotope dilution methods.

Results relate to samples tested.

This Certificate shall not be reproduced except in full, without the written approval of the laboratory.

Reference Method suffix "m" indicates test methods incorporate validated modifications from specific reference methods to improve performance.

\* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.

(1) Soils are reported on a dry weight basis unless otherwise specified.

Your Project #: 1803-E002  
Your C.O.C. #: C#656021-01-01

**Attention: Zoe Hawkes**

Soil Engineers Ltd  
90 West Beaver Creek Road  
Unit 100  
Richmond Hill, ON  
CANADA L4B 1E7

**Report Date: 2018/04/05**  
Report #: R5065521  
Version: 1 - Final

**CERTIFICATE OF ANALYSIS**

**MAXXAM JOB #: B869527**

**Received: 2018/03/28, 14:40**

Encryption Key



Maxxam  
05 Apr 2018 10:22:08

Please direct all questions regarding this Certificate of Analysis to your Project Manager.  
Antonella Brasil, Senior Project Manager  
Email: ABrasil@maxxam.ca  
Phone# (905)817-5817

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**O.REG 153 METALS & INORGANICS PKG (SOIL)**

Maxxam ID		GIS070	GIS071	GIS072	GIS073		
Sampling Date		2018/03/28 08:10	2018/03/28 08:15	2018/03/28 08:20	2018/03/28 08:25		
COC Number		C#656021-01-01	C#656021-01-01	C#656021-01-01	C#656021-01-01		
	UNITS	TP-1	TP-2	TP-3	TP-4	RDL	QC Batch
<b>Calculated Parameters</b>							
Sodium Adsorption Ratio	N/A	0.39	3.7	0.84	0.98		5460910
<b>Inorganics</b>							
Conductivity	mS/cm	0.34	0.32	0.16	0.23	0.002	5466009
Moisture	%	17	15	10	17	1.0	5464808
Available (CaCl2) pH	pH	7.65	7.76	7.66	7.75		5467240
WAD Cyanide (Free)	ug/g	<0.01	<0.01	<0.01	<0.01	0.01	5465527
Chromium (VI)	ug/g	<0.2	<0.2	<0.2	<0.2	0.2	5467127
<b>Metals</b>							
Hot Water Ext. Boron (B)	ug/g	0.36	0.44	0.15	0.40	0.050	5465684
Acid Extractable Antimony (Sb)	ug/g	0.21	<0.20	<0.20	0.25	0.20	5465614
Acid Extractable Arsenic (As)	ug/g	2.6	2.7	1.6	3.0	1.0	5465614
Acid Extractable Barium (Ba)	ug/g	65	90	58	98	0.50	5465614
Acid Extractable Beryllium (Be)	ug/g	0.56	0.54	0.33	0.57	0.20	5465614
Acid Extractable Boron (B)	ug/g	5.2	7.7	5.4	8.4	5.0	5465614
Acid Extractable Cadmium (Cd)	ug/g	0.16	0.13	<0.10	0.24	0.10	5465614
Acid Extractable Chromium (Cr)	ug/g	20	19	12	21	1.0	5465614
Acid Extractable Cobalt (Co)	ug/g	7.6	9.9	4.6	9.6	0.10	5465614
Acid Extractable Copper (Cu)	ug/g	17	21	9.7	21	0.50	5465614
Acid Extractable Lead (Pb)	ug/g	19	20	7.0	29	1.0	5465614
Acid Extractable Molybdenum (Mo)	ug/g	<0.50	0.56	<0.50	<0.50	0.50	5465614
Acid Extractable Nickel (Ni)	ug/g	18	23	9.5	22	0.50	5465614
Acid Extractable Selenium (Se)	ug/g	<0.50	<0.50	<0.50	<0.50	0.50	5465614
Acid Extractable Silver (Ag)	ug/g	<0.20	<0.20	<0.20	<0.20	0.20	5465614
Acid Extractable Thallium (Tl)	ug/g	0.14	0.23	0.10	0.21	0.050	5465614
Acid Extractable Uranium (U)	ug/g	0.53	0.59	0.46	0.60	0.050	5465614
Acid Extractable Vanadium (V)	ug/g	29	27	19	30	5.0	5465614
Acid Extractable Zinc (Zn)	ug/g	57	57	31	81	5.0	5465614
Acid Extractable Mercury (Hg)	ug/g	<0.050	<0.050	<0.050	0.054	0.050	5465614
RDL = Reportable Detection Limit							
QC Batch = Quality Control Batch							



**O.REG 153 METALS & INORGANICS PKG (SOIL)**

Maxxam ID		GIS073			GIS074	GIS075	GIS076		
Sampling Date		2018/03/28 08:25			2018/03/28 08:30	2018/03/28 08:35	2018/03/28 08:40		
COC Number		C#656021-01-01			C#656021-01-01	C#656021-01-01	C#656021-01-01		
	UNITS	TP-4 Lab-Dup	RDL	QC Batch	TP-5	TP-6	TP-7	RDL	QC Batch

**Calculated Parameters**

Sodium Adsorption Ratio	N/A				3.4	0.99	2.6		5460910
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**Inorganics**

Conductivity	mS/cm				0.68	0.97	0.61	0.002	5466009
Moisture	%				16	12	13	1.0	5464808
Available (CaCl2) pH	pH				7.80	7.78	7.70		5467240
WAD Cyanide (Free)	ug/g				<0.01	<0.01	<0.01	0.01	5465527
Chromium (VI)	ug/g				<0.2	<0.2	<0.2	0.2	5467127

**Metals**

Hot Water Ext. Boron (B)	ug/g	0.39	0.050	5465684	0.28	0.30	0.25	0.050	5465684
Acid Extractable Antimony (Sb)	ug/g				<0.20	<0.20	<0.20	0.20	5465614
Acid Extractable Arsenic (As)	ug/g				1.9	1.7	1.9	1.0	5465614
Acid Extractable Barium (Ba)	ug/g				67	67	50	0.50	5465614
Acid Extractable Beryllium (Be)	ug/g				0.40	0.37	0.36	0.20	5465614
Acid Extractable Boron (B)	ug/g				6.3	<5.0	<5.0	5.0	5465614
Acid Extractable Cadmium (Cd)	ug/g				0.12	<0.10	<0.10	0.10	5465614
Acid Extractable Chromium (Cr)	ug/g				16	16	13	1.0	5465614
Acid Extractable Cobalt (Co)	ug/g				6.0	6.0	5.3	0.10	5465614
Acid Extractable Copper (Cu)	ug/g				12	13	10	0.50	5465614
Acid Extractable Lead (Pb)	ug/g				8.5	6.6	8.5	1.0	5465614
Acid Extractable Molybdenum (Mo)	ug/g				<0.50	<0.50	<0.50	0.50	5465614
Acid Extractable Nickel (Ni)	ug/g				13	13	11	0.50	5465614
Acid Extractable Selenium (Se)	ug/g				<0.50	<0.50	<0.50	0.50	5465614
Acid Extractable Silver (Ag)	ug/g				<0.20	<0.20	<0.20	0.20	5465614
Acid Extractable Thallium (Tl)	ug/g				0.12	0.087	0.098	0.050	5465614
Acid Extractable Uranium (U)	ug/g				0.52	0.55	0.51	0.050	5465614
Acid Extractable Vanadium (V)	ug/g				27	23	25	5.0	5465614
Acid Extractable Zinc (Zn)	ug/g				35	31	29	5.0	5465614
Acid Extractable Mercury (Hg)	ug/g				<0.050	<0.050	<0.050	0.050	5465614

RDL = Reportable Detection Limit

QC Batch = Quality Control Batch

Lab-Dup = Laboratory Initiated Duplicate

**O.REG 153 METALS & INORGANICS PKG (SOIL)**

Maxxam ID		GIS077		GIS078		
Sampling Date		2018/03/28 08:45		2018/03/28 08:50		
COC Number		C#656021-01-01		C#656021-01-01		
	UNITS	TP-8	QC Batch	TP-9	RDL	QC Batch
<b>Calculated Parameters</b>						
Sodium Adsorption Ratio	N/A	1.6	5460910	2.6		5460910
<b>Inorganics</b>						
Conductivity	mS/cm	0.54	5466009	0.47	0.002	5466009
Moisture	%	11	5467539	11	1.0	5464808
Available (CaCl <sub>2</sub> ) pH	pH	8.17	5467240	8.21		5467240
WAD Cyanide (Free)	ug/g	<0.01	5465527	<0.01	0.01	5465527
Chromium (VI)	ug/g	<0.2	5467127	<0.2	0.2	5467127
<b>Metals</b>						
Hot Water Ext. Boron (B)	ug/g	0.33	5465684	0.35	0.050	5465684
Acid Extractable Antimony (Sb)	ug/g	<0.20	5465614	<0.20	0.20	5465614
Acid Extractable Arsenic (As)	ug/g	1.8	5465614	1.5	1.0	5465614
Acid Extractable Barium (Ba)	ug/g	42	5465614	52	0.50	5465614
Acid Extractable Beryllium (Be)	ug/g	0.27	5465614	0.31	0.20	5465614
Acid Extractable Boron (B)	ug/g	<5.0	5465614	5.2	5.0	5465614
Acid Extractable Cadmium (Cd)	ug/g	<0.10	5465614	<0.10	0.10	5465614
Acid Extractable Chromium (Cr)	ug/g	11	5465614	13	1.0	5465614
Acid Extractable Cobalt (Co)	ug/g	4.5	5465614	4.8	0.10	5465614
Acid Extractable Copper (Cu)	ug/g	9.9	5465614	9.6	0.50	5465614
Acid Extractable Lead (Pb)	ug/g	7.6	5465614	6.6	1.0	5465614
Acid Extractable Molybdenum (Mo)	ug/g	<0.50	5465614	<0.50	0.50	5465614
Acid Extractable Nickel (Ni)	ug/g	9.5	5465614	10	0.50	5465614
Acid Extractable Selenium (Se)	ug/g	<0.50	5465614	<0.50	0.50	5465614
Acid Extractable Silver (Ag)	ug/g	<0.20	5465614	<0.20	0.20	5465614
Acid Extractable Thallium (Tl)	ug/g	0.083	5465614	0.073	0.050	5465614
Acid Extractable Uranium (U)	ug/g	0.46	5465614	0.42	0.050	5465614
Acid Extractable Vanadium (V)	ug/g	20	5465614	21	5.0	5465614
Acid Extractable Zinc (Zn)	ug/g	26	5465614	31	5.0	5465614
Acid Extractable Mercury (Hg)	ug/g	<0.050	5465614	<0.050	0.050	5465614
RDL = Reportable Detection Limit						
QC Batch = Quality Control Batch						

**TEST SUMMARY**

**Maxxam ID:** GIS070  
**Sample ID:** TP-1  
**Matrix:** Soil

**Collected:** 2018/03/28  
**Shipped:**  
**Received:** 2018/03/28

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Hot Water Extractable Boron	ICP	5465684	2018/04/02	2018/04/03	Suban Kanapathippilai
Free (WAD) Cyanide	TECH	5465527	2018/04/02	2018/04/03	Louise Harding
Conductivity	AT	5466009	2018/04/04	2018/04/04	Tahir Anwar
Hexavalent Chromium in Soil by IC	IC/SPEC	5467127	2018/04/03	2018/04/04	Sally Coughlin
Strong Acid Leachable Metals by ICPMS	ICP/MS	5465614	2018/04/02	2018/04/02	Daniel Teclu
Moisture	BAL	5464808	N/A	2018/03/31	Prgya Panchal
pH CaCl2 EXTRACT	AT	5467240	2018/04/03	2018/04/03	Tahir Anwar
Sodium Adsorption Ratio (SAR)	CALC/MET	5460910	N/A	2018/04/04	Automated Statchk

**Maxxam ID:** GIS071  
**Sample ID:** TP-2  
**Matrix:** Soil

**Collected:** 2018/03/28  
**Shipped:**  
**Received:** 2018/03/28

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Hot Water Extractable Boron	ICP	5465684	2018/04/02	2018/04/03	Suban Kanapathippilai
Free (WAD) Cyanide	TECH	5465527	2018/04/02	2018/04/03	Louise Harding
Conductivity	AT	5466009	2018/04/04	2018/04/04	Tahir Anwar
Hexavalent Chromium in Soil by IC	IC/SPEC	5467127	2018/04/03	2018/04/04	Sally Coughlin
Strong Acid Leachable Metals by ICPMS	ICP/MS	5465614	2018/04/02	2018/04/02	Daniel Teclu
Moisture	BAL	5464808	N/A	2018/03/31	Prgya Panchal
pH CaCl2 EXTRACT	AT	5467240	2018/04/03	2018/04/03	Tahir Anwar
Sodium Adsorption Ratio (SAR)	CALC/MET	5460910	N/A	2018/04/04	Automated Statchk

**Maxxam ID:** GIS072  
**Sample ID:** TP-3  
**Matrix:** Soil

**Collected:** 2018/03/28  
**Shipped:**  
**Received:** 2018/03/28

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Hot Water Extractable Boron	ICP	5465684	2018/04/02	2018/04/03	Suban Kanapathippilai
Free (WAD) Cyanide	TECH	5465527	2018/04/02	2018/04/03	Louise Harding
Conductivity	AT	5466009	2018/04/04	2018/04/04	Tahir Anwar
Hexavalent Chromium in Soil by IC	IC/SPEC	5467127	2018/04/03	2018/04/04	Sally Coughlin
Strong Acid Leachable Metals by ICPMS	ICP/MS	5465614	2018/04/02	2018/04/02	Daniel Teclu
Moisture	BAL	5464808	N/A	2018/03/31	Prgya Panchal
pH CaCl2 EXTRACT	AT	5467240	2018/04/03	2018/04/03	Tahir Anwar
Sodium Adsorption Ratio (SAR)	CALC/MET	5460910	N/A	2018/04/04	Automated Statchk

**Maxxam ID:** GIS073  
**Sample ID:** TP-4  
**Matrix:** Soil

**Collected:** 2018/03/28  
**Shipped:**  
**Received:** 2018/03/28

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Hot Water Extractable Boron	ICP	5465684	2018/04/02	2018/04/02	Suban Kanapathippilai
Free (WAD) Cyanide	TECH	5465527	2018/04/02	2018/04/03	Louise Harding
Conductivity	AT	5466009	2018/04/04	2018/04/04	Tahir Anwar
Hexavalent Chromium in Soil by IC	IC/SPEC	5467127	2018/04/03	2018/04/04	Sally Coughlin

**TEST SUMMARY**

**Maxxam ID:** GIS073  
**Sample ID:** TP-4  
**Matrix:** Soil

**Collected:** 2018/03/28  
**Shipped:**  
**Received:** 2018/03/28

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Strong Acid Leachable Metals by ICPMS	ICP/MS	5465614	2018/04/02	2018/04/02	Daniel Teclu
Moisture	BAL	5464808	N/A	2018/03/31	Prgya Panchal
pH CaCl2 EXTRACT	AT	5467240	2018/04/03	2018/04/03	Tahir Anwar
Sodium Adsorption Ratio (SAR)	CALC/MET	5460910	N/A	2018/04/04	Automated Statchk

**Maxxam ID:** GIS073 Dup  
**Sample ID:** TP-4  
**Matrix:** Soil

**Collected:** 2018/03/28  
**Shipped:**  
**Received:** 2018/03/28

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Hot Water Extractable Boron	ICP	5465684	2018/04/02	2018/04/02	Suban Kanapathippilai

**Maxxam ID:** GIS074  
**Sample ID:** TP-5  
**Matrix:** Soil

**Collected:** 2018/03/28  
**Shipped:**  
**Received:** 2018/03/28

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Hot Water Extractable Boron	ICP	5465684	2018/04/02	2018/04/03	Suban Kanapathippilai
Free (WAD) Cyanide	TECH	5465527	2018/04/02	2018/04/03	Louise Harding
Conductivity	AT	5466009	2018/04/04	2018/04/04	Tahir Anwar
Hexavalent Chromium in Soil by IC	IC/SPEC	5467127	2018/04/03	2018/04/04	Sally Coughlin
Strong Acid Leachable Metals by ICPMS	ICP/MS	5465614	2018/04/02	2018/04/02	Daniel Teclu
Moisture	BAL	5464808	N/A	2018/03/31	Prgya Panchal
pH CaCl2 EXTRACT	AT	5467240	2018/04/03	2018/04/03	Tahir Anwar
Sodium Adsorption Ratio (SAR)	CALC/MET	5460910	N/A	2018/04/04	Automated Statchk

**Maxxam ID:** GIS075  
**Sample ID:** TP-6  
**Matrix:** Soil

**Collected:** 2018/03/28  
**Shipped:**  
**Received:** 2018/03/28

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Hot Water Extractable Boron	ICP	5465684	2018/04/02	2018/04/03	Suban Kanapathippilai
Free (WAD) Cyanide	TECH	5465527	2018/04/02	2018/04/03	Louise Harding
Conductivity	AT	5466009	2018/04/04	2018/04/04	Tahir Anwar
Hexavalent Chromium in Soil by IC	IC/SPEC	5467127	2018/04/03	2018/04/04	Sally Coughlin
Strong Acid Leachable Metals by ICPMS	ICP/MS	5465614	2018/04/02	2018/04/02	Daniel Teclu
Moisture	BAL	5464808	N/A	2018/03/31	Prgya Panchal
pH CaCl2 EXTRACT	AT	5467240	2018/04/03	2018/04/03	Tahir Anwar
Sodium Adsorption Ratio (SAR)	CALC/MET	5460910	N/A	2018/04/04	Automated Statchk

**Maxxam ID:** GIS076  
**Sample ID:** TP-7  
**Matrix:** Soil

**Collected:** 2018/03/28  
**Shipped:**  
**Received:** 2018/03/28

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Hot Water Extractable Boron	ICP	5465684	2018/04/02	2018/04/03	Suban Kanapathippilai

**TEST SUMMARY**

**Maxxam ID:** GIS076  
**Sample ID:** TP-7  
**Matrix:** Soil

**Collected:** 2018/03/28  
**Shipped:**  
**Received:** 2018/03/28

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Free (WAD) Cyanide	TECH	5465527	2018/04/02	2018/04/03	Louise Harding
Conductivity	AT	5466009	2018/04/04	2018/04/04	Tahir Anwar
Hexavalent Chromium in Soil by IC	IC/SPEC	5467127	2018/04/03	2018/04/04	Sally Coughlin
Strong Acid Leachable Metals by ICPMS	ICP/MS	5465614	2018/04/02	2018/04/02	Daniel Teclu
Moisture	BAL	5464808	N/A	2018/03/31	Prgya Panchal
pH CaCl2 EXTRACT	AT	5467240	2018/04/03	2018/04/03	Tahir Anwar
Sodium Adsorption Ratio (SAR)	CALC/MET	5460910	N/A	2018/04/04	Automated Statchk

**Maxxam ID:** GIS077  
**Sample ID:** TP-8  
**Matrix:** Soil

**Collected:** 2018/03/28  
**Shipped:**  
**Received:** 2018/03/28

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Hot Water Extractable Boron	ICP	5465684	2018/04/02	2018/04/03	Suban Kanapathippalai
Free (WAD) Cyanide	TECH	5465527	2018/04/02	2018/04/03	Louise Harding
Conductivity	AT	5466009	2018/04/04	2018/04/04	Tahir Anwar
Hexavalent Chromium in Soil by IC	IC/SPEC	5467127	2018/04/03	2018/04/04	Sally Coughlin
Strong Acid Leachable Metals by ICPMS	ICP/MS	5465614	2018/04/02	2018/04/02	Daniel Teclu
Moisture	BAL	5467539	N/A	2018/04/03	Prgya Panchal
pH CaCl2 EXTRACT	AT	5467240	2018/04/03	2018/04/03	Tahir Anwar
Sodium Adsorption Ratio (SAR)	CALC/MET	5460910	N/A	2018/04/04	Automated Statchk

**Maxxam ID:** GIS078  
**Sample ID:** TP-9  
**Matrix:** Soil

**Collected:** 2018/03/28  
**Shipped:**  
**Received:** 2018/03/28

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Hot Water Extractable Boron	ICP	5465684	2018/04/02	2018/04/03	Suban Kanapathippalai
Free (WAD) Cyanide	TECH	5465527	2018/04/02	2018/04/03	Louise Harding
Conductivity	AT	5466009	2018/04/04	2018/04/04	Tahir Anwar
Hexavalent Chromium in Soil by IC	IC/SPEC	5467127	2018/04/03	2018/04/04	Sally Coughlin
Strong Acid Leachable Metals by ICPMS	ICP/MS	5465614	2018/04/02	2018/04/02	Daniel Teclu
Moisture	BAL	5464808	N/A	2018/03/31	Prgya Panchal
pH CaCl2 EXTRACT	AT	5467240	2018/04/03	2018/04/03	Tahir Anwar
Sodium Adsorption Ratio (SAR)	CALC/MET	5460910	N/A	2018/04/04	Automated Statchk

**GENERAL COMMENTS**

Each temperature is the average of up to three cooler temperatures taken at receipt

Package 1	4.0°C
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**Results relate only to the items tested.**

**QUALITY ASSURANCE REPORT**

QC Batch	Parameter	Date	Matrix Spike		SPIKED BLANK		Method Blank		RPD				
			% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits			
5464808	Moisture	2018/03/31											
5465527	WAD Cyanide (Free)	2018/04/03	100	75 - 125	101	80 - 120	<0.01	ug/g	1.0	20			
5465614	Acid Extractable Antimony (Sb)	2018/04/02	85	75 - 125	100	80 - 120	<0.20	ug/g	NC	35			
5465614	Acid Extractable Arsenic (As)	2018/04/02	94	75 - 125	101	80 - 120	<1.0	ug/g	19	30			
5465614	Acid Extractable Barium (Ba)	2018/04/02	NC	75 - 125	106	80 - 120	<0.50	ug/g	0.60	30			
5465614	Acid Extractable Beryllium (Be)	2018/04/02	99	75 - 125	99	80 - 120	<0.20	ug/g	1.6	30			
5465614	Acid Extractable Boron (B)	2018/04/02	89	75 - 125	97	80 - 120	<5.0	ug/g	1.4	30			
5465614	Acid Extractable Cadmium (Cd)	2018/04/02	94	75 - 125	99	80 - 120	<0.10	ug/g	2.9	30			
5465614	Acid Extractable Chromium (Cr)	2018/04/02	97	75 - 125	100	80 - 120	<1.0	ug/g	5.6	30			
5465614	Acid Extractable Cobalt (Co)	2018/04/02	94	75 - 125	100	80 - 120	<0.10	ug/g	3.1	30			
5465614	Acid Extractable Copper (Cu)	2018/04/02	NC	75 - 125	101	80 - 120	<0.50	ug/g	5.8	30			
5465614	Acid Extractable Lead (Pb)	2018/04/02	98	75 - 125	104	80 - 120	<1.0	ug/g	1.6	30			
5465614	Acid Extractable Mercury (Hg)	2018/04/02	92	75 - 125	96	80 - 120	<0.050	ug/g	2.1	30			
5465614	Acid Extractable Molybdenum (Mo)	2018/04/02	96	75 - 125	101	80 - 120	<0.50	ug/g	NC	30			
5465614	Acid Extractable Nickel (Ni)	2018/04/02	NC	75 - 125	103	80 - 120	<0.50	ug/g	0.13	30			
5465614	Acid Extractable Selenium (Se)	2018/04/02	94	75 - 125	99	80 - 120	<0.50	ug/g	5.8	30			
5465614	Acid Extractable Silver (Ag)	2018/04/02	91	75 - 125	98	80 - 120	<0.20	ug/g	NC	30			
5465614	Acid Extractable Thallium (Tl)	2018/04/02	96	75 - 125	103	80 - 120	<0.050	ug/g	NC	30			
5465614	Acid Extractable Uranium (U)	2018/04/02	98	75 - 125	101	80 - 120	<0.050	ug/g	5.0	30			
5465614	Acid Extractable Vanadium (V)	2018/04/02	NC	75 - 125	101	80 - 120	<5.0	ug/g	2.0	30			
5465614	Acid Extractable Zinc (Zn)	2018/04/02	NC	75 - 125	101	80 - 120	<5.0	ug/g	2.3	30			
5465684	Hot Water Ext. Boron (B)	2018/04/02	111	75 - 125	107	75 - 125	<0.050	ug/g	4.6	30			
5466009	Conductivity	2018/04/04			101	90 - 110	<0.002	mS/cm	2.8	40			
5467127	Chromium (VI)	2018/04/04	87	75 - 125	91	80 - 120	<0.2	ug/g	7.9	10			
5467240	Available (CaCl2) pH	2018/04/03			99	97 - 103			2.4	35			
									0.37	N/A			

**QUALITY ASSURANCE REPORT (CONT'D)**

QC Batch	Parameter	Date	Matrix Spike		SPIKED BLANK		Method Blank		RPD	
			% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
5467539	Moisture	2018/04/03							1.9	20
<p>N/A = Not Applicable</p> <p>Duplicate: Paired analysis of a separate portion of the same sample. Used to evaluate the variance in the measurement.</p> <p>Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate sample matrix interference.</p> <p>Spiked Blank: A blank matrix sample to which a known amount of the analyte, usually from a second source, has been added. Used to evaluate method accuracy.</p> <p>Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.</p> <p>NC (Matrix Spike): The recovery in the matrix spike was not calculated. The relative difference between the concentration in the parent sample and the spike amount was too small to permit a reliable recovery calculation (matrix spike concentration was less than the native sample concentration)</p> <p>NC (Duplicate RPD): The duplicate RPD was not calculated. The concentration in the sample and/or duplicate was too low to permit a reliable RPD calculation (absolute difference &lt;= 2x RDL).</p>										



**VALIDATION SIGNATURE PAGE**

The analytical data and all QC contained in this report were reviewed and validated by the following individual(s).

Ewa Pranjic, M.Sc., C.Chem, Scientific Specialist

---

Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

Your Project #: 1803-E002  
Your C.O.C. #: 657752-08-01

**Attention: Zoe Hawkes**

Soil Engineers Ltd  
90 West Beaver Creek Road  
Unit 100  
Richmond Hill, ON  
CANADA L4B 1E7

**Report Date: 2018/04/17**  
Report #: R5081365  
Version: 1 - Final

**CERTIFICATE OF ANALYSIS**

**MAXXAM JOB #: B883803**

**Received: 2018/04/13, 14:40**

Sample Matrix: Soil  
# Samples Received: 1

Analyses	Quantity	Date	Date	Laboratory Method	Reference
		Extracted	Analyzed		
Conductivity	1	2018/04/17	2018/04/17	CAM SOP-00414	OMOE E3530 v1 m

**Remarks:**

Maxxam Analytics' laboratories are accredited to ISO/IEC 17025:2005 for specific parameters on scopes of accreditation. Unless otherwise noted, procedures used by Maxxam are based upon recognized Provincial, Federal or US method compendia such as CCME, MDDELCC, EPA, APHA.

All work recorded herein has been done in accordance with procedures and practices ordinarily exercised by professionals in Maxxam's profession using accepted testing methodologies, quality assurance and quality control procedures (except where otherwise agreed by the client and Maxxam in writing). All data is in statistical control and has met quality control and method performance criteria unless otherwise noted. All method blanks are reported; unless indicated otherwise, associated sample data are not blank corrected.

Maxxam Analytics' liability is limited to the actual cost of the requested analyses, unless otherwise agreed in writing. There is no other warranty expressed or implied. Maxxam has been retained to provide analysis of samples provided by the Client using the testing methodology referenced in this report. Interpretation and use of test results are the sole responsibility of the Client and are not within the scope of services provided by Maxxam, unless otherwise agreed in writing.

Solid sample results, except biota, are based on dry weight unless otherwise indicated. Organic analyses are not recovery corrected except for isotope dilution methods.

Results relate to samples tested.

This Certificate shall not be reproduced except in full, without the written approval of the laboratory.

Reference Method suffix "m" indicates test methods incorporate validated modifications from specific reference methods to improve performance.

\* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.

Your Project #: 1803-E002  
Your C.O.C. #: 657752-08-01

**Attention: Zoe Hawkes**

Soil Engineers Ltd  
90 West Beaver Creek Road  
Unit 100  
Richmond Hill, ON  
CANADA L4B 1E7

**Report Date: 2018/04/17**  
Report #: R5081365  
Version: 1 - Final

**CERTIFICATE OF ANALYSIS**

**MAXXAM JOB #: B883803**

**Received: 2018/04/13, 14:40**

Encryption Key



Maxxam  
17 Apr 2018 15:30:15

Please direct all questions regarding this Certificate of Analysis to your Project Manager,  
Antonella Brasil, Senior Project Manager  
Email: ABrasil@maxxam.ca  
Phone# (905)817-5817

=====

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**RESULTS OF ANALYSES OF SOIL**

Maxxam ID		GLL491		
Sampling Date		2018/03/28 10:00		
COC Number		657752-08-01		
	<b>UNITS</b>	<b>TP6-1</b>	<b>RDL</b>	<b>QC Batch</b>
<b>Inorganics</b>				
Conductivity	mS/cm	0.78	0.002	5486004
RDL = Reportable Detection Limit				
QC Batch = Quality Control Batch				

Maxxam Job #: B883803  
Report Date: 2018/04/17

Soil Engineers Ltd  
Client Project #: 1803-E002  
Sampler Initials: ZH

**TEST SUMMARY**

**Maxxam ID:** GLL491  
**Sample ID:** TP6-1  
**Matrix:** Soil

**Collected:** 2018/03/28  
**Shipped:**  
**Received:** 2018/04/13

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Conductivity	AT	5486004	2018/04/17	2018/04/17	Tahir Anwar

**GENERAL COMMENTS**

Each temperature is the average of up to three cooler temperatures taken at receipt

Package 1	4.0°C
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**Results relate only to the items tested.**

**QUALITY ASSURANCE REPORT**

QC Batch	Parameter	Date	SPIKED BLANK		Method Blank		RPD	
			% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
5486J04	Conductivity	2018/04/17	100	90 - 110	<0.002	mS/cm	0.19	10
<p>Duplicate: Paired analysis of a separate portion of the same sample. Used to evaluate the variance in the measurement.</p> <p>Spiked Blank: A blank matrix sample to which a known amount of the analyte, usually from a second source, has been added. Used to evaluate method accuracy.</p> <p>Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.</p>								

**VALIDATION SIGNATURE PAGE**

The analytical data and all QC contained in this report were reviewed and validated by the following individual(s).

*Ewa P.* 

Ewa Pranjic, M.Sc., C.Chem, Scientific Specialist

---

Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.



Your Project #: 1803-E002  
Your C.O.C. #: 643583-05-01

**Attention: Zoe Hawkes**

Soil Engineers Ltd  
90 West Beaver Creek Road  
Unit 100  
Richmond Hill, ON  
CANADA L4B 1E7

**Report Date: 2018/04/23**  
Report #: R5088865  
Version: 1 - Final

**CERTIFICATE OF ANALYSIS**

**MAXXAM JOB #: B887866**

**Received: 2018/04/18, 15:05**

Sample Matrix: Soil  
# Samples Received: 3

Analyses	Date		Laboratory Method	Reference
	Quantity Extracted	Analyzed		
Conductivity	3	2018/04/23	CAM SOP-00414	OMOE E3530 v1 m

**Remarks:**

Maxxam Analytics' laboratories are accredited to ISO/IEC 17025:2005 for specific parameters on scopes of accreditation. Unless otherwise noted, procedures used by Maxxam are based upon recognized Provincial, Federal or US method compendia such as CCME, MDDELCC, EPA, APHA.

All work recorded herein has been done in accordance with procedures and practices ordinarily exercised by professionals in Maxxam's profession using accepted testing methodologies, quality assurance and quality control procedures (except where otherwise agreed by the client and Maxxam in writing). All data is in statistical control and has met quality control and method performance criteria unless otherwise noted. All method blanks are reported; unless indicated otherwise, associated sample data are not blank corrected.

Maxxam Analytics' liability is limited to the actual cost of the requested analyses, unless otherwise agreed in writing. There is no other warranty expressed or implied. Maxxam has been retained to provide analysis of samples provided by the Client using the testing methodology referenced in this report. Interpretation and use of test results are the sole responsibility of the Client and are not within the scope of services provided by Maxxam, unless otherwise agreed in writing.

Solid sample results, except biota, are based on dry weight unless otherwise indicated. Organic analyses are not recovery corrected except for isotope dilution methods.

Results relate to samples tested.

This Certificate shall not be reproduced except in full, without the written approval of the laboratory.

Reference Method suffix "m" indicates test methods incorporate validated modifications from specific reference methods to improve performance.

\* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.

Your Project #: 1803-E002  
Your C.O.C. #: 643583-05-01

**Attention: Zoe Hawkes**

Soil Engineers Ltd  
90 West Beaver Creek Road  
Unit 100  
Richmond Hill, ON  
CANADA L4B 1E7

**Report Date: 2018/04/23**  
Report #: R5088865  
Version: 1 - Final

**CERTIFICATE OF ANALYSIS**

**MAXXAM JOB #: B887866**

**Received: 2018/04/18, 15:05**

Encryption Key



Maxxam

23 Apr 2018 16:41:23

Please direct all questions regarding this Certificate of Analysis to your Project Manager,  
Antonella Brasil, Senior Project Manager  
Email: ABrasil@maxxam.ca  
Phone# (905)817-5817

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This report has been generated and distributed using a secure automated process.

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**RESULTS OF ANALYSES OF SOIL**

Maxxam ID		GMG547	GMG548	GMG549		
Sampling Date		2018/03/28 10:00	2018/03/28 10:00	2018/03/28 10:00		
COC Number		643583-05-01	643583-05-01	643583-05-01		
	<b>UNITS</b>	<b>TP6-2</b>	<b>TP6-3</b>	<b>TP6-4</b>	<b>RDL</b>	<b>QC Batch</b>
<b>Inorganics</b>						
Conductivity	mS/cm	0.61	0.60	0.45	0.002	5496201
RDL = Reportable Detection Limit						
QC Batch = Quality Control Batch						

**TEST SUMMARY**

**Maxxam ID:** GMG547  
**Sample ID:** TP6-2  
**Matrix:** Soil

**Collected:** 2018/03/28  
**Shipped:**  
**Received:** 2018/04/18

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Conductivity	AT	5496201	2018/04/23	2018/04/23	Tahir Anwar

**Maxxam ID:** GMG548  
**Sample ID:** TP6-3  
**Matrix:** Soil

**Collected:** 2018/03/28  
**Shipped:**  
**Received:** 2018/04/18

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Conductivity	AT	5496201	2018/04/23	2018/04/23	Tahir Anwar

**Maxxam ID:** GMG549  
**Sample ID:** TP6-4  
**Matrix:** Soil

**Collected:** 2018/03/28  
**Shipped:**  
**Received:** 2018/04/18

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Conductivity	AT	5496201	2018/04/23	2018/04/23	Tahir Anwar

**GENERAL COMMENTS**

Each temperature is the average of up to three cooler temperatures taken at receipt

Package 1	3.0°C
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**Results relate only to the items tested.**

**QUALITY ASSURANCE REPORT**

QC Batch	Parameter	Date	SPIKED BLANK		Method Blank		RPD	
			% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
5496201	Conductivity	2018/04/23	100	90 - 110	<0.002	mS/cm	2.2	10
<p>Duplicate: Paired analysis of a separate portion of the same sample. Used to evaluate the variance in the measurement.</p> <p>Spiked Blank: A blank matrix sample to which a known amount of the analyte, usually from a second source, has been added. Used to evaluate method accuracy.</p> <p>Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.</p>								

**VALIDATION SIGNATURE PAGE**

The analytical data and all QC contained in this report were reviewed and validated by the following individual(s).


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Ewa Pranjic, M.Sc., C.Chem, Scientific Specialist

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