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June 8, 2022
File: PE5694-LET.01

Dr. Sandra Iroakazi
335-A Dufferin Street
Hawkesbury, Ontario
K6A 2R8

Geotechnical Engineering
Environmental Engineering
Hydrogeology
Geological Engineering
Materials Testing
Building Science

Subject: **Fill Quality Assessment
Vacant Property
140 Lusk Street
Ottawa, Ontario**

www.patersongroup.ca

Dear Madame,

Further to your request and authorization, Paterson Group (Paterson) carried out a Fill Quality Assessment Program at the aforementioned site. The results of which are summarized in the following report.

1.0 Background Information

The subject site is located on the north side of Lusk Street, south of O'Keefe Court, in the City of Ottawa, Ontario. The subject property is currently vacant and is predominantly grass/brush covered.

The site topography slopes slightly downward to the west on the western portion of the property and downward to the north elsewhere on the site. The regional topography is undulating.

2.0 Previous Engineering Reports

The following report was reviewed prior to conducting this assessment:

- ❑ *"Phase I Environmental Site Assessment, 140 Lusk Street, Ottawa, Ontario"*, prepared by Paterson Group Inc., dated April 12, 2022.

The Phase I ESA did not identify any potential environmental concerns associated with the neighbouring properties. The Phase I ESA did identify surficial fill throughout the site.

Historically, fill material was brought into the site during the construction of Highway 416 and the realignment of Fallowfield Road and Strandherd Drive in the late 1990's. As such, Paterson recommended that the fill material identified throughout the property by assessed for its quality.

3.0 Subsurface Investigation

As part of the field program, seven (7) test pits (TP1-22 to TP7-22) were placed throughout the property on May 24, 2022 using a rubber tired backhoe under the full time supervision of Paterson personnel. The test pits extended to depths ranging from 2.81 m to 3.46 m below ground surface. The locations of the test pits are illustrated on Drawing PE5694-3 – Test Hole Location Plan, appended to this report.

Subsurface Profile

The soil profile encountered at the test pit locations generally consisted of a layer of fill material underlain by native grey silty clay and till. The fill material throughout the test pits consisted of brown silty sand with gravel, occasional cobbles and boulders. Some limited construction debris was encountered within the fill layer in TP2-22, TP4-22, TP5-22 and TP6-22. The construction debris consisted of asphalt and bricks.

A detailed description of the soil profile encountered at each test hole location is illustrated on the Soil Profile and Test Data sheets, appended to this report.

Soil Sampling Protocol

Soil sampling protocols were followed using the MECP document entitled, *“Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act and Excess Soil Quality”*, dated February 2021.

The samples were recovered by means of grab sampling, and immediately placed into plastic bags. If significant contamination was encountered, the samples were instead placed into glass jars. The samples were also stored in coolers to reduce analyte volatilization during transportation.

A total of thirty-three (33) soil samples were recovered from the test pits by means of grab sampling. The depths at which grab samples were obtained from the test pits are shown as **“G”**, on the Soil Profile and Test Data sheets, appended to this report.

All samples recovered as part of this investigation will be stored in the laboratory for a period of one month after issuance of this report. All samples will then be discarded unless this firm is otherwise directed.

Soil Sample Headspace Analysis

All soil samples collected were subjected to a preliminary screening procedure, which included visual screening for colour and evidence of metals, as well as soil vapour screening with a Photo Ionization Detector.

The recovered soil samples were placed immediately into airtight plastic bags with nominal headspace. All lumps of soil inside the bags were broken by hand, and the soil was allowed to come to room temperature prior to conducting the vapour survey, ensuring consistency of readings between samples. To measure the soil vapours, the analyser probe was inserted into the nominal headspace above the sample. The sample was then agitated and manipulated gently by hand as measurement was taken.

The peak reading registered within the first 15 seconds was recorded as the vapour measurement. The parts per million (ppm) scale was used to measure concentrations of organic vapours.

The organic vapour readings in the recovered soil samples were measured to range between 0.2 and 51.2 ppm. The results of the vapour survey indicate that there is a negligible potential for the presence of volatile substances within the soil matrix.

Refer to the Soil Profile and Test Data sheets, appended to this report, for the soil sample headspace analysis results.

Elevation Surveying

The ground surface elevations at each test pit location were surveyed using a GPS device by Paterson personnel and referenced to a geodetic datum.

Analytical Testing

Paracel Laboratories (Paracel), of Ottawa, Ontario, performed the laboratory analysis on the samples submitted for analytical testing. Paracel is a member of the Standards Council of Canada/Canadian Association for Laboratory Accreditation (SCC/CALA) and is accredited and certified by the SCC/CALA for specific tests registered with the association.

4.0 Analytical Test Results

Selected Soil and Groundwater Standards

The soil standards for the subject property were obtained from Table 3 of the document entitled, *“Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act”*, prepared by the Ontario Ministry of Environment, Conservation and Parks (MECP), and dated April 15, 2011. The selected MECP standards are based on the following considerations:

- Full depth conditions;
- Coarse-grained soil conditions;
- Non-potable groundwater conditions;

Commercial land use.

Grain size analysis was not conducted as part of this assessment. The coarse-grained soil standards were selected as a conservative approach.

The soil results were also compared to the MECP Table 1 (background) standards, as any soil removed from the property during redevelopment would need to be in compliance with these standards or be taken to an approved waste disposal site.

Soil Analysis

Six (6) soil samples were submitted for laboratory analysis of metals and polycyclic aromatic hydrocarbons (PAHs).

The results of the analytical testing are presented below in Tables 1 and 2, as well as on the laboratory certificate of analysis, appended to this report.

Table 1 Analytical Test Results – Soil – Metals								
Parameter	MDL (µg/g)	Soil Samples (µg/g)					MECP Table 3 Commercial Soil Standards (µg/g)	MECP Table 1 Soil Standards (µg/g)
		May 24, 2022						
		TP1-22- G3	TP3-22- G2	TP4-22- G1	TP5-22- G2	TP6-22- G1		
Antimony	1.0	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	40	1.3
Arsenic	1.0	4.2	3.5	3.4	3.6	2.5	18	18
Barium	1.0	91.3	129	253	277	189	670	220
Beryllium	0.5	ND (0.5)	ND (0.5)	0.6	0.7	ND (0.5)	8	2.5
Boron	5.0	5.7	ND (5.0)	7.6	7.0	ND (5.0)	120	36
Cadmium	0.5	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	1.9	1.2
Chromium	5.0	14.9	14.6	35.2	43.2	31.5	160	70
Cobalt	1.0	4.9	5.0	9.8	11.2	8.2	80	21
Copper	5.0	13.3	16.0	22.9	23.5	19.7	230	92
Lead	1.0	7.1	6.2	15.5	8.2	15.0	120	120
Molybdenum	1.0	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	40	2
Nickel	5.0	9.9	9.4	22.2	24.8	17.6	270	82
Selenium	1.0	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	5.5	1.5
Silver	0.3	ND (0.3)	ND (0.3)	ND (0.3)	ND (0.3)	ND (0.3)	40	0.5
Thallium	1.0	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	3.3	1
Uranium	1.0	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	33	2.5
Vanadium	10.0	25.1	24.2	42.4	54.2	39.0	86	86
Zinc	20.0	24.2	27.1	57.4	62.5	49.3	340	290

Notes:

- MDL – Method Detection Limit
- nd – not detected above the MDL
- Bold and Underlined** – value exceeds selected MECP standards

All detected metal parameter concentrations are in compliance with the selected MECP Table 3 commercial standards for coarse-grained soils. The barium concentrations

identified in soil samples TP4-22-G1 and TP5-22-G2 exceed the MECP Table 1 background site condition standards. It is considered likely that these barium concentrations are naturally occurring in the silty clay fill.

Table 2 Analytical Test Results – Soil – PAHs							
Parameter	MDL (µg/g)	Soil Samples (µg/g)				MECP Table 3 Commercial Soil Standards (µg/g)	MECP Table 1 Soil Standards (µg/g)
		May 24, 2022					
		TP1-22- G3	TP4-22- G1	TP6-22- G1	TP7-22- G4		
Acenaphthene	0.02	ND (0.02)	ND (0.02)	ND (0.02)	ND (0.02)	96	0.072
Acenaphthylene	0.02	ND (0.02)	0.04	0.02	ND (0.02)	0.15	0.093
Anthracene	0.02	ND (0.02)	0.04	0.02	ND (0.02)	0.67	0.16
Benzo[a]anthracene	0.02	ND (0.02)	0.10	0.04	0.04	0.96	0.36
Benzo[a]pyrene	0.02	ND (0.02)	0.11	0.05	0.05	0.3	0.3
Benzo[b]fluoranthene	0.02	ND (0.02)	0.12	0.05	0.05	0.96	0.47
Benzo[g,h,i]perylene	0.02	ND (0.02)	0.07	0.04	0.04	9.6	0.68
Benzo[k]fluoranthene	0.02	ND (0.02)	0.06	0.03	0.02	0.96	0.48
Chrysene	0.02	ND (0.02)	0.10	0.04	0.06	9.6	2.8
Dibenzo[a,h]anthracene	0.02	ND (0.02)	ND (0.02)	ND (0.02)	ND (0.02)	0.1	0.1
Fluoranthene	0.02	ND (0.02)	0.15	0.08	0.09	9.6	0.56
Fluorene	0.02	ND (0.02)	ND (0.02)	ND (0.02)	ND (0.02)	62	0.12
Indeno [1,2,3-cd] pyrene	0.02	ND (0.02)	0.06	0.04	0.03	0.76	0.23
1-Methylnaphthalene	0.02	ND (0.02)	ND (0.02)	0.02	ND (0.02)	76	0.59
2-Methylnaphthalene	0.02	ND (0.02)	ND (0.02)	0.03	ND (0.02)	76	0.59
Methylnaphthalene (1&2)	0.04	ND (0.04)	ND (0.04)	0.05	ND (0.04)	76	0.59
Naphthalene	0.01	ND (0.01)	ND (0.01)	0.02	ND (0.01)	9.6	0.09
Phenanthrene	0.02	ND (0.02)	0.07	0.06	0.05	12	0.69
Pyrene	0.02	ND (0.02)	0.14	0.07	0.07	96	1

Notes:

- MDL – Method Detection Limit
- nd – not detected above the MDL
- Bold and Underlined** – value exceeds selected MECP standards

All detected PAH parameter concentrations are in compliance with the selected MECP Table 3 commercial standards for coarse-grained soils, as well as the MECP Table 1 background site condition standards.

5.0 Assessment and Recommendations

Assessment

A Fill Quality Assessment Program was carried out throughout the vacant property located at 140 Lusk Street, in the City of Ottawa, Ontario. The purpose of this assessment was to assess the quality of the previously identified fill material on the subject property. Seven (7) test pits were placed throughout the subject property on May 24, 2022.

Soil

No unusual visual or olfactory signs of contamination were observed in the soil samples obtained from the test pits, however, some construction debris consisting of asphalt and brick was encountered within the fill layer in TP2-22, TP4-22, TP5-22, and TP6-22. Six (6) soil samples were submitted to Paracel Laboratories for analysis of the following parameters: metals and PAHs.

All detected PAH concentrations identified in the soil samples analysed comply with the MECP Table 3 commercial standards, as well as the MECP Table 1 background site conditions standards.

All detected metal parameter concentrations identified in the soil samples analysed comply with the MECP Table 3 commercial standards. The barium concentrations in samples TP4-22-G1 and TP5-22-G2 exceed the MECP Table 1 standards, although it is considered possible that these are naturally occurring concentrations.

Recommendations

Soil

Based on our observations and the limited testing program carried out, the fill quality complies with the MECP standards for the subject property, however, based on the significant volume of fill on site and taking into consideration the future development of the land, it is anticipated that a substantial amount of fill will have to be removed for construction purposes. All fill will have to be removed from beneath footings. While it is typical to remove all fill from beneath building floor slabs and hard surfaced parking lots, it may be possible to leave some fill in place and/or remove and reuse some of the fill provided proper placement and compaction is implemented. The practicality of reusing the fill and/or leaving it in place will also be determined by the level of risk/degree of potential settlement of the overlying structure, and the time of year and/or weather conditions at the time of construction.

Currently, the test data indicates that the majority of the fill tested is considered clean for off-site disposal, although any fill with significant construction debris is not considered to be clean. That being said, based on the volume of fill material that ultimately has to be removed for construction purposes, it is likely that additional testing will be required in the future to qualify the fill for off-site disposal.

5.0 Statement of Limitations

The client should be aware that any information pertaining to soils and all test hole logs are furnished as a matter of general information only and test hole descriptions or logs are not to be interpreted as descriptive of conditions at locations other than those described by the test holes themselves.

This report was prepared for the sole use of Dr. Sandra Iroakazi. Permission from Dr. Sandra Iroakazi and Paterson Group will be required prior to the release of this report to any other party.

We trust that this report satisfies your requirements.

Paterson Group Inc.



Joshua Dempsey, B.Sc.



Mark D'Arcy, P.Eng., QP_{ESA}

Report Distribution

- Dr. Sandra Iroakazi
- Paterson Group Inc.

Attachments

- Soil Profile and Test Data Sheets
- Laboratory Certificate of Analysis
- Drawing PE5694-3 – Test Hole Location Plan

DATUM Geodetic

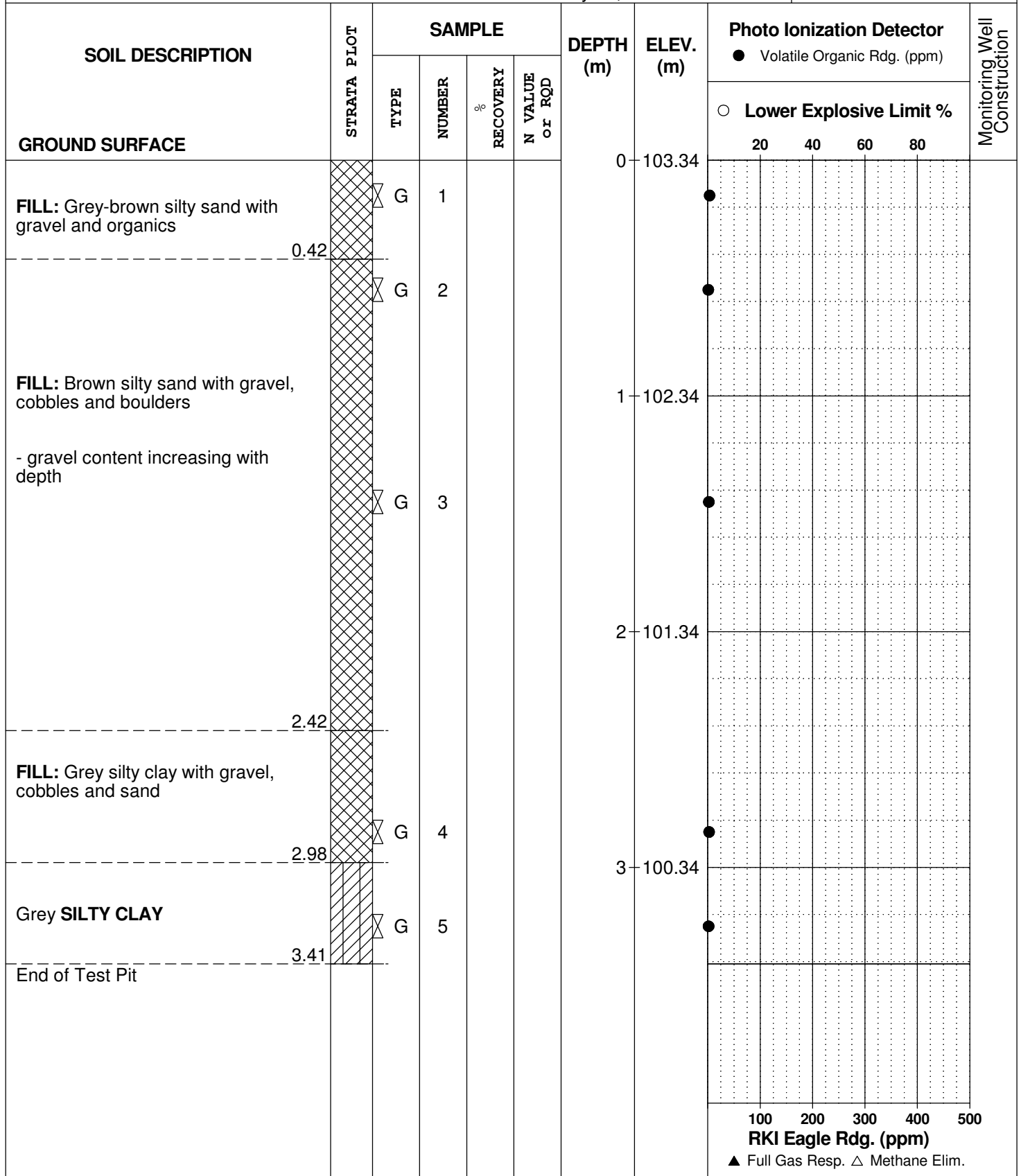
REMARKS

BORINGS BY Excavator

DATE May 24, 2022

FILE NO. **PE5694**

HOLE NO. **TP 1-22**



DATUM Geodetic



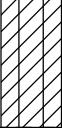
REMARKS

BORINGS BY Excavator

DATE May 24, 2022

FILE NO. **PE5694**

HOLE NO. **TP 2-22**

SOIL DESCRIPTION	STRATA PLOT	SAMPLE				DEPTH (m)	ELEV. (m)	Photo Ionization Detector				Monitoring Well Construction	
		TYPE	NUMBER	RECOVERY %	N VALUE or RQD			● Volatile Organic Rdg. (ppm)	○ Lower Explosive Limit %				
GROUND SURFACE								20	40	60	80		
FILL: Brown silty sand with gravel, cobbles and boulders, some brick fragments		G	1			0	103.40						
		G	2			1	102.40						
		G	3			2	101.40						
Brown SILTY SAND with gravel		G	4			3	100.40						
Grey SILTY CLAY		G	5										
End of Test Pit													

2.82

3.04

3.42

100 200 300 400 500

RKI Eagle Rdg. (ppm)

▲ Full Gas Resp. △ Methane Elim.

DATUM Geodetic

REMARKS

BORINGS BY Excavator

DATE May 24, 2022

FILE NO. **PE5694**

HOLE NO. **TP 3-22**

SOIL DESCRIPTION	STRATA PLOT	SAMPLE				DEPTH (m)	ELEV. (m)	Photo Ionization Detector				Monitoring Well Construction		
		TYPE	NUMBER	RECOVERY	N VALUE or RQD			● Volatile Organic Rdg. (ppm)	○ Lower Explosive Limit %	20	40		60	80
GROUND SURFACE						0	103.30							
FILL: Brown silty sand with gravel, cobbles and boulders		G	1					●						
	0.33													
		G	2					●						
FILL: Grey-brown silty sand with gravel, cobbles and clay, trace organics		G	3			1	102.30							
	2.11													
		G	4					●						
FLL: Dark brown silty sand with gravel, organics and silty sand pockets		G	4			2	101.30							
	3.03													
Grey SILTY CLAY with sand		G	5					●						
	3.46													
End of Test Pit														

100 200 300 400 500
RKI Eagle Rdg. (ppm)
▲ Full Gas Resp. △ Methane Elim.

DATUM Geodetic

REMARKS

BORINGS BY Excavator

DATE May 24, 2022

FILE NO. **PE5694**

HOLE NO. **TP 4-22**

SOIL DESCRIPTION	STRATA PLOT	SAMPLE				DEPTH (m)	ELEV. (m)	Photo Ionization Detector				Monitoring Well Construction	
		TYPE	NUMBER	RECOVERY	N VALUE or RQD			● Volatile Organic Rdg. (ppm)	○ Lower Explosive Limit %				
GROUND SURFACE								20	40	60	80		
FILL: Brown silty sand with gravel and cobbles, trace brick and asphalt	X	G	1			0	103.56						
	0.88												
FILL: Brown silty sand with organics, gravel and cobbles	X	G	2			1	102.56						
	2.02												
GLACIAL TILL: Grey silty sand with gravel and clay	X	G	4			2	101.56						
	2.46												
End of Test Pit													

100 200 300 400 500
RKI Eagle Rdg. (ppm)
▲ Full Gas Resp. △ Methane Elim.

DATUM Geodetic

REMARKS

BORINGS BY Excavator

DATE May 24, 2022

FILE NO. **PE5694**

HOLE NO. **TP 5-22**

SOIL DESCRIPTION	STRATA PLOT	SAMPLE				DEPTH (m)	ELEV. (m)	Photo Ionization Detector				Monitoring Well Construction	
		TYPE	NUMBER	RECOVERY %	N VALUE or RQD			● Volatile Organic Rdg. (ppm)	○ Lower Explosive Limit %				
GROUND SURFACE								20	40	60	80		
FILL: Brown silty sand with gravel and cobbles, trace brick and asphalt	X	G	1			0	103.54						
0.67													
FILL: Grey silty clay with sand and gravel	X	G	2			1	102.54						
1.31													
FILL: Brown silty sand with organics, clay and gravel	X	G	3			2	101.54						
2.92													
GLACIAL TILL: Grey silty sand with clay, gravel and cobbles	X	G	5			3	100.54						
3.17													
End of Test Pit													

100 200 300 400 500
RKI Eagle Rdg. (ppm)
▲ Full Gas Resp. △ Methane Elim.

DATUM Geodetic

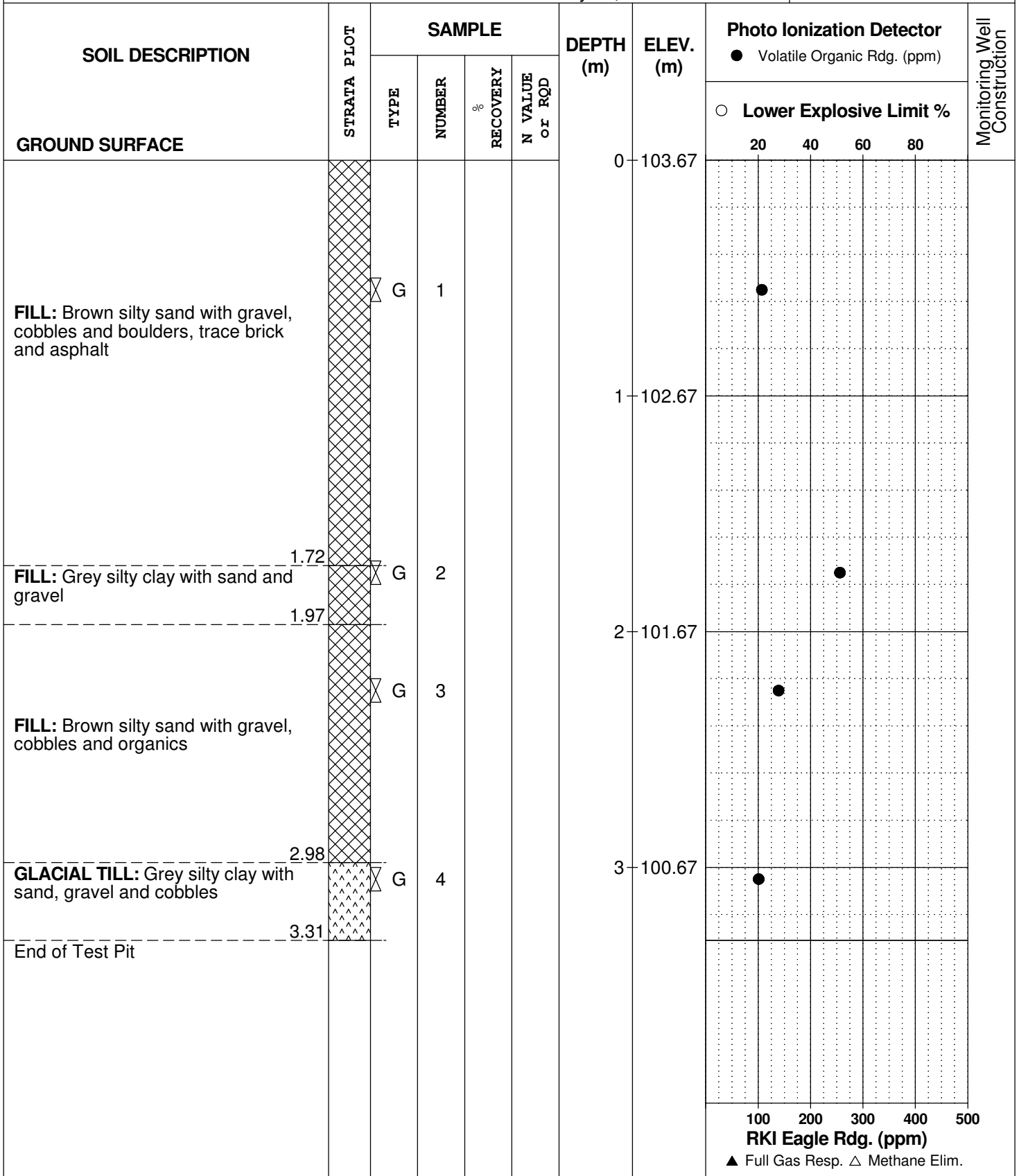
REMARKS

BORINGS BY Excavator

DATE May 24, 2022

FILE NO. **PE5694**

HOLE NO. **TP 6-22**



100 200 300 400 500
RKI Eagle Rdg. (ppm)
▲ Full Gas Resp. △ Methane Elim.

DATUM Geodetic

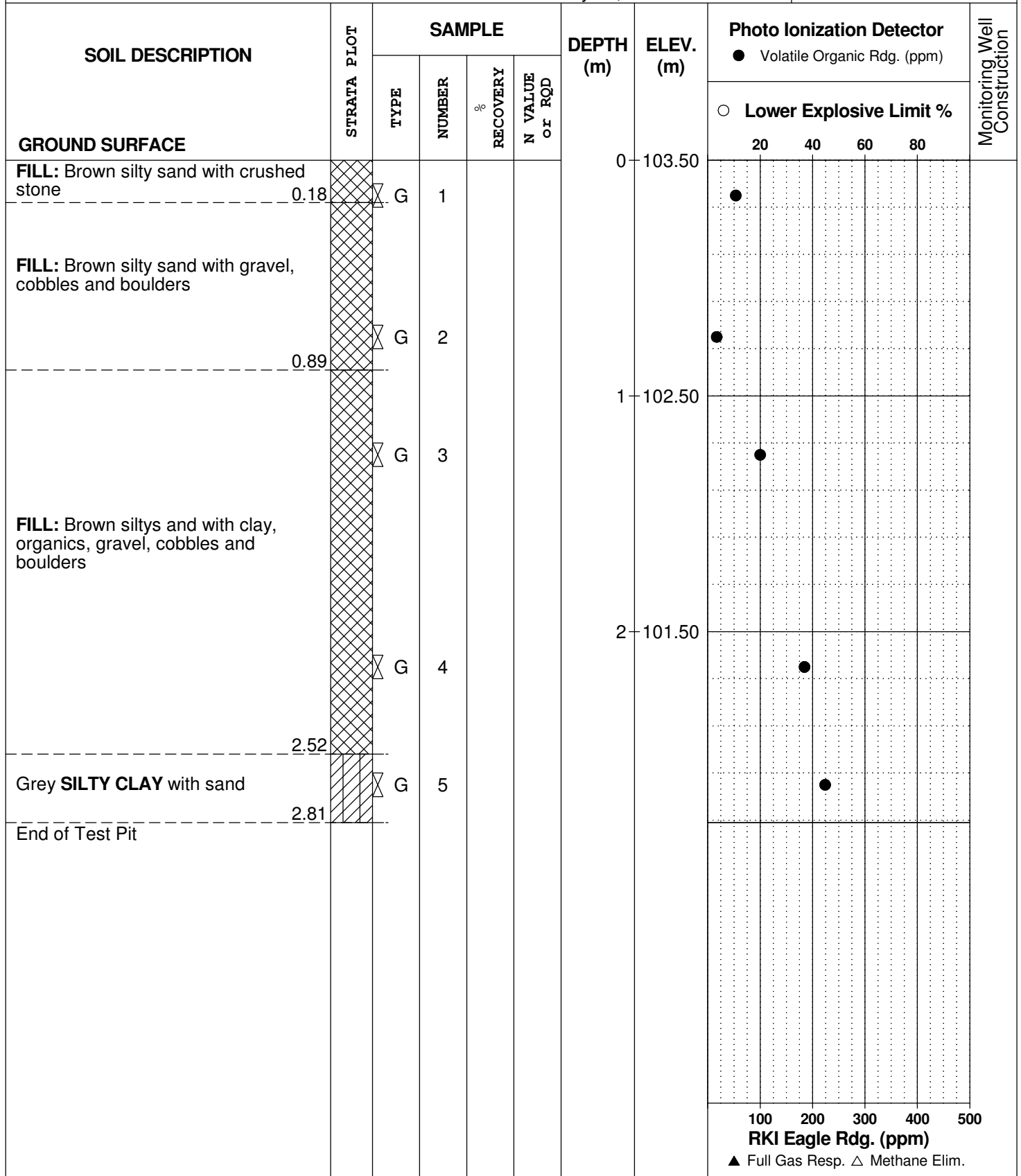
REMARKS

BORINGS BY Excavator

DATE May 24, 2022

FILE NO. **PE5694**

HOLE NO. **TP 7-22**



Certificate of Analysis

Paterson Group Consulting Engineers

154 Colonnade Road South
Nepean, ON K2E 7J5
Attn: Mark D'Arcy

Client PO:
Project: PE5694
Custody: 136579

Report Date: 6-Jun-2022
Order Date: 25-May-2022

Order #: 2222173

This Certificate of Analysis contains analytical data applicable to the following samples as submitted:

Parcel ID	Client ID
2222173-01	TP1-22-G3
2222173-02	TP3-22-G2
2222173-03	TP4-22-G1
2222173-04	TP5-22-G2
2222173-05	TP6-22-G1
2222173-06	TP7-22-G4

Approved By:



Mark Foto, M.Sc.
Lab Supervisor

Certificate of Analysis

Report Date: 06-Jun-2022

Client: **Paterson Group Consulting Engineers**

Order Date: 25-May-2022

Client PO:

Project Description: **PE5694**

Analysis Summary Table

Analysis	Method Reference/Description	Extraction Date	Analysis Date
REG 153: Metals by ICP/MS, soil	EPA 6020 - Digestion - ICP-MS	30-May-22	30-May-22
REG 153: PAHs by GC-MS	EPA 8270 - GC-MS, extraction	25-May-22	1-Jun-22
Solids, %	Gravimetric, calculation	31-May-22	31-May-22

Certificate of Analysis

Report Date: 06-Jun-2022

Client: Paterson Group Consulting Engineers

Order Date: 25-May-2022

Client PO:

Project Description: PE5694

Client ID:	TP1-22-G3	TP3-22-G2	TP4-22-G1	TP5-22-G2
Sample Date:	24-May-22 09:00	24-May-22 09:00	24-May-22 09:00	24-May-22 09:00
Sample ID:	2222173-01	2222173-02	2222173-03	2222173-04
MDL/Units	Soil	Soil	Soil	Soil

Physical Characteristics

% Solids	0.1 % by Wt.	85.4	81.6	88.6	84.3
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Metals

Element	MDL/Units	TP1-22-G3	TP3-22-G2	TP4-22-G1	TP5-22-G2
Antimony	1.0 ug/g dry	<1.0	<1.0	<1.0	<1.0
Arsenic	1.0 ug/g dry	4.2	3.5	3.4	3.6
Barium	1.0 ug/g dry	91.3	129	253	277
Beryllium	0.5 ug/g dry	<0.5	<0.5	0.6	0.7
Boron	5.0 ug/g dry	5.7	<5.0	7.6	7.0
Cadmium	0.5 ug/g dry	<0.5	<0.5	<0.5	<0.5
Chromium	5.0 ug/g dry	14.9	14.6	35.2	43.2
Cobalt	1.0 ug/g dry	4.9	5.0	9.8	11.2
Copper	5.0 ug/g dry	13.3	16.0	22.9	23.5
Lead	1.0 ug/g dry	7.1	6.2	15.5	8.2
Molybdenum	1.0 ug/g dry	<1.0	<1.0	<1.0	<1.0
Nickel	5.0 ug/g dry	9.9	9.4	22.2	24.8
Selenium	1.0 ug/g dry	<1.0	<1.0	<1.0	<1.0
Silver	0.3 ug/g dry	<0.3	<0.3	<0.3	<0.3
Thallium	1.0 ug/g dry	<1.0	<1.0	<1.0	<1.0
Uranium	1.0 ug/g dry	<1.0	<1.0	<1.0	<1.0
Vanadium	10.0 ug/g dry	25.1	24.2	42.4	54.2
Zinc	20.0 ug/g dry	24.2	27.1	57.4	62.5

Semi-Volatiles

Compound	MDL/Units	TP1-22-G3	TP3-22-G2	TP4-22-G1	TP5-22-G2
Acenaphthene	0.02 ug/g dry	<0.02	-	<0.02	-
Acenaphthylene	0.02 ug/g dry	<0.02	-	0.04	-
Anthracene	0.02 ug/g dry	<0.02	-	0.04	-
Benzo [a] anthracene	0.02 ug/g dry	<0.02	-	0.10	-
Benzo [a] pyrene	0.02 ug/g dry	<0.02	-	0.11	-
Benzo [b] fluoranthene	0.02 ug/g dry	<0.02	-	0.12	-
Benzo [g,h,i] perylene	0.02 ug/g dry	<0.02	-	0.07	-
Benzo [k] fluoranthene	0.02 ug/g dry	<0.02	-	0.06	-
Chrysene	0.02 ug/g dry	<0.02	-	0.10	-
Dibenzo [a,h] anthracene	0.02 ug/g dry	<0.02	-	<0.02	-
Fluoranthene	0.02 ug/g dry	<0.02	-	0.15	-
Fluorene	0.02 ug/g dry	<0.02	-	<0.02	-
Indeno [1,2,3-cd] pyrene	0.02 ug/g dry	<0.02	-	0.06	-
1-Methylnaphthalene	0.02 ug/g dry	<0.02	-	<0.02	-

Certificate of Analysis

Report Date: 06-Jun-2022

Client: Paterson Group Consulting Engineers

Order Date: 25-May-2022

Client PO:

Project Description: PE5694

	Client ID:	TP1-22-G3	TP3-22-G2	TP4-22-G1	TP5-22-G2
	Sample Date:	24-May-22 09:00	24-May-22 09:00	24-May-22 09:00	24-May-22 09:00
	Sample ID:	2222173-01	2222173-02	2222173-03	2222173-04
	MDL/Units	Soil	Soil	Soil	Soil
2-Methylnaphthalene	0.02 ug/g dry	<0.02	-	<0.02	-
Methylnaphthalene (1&2)	0.04 ug/g dry	<0.04	-	<0.04	-
Naphthalene	0.01 ug/g dry	<0.01	-	<0.01	-
Phenanthrene	0.02 ug/g dry	<0.02	-	0.07	-
Pyrene	0.02 ug/g dry	<0.02	-	0.14	-
2-Fluorobiphenyl	Surrogate	105%	-	102%	-
Terphenyl-d14	Surrogate	110%	-	104%	-

Certificate of Analysis

Report Date: 06-Jun-2022

Client: Paterson Group Consulting Engineers

Order Date: 25-May-2022

Client PO:

Project Description: PE5694

Client ID:	TP6-22-G1	TP7-22-G4	-	-
Sample Date:	24-May-22 09:00	24-May-22 09:00	-	-
Sample ID:	2222173-05	2222173-06	-	-
MDL/Units	Soil	Soil	-	-

Physical Characteristics

% Solids	0.1 % by Wt.	90.1	86.0	-	-
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Metals

Antimony	1.0 ug/g dry	<1.0	-	-	-
Arsenic	1.0 ug/g dry	2.5	-	-	-
Barium	1.0 ug/g dry	189	-	-	-
Beryllium	0.5 ug/g dry	<0.5	-	-	-
Boron	5.0 ug/g dry	<5.0	-	-	-
Cadmium	0.5 ug/g dry	<0.5	-	-	-
Chromium	5.0 ug/g dry	31.5	-	-	-
Cobalt	1.0 ug/g dry	8.2	-	-	-
Copper	5.0 ug/g dry	19.7	-	-	-
Lead	1.0 ug/g dry	15.0	-	-	-
Molybdenum	1.0 ug/g dry	<1.0	-	-	-
Nickel	5.0 ug/g dry	17.6	-	-	-
Selenium	1.0 ug/g dry	<1.0	-	-	-
Silver	0.3 ug/g dry	<0.3	-	-	-
Thallium	1.0 ug/g dry	<1.0	-	-	-
Uranium	1.0 ug/g dry	<1.0	-	-	-
Vanadium	10.0 ug/g dry	39.0	-	-	-
Zinc	20.0 ug/g dry	49.3	-	-	-

Semi-Volatiles

Acenaphthene	0.02 ug/g dry	<0.02	<0.02	-	-
Acenaphthylene	0.02 ug/g dry	0.02	<0.02	-	-
Anthracene	0.02 ug/g dry	0.02	<0.02	-	-
Benzo [a] anthracene	0.02 ug/g dry	0.04	0.04	-	-
Benzo [a] pyrene	0.02 ug/g dry	0.05	0.05	-	-
Benzo [b] fluoranthene	0.02 ug/g dry	0.05	0.05	-	-
Benzo [g,h,i] perylene	0.02 ug/g dry	0.04	0.04	-	-
Benzo [k] fluoranthene	0.02 ug/g dry	0.03	0.02	-	-
Chrysene	0.02 ug/g dry	0.04	0.06	-	-
Dibenzo [a,h] anthracene	0.02 ug/g dry	<0.02	<0.02	-	-
Fluoranthene	0.02 ug/g dry	0.08	0.09	-	-
Fluorene	0.02 ug/g dry	<0.02	<0.02	-	-
Indeno [1,2,3-cd] pyrene	0.02 ug/g dry	0.04	0.03	-	-
1-Methylnaphthalene	0.02 ug/g dry	0.02	<0.02	-	-

Certificate of Analysis

Report Date: 06-Jun-2022

Client: Paterson Group Consulting Engineers

Order Date: 25-May-2022

Client PO:

Project Description: PE5694

	MDL/Units	TP6-22-G1 Soil	TP7-22-G4 Soil	-	-
2-Methylnaphthalene	0.02 ug/g dry	0.03	<0.02	-	-
Methylnaphthalene (1&2)	0.04 ug/g dry	0.05	<0.04	-	-
Naphthalene	0.01 ug/g dry	0.02	<0.01	-	-
Phenanthrene	0.02 ug/g dry	0.06	0.05	-	-
Pyrene	0.02 ug/g dry	0.07	0.07	-	-
2-Fluorobiphenyl	Surrogate	82.1%	80.0%	-	-
Terphenyl-d14	Surrogate	86.8%	91.4%	-	-

Certificate of Analysis

Report Date: 06-Jun-2022

Client: Paterson Group Consulting Engineers

Order Date: 25-May-2022

Client PO:

Project Description: PE5694

Method Quality Control: Blank

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Metals									
Antimony	ND	1.0	ug/g						
Arsenic	ND	1.0	ug/g						
Barium	ND	1.0	ug/g						
Beryllium	ND	0.5	ug/g						
Boron	ND	5.0	ug/g						
Cadmium	ND	0.5	ug/g						
Chromium	ND	5.0	ug/g						
Cobalt	ND	1.0	ug/g						
Copper	ND	5.0	ug/g						
Lead	ND	1.0	ug/g						
Molybdenum	ND	1.0	ug/g						
Nickel	ND	5.0	ug/g						
Selenium	ND	1.0	ug/g						
Silver	ND	0.3	ug/g						
Thallium	ND	1.0	ug/g						
Uranium	ND	1.0	ug/g						
Vanadium	ND	10.0	ug/g						
Zinc	ND	20.0	ug/g						
Semi-Volatiles									
Acenaphthene	ND	0.02	ug/g						
Acenaphthylene	ND	0.02	ug/g						
Anthracene	ND	0.02	ug/g						
Benzo [a] anthracene	ND	0.02	ug/g						
Benzo [a] pyrene	ND	0.02	ug/g						
Benzo [b] fluoranthene	ND	0.02	ug/g						
Benzo [g,h,i] perylene	ND	0.02	ug/g						
Benzo [k] fluoranthene	ND	0.02	ug/g						
Chrysene	ND	0.02	ug/g						
Dibenzo [a,h] anthracene	ND	0.02	ug/g						
Fluoranthene	ND	0.02	ug/g						
Fluorene	ND	0.02	ug/g						
Indeno [1,2,3-cd] pyrene	ND	0.02	ug/g						
1-Methylnaphthalene	ND	0.02	ug/g						
2-Methylnaphthalene	ND	0.02	ug/g						
Methylnaphthalene (1&2)	ND	0.04	ug/g						
Naphthalene	ND	0.01	ug/g						
Phenanthrene	ND	0.02	ug/g						
Pyrene	ND	0.02	ug/g						
Surrogate: 2-Fluorobiphenyl	1.46		ug/g		110	50-140			
Surrogate: Terphenyl-d14	1.73		ug/g		130	50-140			

Certificate of Analysis

Report Date: 06-Jun-2022

Client: Paterson Group Consulting Engineers

Order Date: 25-May-2022

Client PO:

Project Description: PE5694

Method Quality Control: Duplicate

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Metals									
Antimony	ND	1.0	ug/g	ND			NC	30	
Arsenic	4.0	1.0	ug/g	3.8			5.9	30	
Barium	391	1.0	ug/g	386			1.3	30	
Beryllium	1.6	0.5	ug/g	1.5			4.8	30	
Boron	6.6	5.0	ug/g	8.1			20.1	30	
Cadmium	ND	0.5	ug/g	ND			NC	30	
Chromium	66.8	5.0	ug/g	65.8			1.5	30	
Cobalt	17.5	1.0	ug/g	16.1			8.8	30	
Copper	24.9	5.0	ug/g	24.2			2.9	30	
Lead	9.7	1.0	ug/g	9.1			7.1	30	
Molybdenum	ND	1.0	ug/g	ND			NC	30	
Nickel	36.6	5.0	ug/g	35.6			2.8	30	
Selenium	1.1	1.0	ug/g	1.2			3.0	30	
Silver	ND	0.3	ug/g	ND			NC	30	
Thallium	ND	1.0	ug/g	ND			NC	30	
Uranium	ND	1.0	ug/g	ND			NC	30	
Vanadium	80.4	10.0	ug/g	81.3			1.1	30	
Zinc	111	20.0	ug/g	109			1.7	30	
Physical Characteristics									
% Solids	73.3	0.1	% by Wt.	74.0			0.9	25	
Semi-Volatiles									
Acenaphthene	ND	0.02	ug/g	ND			NC	40	
Acenaphthylene	ND	0.02	ug/g	ND			NC	40	
Anthracene	ND	0.02	ug/g	ND			NC	40	
Benzo [a] anthracene	ND	0.02	ug/g	ND			NC	40	
Benzo [a] pyrene	ND	0.02	ug/g	ND			NC	40	
Benzo [b] fluoranthene	ND	0.02	ug/g	ND			NC	40	
Benzo [g,h,i] perylene	ND	0.02	ug/g	ND			NC	40	
Benzo [k] fluoranthene	ND	0.02	ug/g	ND			NC	40	
Chrysene	ND	0.02	ug/g	ND			NC	40	
Dibenzo [a,h] anthracene	ND	0.02	ug/g	ND			NC	40	
Fluoranthene	ND	0.02	ug/g	ND			NC	40	
Fluorene	ND	0.02	ug/g	ND			NC	40	
Indeno [1,2,3-cd] pyrene	ND	0.02	ug/g	ND			NC	40	
1-Methylnaphthalene	ND	0.02	ug/g	ND			NC	40	
2-Methylnaphthalene	ND	0.02	ug/g	ND			NC	40	
Naphthalene	ND	0.01	ug/g	ND			NC	40	
Phenanthrene	ND	0.02	ug/g	ND			NC	40	
Pyrene	ND	0.02	ug/g	ND			NC	40	
Surrogate: 2-Fluorobiphenyl	1.96		ug/g		119	50-140			
Surrogate: Terphenyl-d14	1.65		ug/g		99.9	50-140			

Certificate of Analysis

Report Date: 06-Jun-2022

Client: Paterson Group Consulting Engineers

Order Date: 25-May-2022

Client PO:

Project Description: PE5694

Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Metals									
Antimony	59.5	1.0	ug/g	ND	119	70-130			
Arsenic	58.2	1.0	ug/g	1.5	113	70-130			
Barium	209	1.0	ug/g	154	109	70-130			
Beryllium	56.5	0.5	ug/g	0.6	112	70-130			
Boron	57.3	5.0	ug/g	ND	108	70-130			
Cadmium	60.6	0.5	ug/g	ND	121	70-130			
Chromium	85.7	5.0	ug/g	26.3	119	70-130			
Cobalt	62.8	1.0	ug/g	6.4	113	70-130			
Copper	62.4	5.0	ug/g	9.7	105	70-130			
Lead	43.0	1.0	ug/g	3.6	78.8	70-130			
Molybdenum	55.6	1.0	ug/g	ND	111	70-130			
Nickel	68.3	5.0	ug/g	14.2	108	70-130			
Selenium	50.5	1.0	ug/g	ND	100	70-130			
Silver	55.5	0.3	ug/g	ND	111	70-130			
Thallium	59.8	1.0	ug/g	ND	119	70-130			
Uranium	38.2	1.0	ug/g	ND	76.3	70-130			
Vanadium	91.1	10.0	ug/g	32.5	117	70-130			
Zinc	93.1	20.0	ug/g	43.7	98.8	70-130			
Semi-Volatiles									
Acenaphthene	0.166	0.02	ug/g	ND	80.1	50-140			
Acenaphthylene	0.138	0.02	ug/g	ND	66.6	50-140			
Anthracene	0.153	0.02	ug/g	ND	73.9	50-140			
Benzo [a] anthracene	0.132	0.02	ug/g	ND	63.8	50-140			
Benzo [a] pyrene	0.138	0.02	ug/g	ND	66.9	50-140			
Benzo [b] fluoranthene	0.140	0.02	ug/g	ND	67.5	50-140			
Benzo [g,h,i] perylene	0.138	0.02	ug/g	ND	66.5	50-140			
Benzo [k] fluoranthene	0.131	0.02	ug/g	ND	63.2	50-140			
Chrysene	0.166	0.02	ug/g	ND	80.0	50-140			
Dibenzo [a,h] anthracene	0.141	0.02	ug/g	ND	68.0	50-140			
Fluoranthene	0.137	0.02	ug/g	ND	66.2	50-140			
Fluorene	0.162	0.02	ug/g	ND	78.3	50-140			
Indeno [1,2,3-cd] pyrene	0.139	0.02	ug/g	ND	67.0	50-140			
1-Methylnaphthalene	0.199	0.02	ug/g	ND	96.0	50-140			
2-Methylnaphthalene	0.259	0.02	ug/g	ND	125	50-140			
Naphthalene	0.192	0.01	ug/g	ND	92.8	50-140			
Phenanthrene	0.154	0.02	ug/g	ND	74.4	50-140			
Pyrene	0.138	0.02	ug/g	ND	66.8	50-140			
Surrogate: 2-Fluorobiphenyl	1.94		ug/g		117	50-140			
Surrogate: Terphenyl-d14	1.67		ug/g		101	50-140			

Certificate of Analysis

Report Date: 06-Jun-2022

Client: Paterson Group Consulting Engineers

Order Date: 25-May-2022

Client PO:

Project Description: PE5694

Qualifier Notes:

None

Sample Data Revisions

None

Work Order Revisions / Comments:

None

Other Report Notes:

n/a: not applicable

ND: Not Detected

MDL: Method Detection Limit

Source Result: Data used as source for matrix and duplicate samples

%REC: Percent recovery.

RPD: Relative percent difference.

NC: Not Calculated

Soil results are reported on a dry weight basis when the units are denoted with 'dry'.

Where %Solids is reported, moisture loss includes the loss of volatile hydrocarbons.



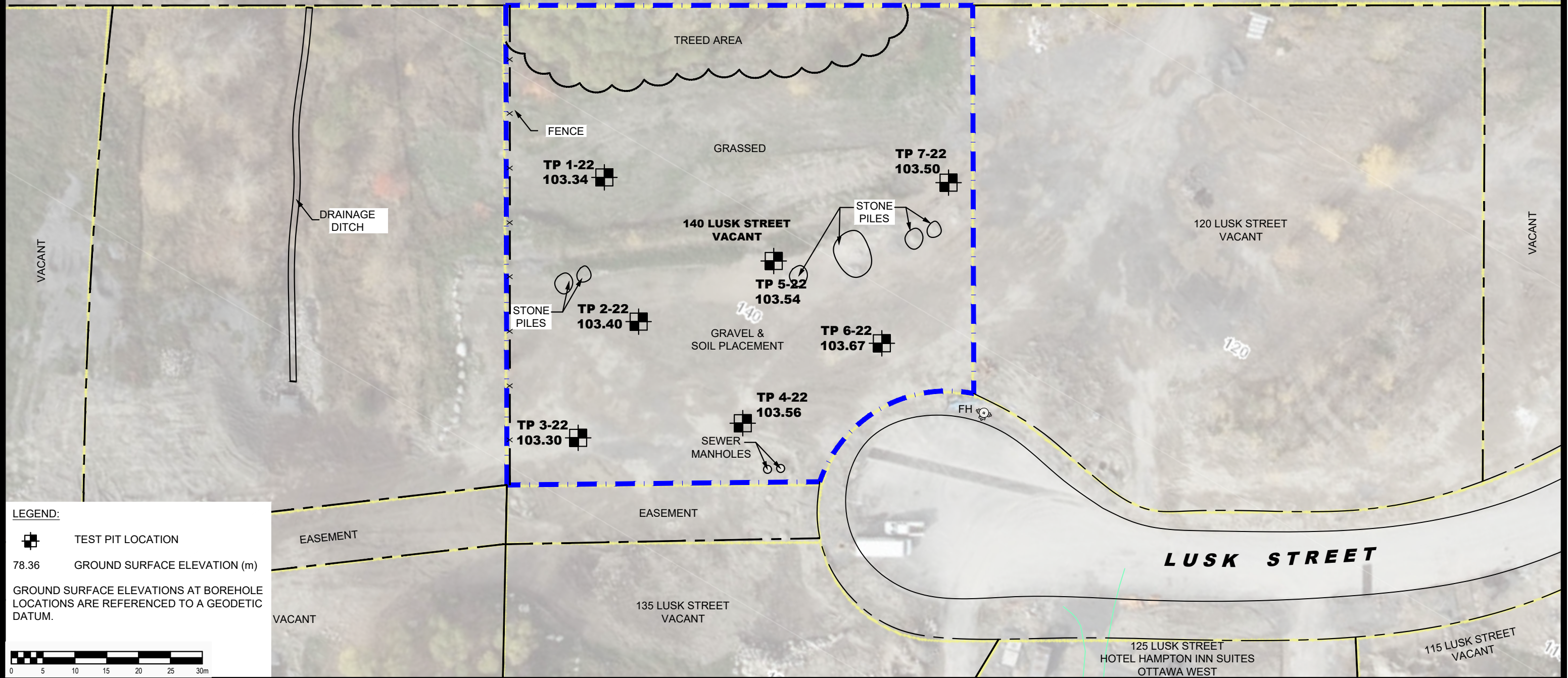
Parcel Order Number (Lab Use Only) 2222173	Chain Of Custody (Lab Use Only) No 136579
--	---

Client Name: Paterson	Project Ref: PE5694	Page <u> </u> of <u> </u>
Contact Name: Mark D'Arcy	Quote #:	Turnaround Time <input type="checkbox"/> 1 day <input type="checkbox"/> 3 day <input type="checkbox"/> 2 day <input checked="" type="checkbox"/> Regular
Address: 154 Colonnade Rd	PO #:	
Telephone: 613-226-7381	E-mail: MDarcy@Patersongroup.ca	Date Required: _____

REG 153/04 <input checked="" type="checkbox"/> REG 406/19 <input type="checkbox"/>		Other Regulation	Matrix Type: S (Soil/Sed.) GW (Ground Water) SW (Surface Water) SS (Storm/Sanitary Sewer) P (Paint) A (Air) O (Other)		Required Analysis																
Table 1 <input checked="" type="checkbox"/>	Res/Park <input type="checkbox"/>	Med/Fine <input type="checkbox"/>	REG 558 <input type="checkbox"/>	PWQO <input type="checkbox"/>	Matrix	Air Volume	# of Containers	Sample Taken		PHCs F1-F4+BTEX	VOCs	PAHs	Metals by ICP	Hg	CrVI	B (HWS)					
Table 2 <input type="checkbox"/>	Ind/Comm <input type="checkbox"/>	Coarse <input type="checkbox"/>	CCME <input type="checkbox"/>	MISA <input type="checkbox"/>				Date	Time												
Table 3 <input type="checkbox"/>	Agri/Other <input type="checkbox"/>		SU - Sani <input type="checkbox"/>	SU - Storm <input type="checkbox"/>																	
Table <u> </u>			Mun: _____																		
For RSC: <input type="checkbox"/> Yes <input type="checkbox"/> No		Other: _____																			
Sample ID/Location Name																					
1	TP1-22-G3		S	1	May 24 2022							X	X								
2	TP3-22-G2		↓	↓	↓								X								
3	TP4-22-G1		↓	↓	↓							X	X								
4	TP5-22-G2		↓	↓	↓								X								
5	TP6-22-G1		↓	↓	↓							X	X								
6	TP7-22-G4		↓	↓	↓							X									
7																					
8																					
9																					
10																					

Comments:			Method of Delivery: PARACEL LOGDEL		
Relinquished By (Sign): Gpat	Received By Driver/Depot: M. DELOISE	Received at Lab: [Signature]	Verified By: [Signature]		
Relinquished By (Print): Grant Paterson	Date/Time: 15/05/22 3:10	Date/Time: May 25 2022	Date/Time: May 26, 22 10:49		
Date/Time: 15/05/22	Temperature: PH °C	Temperature: 22.0 °C	pH Verified: <input type="checkbox"/>	By: _____	

O'KEEFE COURT



LEGEND:

- TEST PIT LOCATION
- 78.36 GROUND SURFACE ELEVATION (m)

GROUND SURFACE ELEVATIONS AT BOREHOLE LOCATIONS ARE REFERENCED TO A GEODETIC DATUM.

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consulting engineers

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NO.	REVISIONS	DATE	INITIAL

DR. SANDRA IROAKAZI
FILL QUALITY ASSESSMENT
140 LUSK STREET
ONTARIO

OTTAWA,
Title: **TEST HOLE LOCATION PLAN**

Scale:	1:600	Date:	04/2022
Drawn by:	JM	Report No.:	PE5694-LET.01
Checked by:	MSP	Dwg. No.:	PE5694-3
Approved by:	MSD	Revision No.:	