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Phase II - Environmental Site Assessment

70 Nicholas Street
Ottawa, Ontario

Prepared For

The Cadillac Fairview Corporation Limited

November 9, 2021

Report: PE5267-2

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EXECUTIVE SUMMARY

Assessment

A Phase II ESA was conducted for the northeast portion of the property addressed 70 Nicholas Street, in the City of Ottawa, Ontario. The purpose of the Phase II ESA was to address potentially contaminating activities (PCAs) that were identified during the Phase I ESA and considered to result in areas of potential environmental concern (APECs) on the Phase II Property.

The Phase II ESA was carried out in conjunction with a geotechnical investigation and consisted of the placement of four boreholes and nine test pits. All boreholes were constructed with groundwater monitoring wells. The general soil profile encountered during the field program consisted of a silty sand fill layer, over a layer of clay followed by glacial till (on the southwest corner of the site only), followed by limestone bedrock. No unusual staining or odour was noted at the time of the field program. Deleterious material identified in the fill material consists of construction debris, coal, brick, concrete and a layer of asphalt in TP7-21.

A total of 17 soil samples were submitted for laboratory analysis of Metals (including methyl mercury), Volatile Organic Compounds (VOCs), Benzene, Toluene, Ethylbenzene and Xylenes (BTEX), Petroleum Hydrocarbons (PHCs, Fractions F_1-F_4) and/or Polycyclic Aromatic Hydrocarbons (PAHs). No VOC or BTEX concentrations identified in the samples analysed. Concentrations of metals (including As, Sb, Se), Hg, PAH and/or PHC (F_3) parameters exceeding the MECP Table 3 standards were identified in soil Samples BH1-21-SS5/6, BH2-21-SS4, BH3-21-SS4/5 TP1-21-GS3, TP3-21-GS3, TP5-21-GS2 and TP6-21-GS5. Based on Hg results, MeHg was analyzed and determined to comply with the MECP Table 3 standards.

Groundwater samples from monitoring wells BH1-21, BH2-21, BH3-21 and BH4-21 were collected during the May 25, 2021 sampling event. No sheen, free product or odour was noted during the groundwater sampling event.

Groundwater samples were analyzed for Metals, BTEX, PHCs and/or PAHs. All groundwater results comply with the selected MECP Table 3 Residential Standards.

Recommendations

Soil

Based on the findings of the Phase II ESA, it is anticipated that fill material impacted with metals, mercury, PAHs and/or PHC (F_3) exceeding the MECP Table 3 standards is present across the Phase II Property at depths extending up to approximately 5.0m

below grade. It is our understanding that the Phase II Property will be redeveloped with a residential multi-story building with 2 levels of underground parking.

It is recommended that an environmental site remediation program, involving the removal of all impacted fill material be completed prior to site redevelopment. Prior to off-site disposal of the impacted soil at a licenced landfill site, a leachate analysis of a representative sample of contaminated soil must be conducted in accordance with Ontario Regulation 347/558.

It is also recommended that Paterson personnel be onsite during construction activities to direct the excavation and segregation of impacted soil and to conduct additional delineation or confirmatory sampling as required.

Any clean soil that requires removal from the Phase II Property for construction purposes must be handled in accordance with Ontario Regulation 406/19: On-Site and Excess Soil Management.

Groundwater

It is recommended that the monitoring wells installed on the Phase II Property remain viable for future monitoring, if required. It is expected that groundwater monitoring wells will be abandoned in accordance with O.Reg.903 at the time of the construction excavation.

1.0 INTRODUCTION

At the request of The Cadillac Fairview Corporation Limited, Paterson Group (Paterson) conducted a Phase II Environmental Site Assessment for the northeast portion of the property addressed 70 Nicholas Street, in the City of Ottawa, Ontario. The purpose of this Phase II ESA is to address areas of potential environmental concern (APECs) identified on the Phase II Property during the Phase I ESA conducted by Paterson in June of 2021.

1.1 Site Description

Address:	70 Nicholas Street, Ottawa, Ontario
Location:	The Phase II Property is located on the west side of Nicholas Street between Daly Avenue and the Mackenzie King Bridge, in the City of Ottawa. The Phase I Property is shown on Figure 1 - Key Plan following the body of this report.
Latitude and Longitude:	45° 25' 30" N, 75° 41' 22" W

Site Description:

Configuration:	Irregular
Site Area:	0.27 ha (approximate)
Zoning:	Mixed Use Downtown Zone

1.2 Property Ownership

Paterson was engaged to conduct this Phase I ESA by Mr. Aaron Cameron of The Cadillac Fairview Corporation Limited. Mr. Cameron can be reached by telephone at 416-566-9200.

1.3 Current and Proposed Future Uses

The Phase II Property is currently occupied by a vacant building. It is our understanding that the Phase II Property redevelopment will consist of a residential high rise building with two underground parking levels. Associated access lanes, walkways and hardscaped areas are also anticipated as part of the development. It is expected that the proposed buildings will be municipally serviced.

1.4 Applicable Site Condition Standard

The site condition standards for the 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), April 2011. The MECP selected Table 3 Standards are based on the following considerations:

- ❒ Coarse-grained soil conditions
- ❒ Full depth generic site conditions
- ❒ Non-potable groundwater conditions
- ❒ Residential land use

Section 35 of O.Reg. 153/04 does apply to the Phase II Property in that the property relies upon municipal drinking water.

Section 41 of O.Reg. 153/04 does not apply to the Phase II Property, as the property is not within 30m of an environmentally sensitive area and the pH of the soil at the property is between 5 and 9 for surface soil and between 5 and 11 for sub-surface soil.

Section 43.1 of O.Reg. 153/04 does not apply to the Phase II Property in that the property is not a Shallow Soil property and the property is not within 30m of a water body.

The intended use of the Phase II Property is residential; therefore, the Residential Standards have been selected for the purpose of this Phase II ESA.

2.0 BACKGROUND INFORMATION

2.1 Physical Setting

The Phase II Property is located on the west side of Nicholas Street, between Daly Avenue and the Mackenzie King Bridge, in the City of Ottawa, Ontario. The Phase II Property is situated in a mixed-use downtown zone consisting of primarily commercial with some residential land use. The setting of the Phase II Property is shown on Drawing PE5267-2 – Surrounding Land Use Plan.

At the time of the Phase II ESA, the Phase II Property was occupied by a vacant building on the east-central portion. The building was constructed circa 1878 with a stone foundation and consists of one storey with a small basement crawl space.

The remainder of the Phase II Property consists of an access road to a (off-site) truck loading area across the southeast portion and vacant grassed/treed land on the remaining areas.

Site topography slopes down to the east, in the direction of Nicholas Street. The regional topography in the general area of the Phase II Property slopes downward to the north-northwest, towards the Ottawa River. Site drainage consists primarily of infiltration and surface runoff to catch basins on site and along adjacent roadways. Multiple underground utilities were identified on the Phase I Property including electrical, gas, water, sewer and telecommunication lines.

2.2 Past Investigations

Paterson completed a Phase I ESA in June of 2021 for the Phase II Property. Based on the findings of the Phase I ESA, several on and off-site PCAs were considered to result in APECs on the Phase II Property as shown in Table 1.

Table 1
Areas of Potential Environmental Concern

Area of Potential Environmental Concern	Location of Area of Potential Environmental Concern with respect to Phase I Property	Potentially Contaminating Activity	Location of PCA (on-site or off-site)	Contaminants of Potential Concern	Media Potentially Impacted (Groundwater, Soil, and/or Sediment)
APEC 1 (former warehouse / workshop)	Northern portion of the Phase I Property	Other – associated with the former warehouse and workshop	On-site	BTEX PHCs (F_1-F_4)	Soil Groundwater
APEC 2 (former coal storage)	Northeast portion of the Phase I Property	Other – former coal storage	On-site	Metals As, Sb, Se Hg, CrVI PAH	Soil Groundwater
APEC 3 (former coal storage – Canadian Granite Co.)	Northeast portion of the Phase I Property	Other – former coal storage	On-site	Metals As, Sb, Se Hg, CrVI PAH	Soil Groundwater

Table 1 Continued
Areas of Potential Environmental Concern

Area of Potential Environmental Concern	Location of Area of Potential Environmental Concern with respect to Phase I Property	Potentially Contaminating Activity	Location of PCA (on-site or off-site)	Contaminants of Potential Concern	Media Potentially Impacted (Groundwater, Soil, and/or Sediment)
APEC 4 (former garage)	Southwest portion of the Phase I Property	PCA 52 - Storage, maintenance, fuelling and repair of equipment, vehicles and material used to maintain transportation systems	On-site	BTEX PHCs (F_1-F_4) VOCs	Soil Groundwater
APEC 5[1] (use of de-icing salt associated with on-site and adjacent roadways)	South portion of the Phase I Property	Other - use of salt for de-icing purposes	On-site	EC SAR	Soil
APEC 6 (former railway spur line)	Western portion of the Phase I Property	PCA 46 – Rail Yards, Tracks and Spurs	On-site	Metals As, Sb, Se Hg, CrVI PAH PHCs (F_1-F_4)	Soil Groundwater
APEC 7 (fill material of unknown quality)	Potentially across the Phase I Property	PCA 30 - Importation of Fill Material of Unknown Quality	On-site	Metals As, Sb, Se Hg, CrVI PAHs PHCs (F_1-F_4)	Soil (Fill Material)
APEC 8 (former rail yard and rail lines)	West portion of the Phase I Property	PCA 46 – Rail Yards, Tracks and Spurs	Off-site	Metals As, Sb, Se Hg, CrVI PAH PHCs (F_1-F_4)	Groundwater
APEC 9 (former coal storage)	West portion of the Phase I Property	Other – former coal storage	Off-site	Metals As, Sb, Se Hg, CrVI PAH	Groundwater

Notes:
1 – In accordance with Section 49.1 of Ontario Regulation 153/04 standards are deemed to be met if an applicable site condition standard is exceeded at a property solely because the qualified person has determined, based on a phase two environmental site assessment, that a substance has been applied to surfaces for the safety of vehicular or pedestrian traffic under conditions of snow or ice or both. As further discussed in the Phase II CSM, the exemption outlined in Section 49.1 is being relied upon with respect to the RSC Property.

The rationale for identifying the above PCAs is based on fire insurance plans, city directories, aerial photographs, field observations, and personal interviews. A Phase II ESA was recommended to address the aforementioned APECs.

3.0 SCOPE OF INVESTIGATION

3.1 Overview of Site Investigation

The subsurface investigation was conducted during the interim of May 14 through May 17, 2021 and June 15, 2021, in conjunction with a Geotechnical Investigation. The field program consisted of drilling four boreholes to address the APECs identified on the Phase II Property. All four of the boreholes (BH1-21 through BH4-21) were instrumented with groundwater monitoring wells. Boreholes were drilled to a maximum depth of 10.62 m below the ground surface (mbgs).

Additionally, nine test pits were placed across the Phase I Property to assess the quality of the fill material.

3.2 Media Investigated

During the subsurface investigation, soil samples and groundwater samples were obtained and submitted for laboratory analysis. The rationale for sampling and analyzing these media is based on the Contaminants of Potential Concern identified in the Phase I ESA.

The contaminants of potential concern for the soil and groundwater on the subject site include the following:

- Metals (including Arsenic (As,), Antimony (Sb) and Selenium);
- Mercury (Hg);
- Hexavalent Chromium;
- Volatile Organic Compounds (VOCs);
- Benzene, Toluene, Ethylbenzene, and Xylenes (BTEX);
- Petroleum Hydrocarbons, fractions 1 - 4 (PHCs F_1-F_4); and
- Polycyclic Aromatic Hydrocarbons (PAHs).

3.3 Phase I Conceptual Site Model

Geological and Hydrogeological Setting

The Geological Survey of Canada website on the Urban Geology of the National Capital Area was consulted as part of this assessment. Based on this information, the bedrock in the area of the Phase I Property consists of interbedded limestone and shale of the Verulam Formation. Based on the maps, the thickness of the overburden ranges from 5 to 10 m and consists of plain till. Groundwater flow is expected to reflect regional topography and flow in a northwesterly direction toward the Ottawa River.

Buildings and Structures

The central portion of the Phase I Property is occupied by a vacant building. The building is storey and constructed with a stone foundation. A crawl space is present beneath the northwestern portion of the building. The exterior of the building is finished with brick, stone and a sloped shingle-style roof. The building was constructed circa 1878 and was most recently heated with electric baseboard heaters. No other buildings or structures are present on the Phase I Property.

Subsurface Structures and Utilities

A small basement crawl space is present beneath the northwestern portion of the building. Multiple underground utilities were identified on the Phase I Property including electrical, gas, water, sewer and telecommunication lines.

Water Bodies

No water bodies are present on the Phase I Property. The closest water body is the Rideau Canal, located approximately 200 m northwest of the Phase I Property.

Areas of Natural Significance

No areas of natural significance were identified on the Phase I Property or in the Phase I ESA Study Area.

Drinking Water Wells

No potable well records were identified for the Phase I Property or the Phase I Study Area.

Monitoring Well Records

No monitoring well records were identified on the Phase I Property. A total of 13 well records were identified for properties within the Phase I Study Area. All of the reported well records were dated between 2010 and 2018. A monitoring well record for the property addressed 2 Daly Avenue, approximately 15 m east of the Phase I Property was identified. Five monitoring well records were identified for the properties addressed 70 & 90 Waller Street, approximately 125 m northeast of the Phase I Property.

The monitoring well records identified within the Phase I Study Area are not considered to represent a concern to the Phase I Property based on their respective separation distances.

Neighbouring Land Use

Neighbouring land use in the Phase I Study Area is primarily commercial with some residential land use.

Potentially Contaminating Activities

As per section 7.1 of this report, seven PCAs were identified on the Phase I Property and pertain to a historical post office warehouse/workshop, two separate historical coal storage locations, a historical railway spur line, the use of de-icing salt (on the former roadway through the south portion of the Phase I Property and adjacent roadways), a former garage and fill material of unknown quality throughout the Phase I Property. The seven identified PCAs result in seven APECs for the Phase I Property.

Two off-site PCAs that result in APECs for the Phase I Property were identified within the Study Area. The PCAs include a historical rail yard with associated rail lines and coal storage located adjacent to the west of the Phase I Property. The remaining 42 off-site PCAs identified within the Phase I Study Area are not considered to result in APECs on the subject property due to their respective separation distances and/or cross/down gradient orientations with respect to the Phase I Property.

Areas of Potential Environmental Concern

Nine APECs were identified on the subject site, seven of which resulted from on-site activities including a historical post office warehouse/workshop, two separate historical coal storages, a historical railway spur line, the use of de-icing salt, a former garage and fill material of unknown quality throughout the Phase I

Property. The remaining two APECs are resultant of off-site activities and include a historical rail yard with associated rail lines and coal storage located adjacent to the west of the Phase I Property.

According to Section 49.1 of O.Reg. 153/04, if an applicable site condition standard is exceeded at a property solely because of the following reason, the applicable site condition standard is deemed not to be exceeded for the purpose of Part XV.1 of the Act: "The qualified person has determined, based on a phase one environmental site assessment or a phase two environmental site assessment, that a substance has been applied to surfaces for the safety of vehicular or pedestrian traffic under conditions of snow or ice or both."

In accordance with Section 49.1 of O.Reg. 153/04, any EC and SAR concentrations on the RSC Property that exceed the MECP Table 3 standards for a residential/institutional land use are deemed not to be exceeded for the purpose of Part XV.1 of the Act. This exemption is being relied on for APEC 5.

Contaminants of Potential Concern

The contaminants of potential concern (CPCs) associated with the aforementioned APECs are considered to be:

- Metals (including arsenic (As), antimony (Sb) and selenium (Se))
- Mercury (Hg)
- Hexavalent Chromium (Cr_{VI})
- Volatile Organic Compounds (VOCs)
- Benzene, Toluene, Ethylbenzene, Xylenes (BTEX)
- Petroleum Hydrocarbons (PHCs, Fractions F_1-F_4)
- Polycyclic Aromatic Hydrocarbons (PAHs)

Assessment of Uncertainty and/or Absence of Information

The information available for review as part of the preparation of this Phase I-ESA is considered to be sufficient to conclude that there are APECs on the Phase I Property which may potentially have impacted the Phase I Property. The presence of PCAs was confirmed by a variety of independent sources, and as such, the conclusions of this report are not affected by uncertainty which may be present with respect to the individual sources.

3.4 Deviations from Sampling and Analysis Plan

The Sampling and Analysis Plan for this project is included in Appendix 1 of this report.

3.5 Impediments

The depth of the test pits was impeded by large boulders and concrete in the fill material; test pits were completed on practical refusal.

4.0 INVESTIGATION METHOD

4.1 Subsurface Investigation

The subsurface investigation was completed in conjunction with a Geotechnical Investigation during the interim of May 14 through May 17, 2021 and June 15, 2021. The field program consisted of drilling four boreholes (BH1-21 through BH4-21) and excavating nine test pits (TP1-21 through TP9-21) across the Phase II Property.

The boreholes were drilled to a maximum depth of 10.62 m below ground surface (mbgs). Three of the four boreholes were cored into the bedrock and all four were completed as groundwater monitoring wells to access.

The boreholes and test pits were placed to address the aforementioned APECs presented in Table 1, and to provide coverage of the proposed building footprint for geotechnical purposes. The boreholes were drilled using a low-clearance drill rig operated by George Downing Estate Drilling of Hawkesbury, Ontario, under full-time supervision of Paterson personnel. The borehole locations are indicated on the attached Drawing PE5267-3 - Test Hole Location Plan.

4.2 Soil Sampling

A total of 24 soil samples were obtained from the boreholes by means of grab sampling from shallow auger flights and split spoon sampling. Split spoon samples were taken at approximate 0.76 m intervals. The depths at which split spoon and auger samples were obtained from the boreholes are shown as "**SS**" and "**AU**" on the Soil Profile and Test Data Sheets.

Upon refusal of the augers, boreholes BH1-21, BH2-21 and BH4-21 were advanced into bedrock using a diamond coring system. An additional 14 rock core samples were recovered and are shown as "**RC**" on the Soil Profile and Test Data Sheets.

During the test pit program, a total of 38 soil samples were obtained from the test pits by means of grab sampling. The depths at which grab samples were

obtained from the test holes are shown as "**G**" on the Soil Profile and Test Data Sheets.

The site stratigraphy generally consists of a layer of topsoil (0.1 to 0.2m thick) or engineered fill over (up to 0.5m thick) over a thick layer of fill material extending to depths up to approximately 5.0m below grade. The fill material primarily consists of brown silty sand with some clay and gravel. Fragments of concrete, brick, wood and/or coal were identified at each test hole location. A thin layer of silty clay (from 4.27 to 5.18 mbgs) followed by a silty clay glacial till (from 5.18 to 7.01 mbgs) was encountered in BH3-21 below the fill material. A layer of asphalt was encountered in TP7-21 from 0.5 to 0.6 mbgs. Limestone bedrock was encountered beneath the fill material or glacial till at BH3-21, at depths ranging from approximately 2.6 to 7.0m below grade.

Borehole and test pit locations are shown on Drawing PE5267-3 – Test Hole Location Plan.

4.3 Field Screening Measurements

Soil samples recovered at the time of sampling 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. Allowing the samples to stabilize to room temperature ensures consistency of readings between samples.

To measure the soil vapours, the analyser probe is inserted into the nominal headspace above the soil sample. A photoionization detector (PID) was used to measure the volatile organic vapour concentrations. The sample is agitated/manipulated gently as the measurement is taken. The peak reading registered within the first 15 seconds is recorded as the vapour measurement.

The organic vapour readings were generally below 20ppm and not considered to be indicative of potential contamination. A slightly elevated reading of 77.2ppm was identified for Sample BH2-21-SS2. These results were not considered to be indicative of potential significant contamination from volatile contaminants. Vapour readings are noted on the Soil Profile and Test Data Sheets in Appendix 1.

No olfactory indications of potential contamination were identified in the soil samples. Deleterious material identified in the fill material consists of construction debris, coal, brick, concrete and a layer of asphalt in TP7-21. The

results of the vapour survey are presented on the Soil Profile and Test Data sheets.

4.4 Groundwater Monitoring Well Installation

Four groundwater monitoring wells were installed on the Phase II Property as part of the subsurface investigation. The monitoring wells consisted of 32 mm diameter, Schedule 40 threaded PVC risers and screens. Monitoring well construction details are listed in Table 3 and are also presented on the Soil Profile and Test Data Sheets provided in Appendix 1.

Borehole locations and elevations were surveyed geodetically by Paterson personnel.

TABLE 3 - Monitoring Well Construction Details

Well ID	Ground Surface Elevation	Total Depth (m BGS)	Screened Interval (m BGS)	Sand Pack (m BGS)	Bentonite Seal (m BGS)	Casing Type
BH1-21	67.20	10.49	7.44-10.49	6.71-10.49	0.15-6.71	Stick-Up
BH2-21	66.14	10.62	7.57-10.62	6.10-10.62	0.15-6.10	Stick-Up
BH3-21	67.28	7.01	3.96-7.01	3.35-7.01	0.15-3.35	Stick-Up
BH4-21	66.89	10.36	7.31-10.36	6.71-10.36	0.15-6.71	Stick-Up

4.5 Field Measurement of Water Quality Parameters

Groundwater samples were collected on May 25, 2021. Water quality parameters were measured in the field using a multi-parameter analyzer. Parameters measured in the field include temperature, pH and electrical conductivity.

Field parameters were measured after each well volume purged. Wells were purged prior to sampling until at least three well volumes had been removed, the field parameters were relatively stable or the well was dry. Stabilized field parameter values are summarized in Table 4.

Table 4 - Field Measurement of Water Quality Parameters – May 25, 2021

Parameter	BH1-21	BH2-21	BH3-21	BH4-21
Temperature (°C)	22.3	20.7	20.0	21.7
pH	7.31	7.48	7.08	7.53
Electrical Conductivity (µS/cm)	1,980	2,010	2,450	2,380

4.6 Groundwater Sampling

Groundwater sampling protocols were followed using the MECP document entitled "Guidance on Sampling and Analytical Methods for Use at Contaminated Sites in Ontario", dated May 1996. Groundwater samples were obtained from each monitoring well, using dedicated sampling equipment. Standing water was purged from each well prior to sampling. Samples were stored in coolers to reduce analyte volatilization during transportation. Details of our standard operating procedure for groundwater sampling are provided in the Sampling and Analysis Plan in Appendix 1.

4.7 Analytical Testing

Based on the guidelines outlined in the Sampling and Analysis Plan appended to this report, the following soil and groundwater samples, as well as analyzed parameters are presented in Tables 5 and 6.

Table 5 - Testing Parameters for Submitted Soil Samples

Sample ID	Sample Depth & Stratigraphic Unit	Parameters Analyzed					Rationale
		Metals[1]	VOCs	BTEX	PHCs F_1-F_4	PAHs	
May 14, 2021							
BH1-21-SS3	1.52 - 2.13 m Brown Silty Sand (Fill Material)			X	X		Assess potential soil impacts resulting from the historical on-site spur line and off-site rail yard and rail tracks.
BH1-21-SS5/6	3.05 - 4.42 m Brown Silty Sand (Fill Material)	X				X	Assess potential soil impacts resulting from the historical on-site spur line and off-site rail yard and rail tracks.
May 17, 2021							
BH2-21-SS4	2.29 - 2.62 m Brown Silty Sand (Fill Material)	X				X	Assess potential soil impacts resulting from the presence of the historical on-site warehouse/workshop and coal storage.
BH3-21-SS2	0.76 – 1.37 m Brown Silty Sand (Fill Material)			X	X		Assess potential soil impacts resulting from the presence of the historical on-site garage and coal storage yard and the off-site coal storage.

Table 5 Continued - Testing Parameters for Submitted Soil Samples

Sample ID	Sample Depth & Stratigraphic Unit	Parameters Analyzed					Rationale
		Metals[1]	VOCs	BTEX	PHCs F_1-F_4	PAHs	
BH3-21-SS4/5	2.29 – 3.66 m Brown Silty Sand (Fill Material)	X				X	Assess potential soil impacts resulting from the presence of the historical on-site garage and coal storage yard and the off-site coal storage.
BH4-21-SS2	0.76 – 1.37 m Brown Silty Sand (Fill Material)	X				X	Assess potential soil impacts resulting from the presence of fill material.
DUP	2.29 – 3.66 m Brown Silty Sand (Fill Material)	X				X	Duplicate soil sample (BH3-21-SS4/5) for QA/QC purposes
June 25, 2021							
TP1-21-GS3	1.7 – 1.9 m Brown Silty Sand (Fill Material)		X		X		Delineation of previously identified impacts and further assessment of the fill material
TP1-21-GS4	2.3 – 2.5 m Brown Silty Sand (Fill Material)	X[2]					Delineation of previously identified impacts and further assessment of the fill material
TP2-21-GS4	1.7 – 1.9 m Brown Silty Sand (Fill Material)	X		X	X	X	Delineation of previously identified impacts and further assessment of the fill material
TP3-21-GS3	0.5 – 0.7 m Brown Silty Sand (Fill Material)	X				X	Delineation of previously identified impacts and further assessment of the fill material
TP4-21-GS2	0.7 – 0.8 m Brown Silty Sand (Fill Material)	X					Delineation of previously identified impacts and further assessment of the fill material
TP5-21-GS2	1.7 – 1.9 m Brown Silty Sand (Fill Material)					X	Delineation of previously identified impacts and further assessment of the fill material
TP6-21-GS5	1.7 – 1.9 m Brown Silty Sand (Fill Material)	X				X	Delineation of previously identified impacts and further assessment of the fill material
TP6-21-GS6	1.7 – 1.9 m Brown Silty Sand (Fill Material)	X[2]					Delineation of previously identified impacts and further assessment of the fill material
TP7-21-GS6	2.7 – 3.0 m Brown Silty Sand (Fill Material)	X[2]					Delineation of previously identified impacts and further assessment of the fill material

Table 5 Continued - Testing Parameters for Submitted Soil Samples							
TP8-21-GS5	2.5-2.7 Brown Silty Sand (Fill Material)	X[2]					Delineation of previously identified impacts and further assessment of the fill material
DUP3	1.7 – 1.9 m Brown Silty Sand (Fill Material)					X	Duplicate soil sample (TP3-21-GS3) for QA/QC purposes
DUP4	1.7 – 1.9 m Brown Silty Sand (Fill Material)	X					Duplicate soil sample (TP4-21-GS2) for QA/QC purposes

Notes:
- 1 – including As, Sb, Se, Hg and CrVI
- 2 – tested specifically for methyl mercury

TABLE 6 - Testing Parameters for Submitted Groundwater Samples						
Sample ID	**Screened Interval**	**Parameters Analyzed**				**Rationale**
		Metals[1]	**BTEX**	**PHCs F_1-F_4**	**PAHs**	
May 25, 2021						
MW1-21-GW1	7.44 - 10.49m Bedrock	X			X	Assess potential groundwater impacts resulting from the historical on-site spur line and off-site rail yard and rail tracks.
MW2-21-GW1	7.57 - 10.62m Bedrock	X			X	Assess potential groundwater impacts resulting from the historical on-site warehouse/workshop and coal storage.
MW3-21-GW1	3.96 - 7.01m Glacial Till	X	X	X		Assess potential groundwater impacts resulting from the historical on-site garage and coal storage yard and the off-site coal storage..
MW4-21-GW1	7.31 - 10.36m Bedrock				X	Assess potential groundwater impacts resulting from the historical on-site roadway.
DUP1	7.31 - 10.36m Bedrock				X	Duplicate groundwater sample (MW4-21-GW1) for QA/QC purposes.
DUP2	7.57 - 10.62m Bedrock	X				Duplicate groundwater sample (MW2-21-GW1) for QA/QC purposes.

Notes:
- 1 – including Hg and Cr_{VI}

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). Paracel is accredited and certified by SCC/CALA for specific tests registered with the association.

4.8 Residue Management

All soil cuttings, purge water and fluids from equipment cleaning were retained on-site.

4.9 Elevation Surveying

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

4.10 Quality Assurance and Quality Control Measures

A summary of quality assurance and quality control (QA/QC) measures, including sampling containers, preservation, labelling, handling, and custody, equipment cleaning procedures, and field quality control measurements is provided in the Sampling and Analysis Plan in Appendix 1.

5.0 REVIEW AND EVALUATION

5.1 Geology

Site soils consist of a layer of topsoil (0.1 to 0.2m thick) or engineered fill over (up to 0.5m thick) a thick layer of fill material extending to depths up to approximately 5.0m below grade. The fill material primarily consists of brown silty sand with some clay and gravel. Fragments of concrete, brick, wood and/or coal were identified at each test hole location. A thin layer of silty clay (from 4.27 to 5.18 mbgs) followed by a silty clay glacial till (from 5.18 to 7.01 mbgs) was encountered in BH3-21 below the fill material. A layer of asphalt was encountered in TP7-21 from 0.5 to 0.6 mbgs. Limestone bedrock was encountered beneath the fill material or glacial till at BH3-21, at depths ranging from approximately 2.6 to 7.0m below grade. Groundwater was encountered within the bedrock at depths ranging from approximately 5.64 to 9.00 m below ground surface and within the overburden in BH3-21 at a depth of approximately 5.60m below ground surface.

Site geology details are provided in the Soil Profile and Test Data Sheets provided in Appendix 1.

5.2 Groundwater Elevations, Flow Direction, and Hydraulic Gradient

Groundwater levels were measured during the groundwater sampling event on May 25, 2021 using an electronic water level meter. Groundwater levels are summarized in Table 7.

TABLE 7 - Groundwater Level Measurements

Borehole Location	Ground Surface Elevation (m)	Water Level Depth (m below grade)	Water Level Elevation (m ASL)	Date of Measurement
BH1-21	67.20	9.00	58.20	May 25, 2021
BH2-21	66.14	6.86	59.28	May 25, 2021
BH3-21	67.28	5.60	61.68	May 25, 2021
BH4-21	66.89	5.64	61.24	May 25, 2021

Based on the groundwater elevations measured during the sampling event, groundwater contour mapping was completed. Groundwater contours are shown on Drawing PE5267-3 – Test Hole Location Plan. Based on the contour mapping, groundwater flow at the Phase II Property is in a northwestern direction. A horizontal hydraulic gradient of approximately 0.06 m/m was calculated.

It should be noted that groundwater levels are expected to fluctuate throughout the year with seasonal variations.

5.3 Fine-Coarse Soil Texture

Grain-size analysis was not completed as part of this investigation. Coarse-grained soil standards were chosen based on the nature of the recovered soil samples.

5.4 Soil: Field Screening

The organic vapour readings were generally below 20ppm and not considered to be indicative of potential contamination. A slightly elevated reading of 77.2ppm was identified for Sample BH2-21-SS2. No olfactory indications of potential contamination were identified in the soil samples. Deleterious material identified in the fill material consists of construction debris, coal, brick, concrete and a layer of asphalt in TP7-21. The results of the vapour survey are presented on the Soil Profile and Test Data sheets.

The field screening results of each individual soil sample are provided on the Soil Profile and Test Data Sheets appended to this report.

5.5 Soil Quality

Based on the findings of the field screening in combination with sample depth and location, seven soil samples (including one duplicate) were submitted for analysis of metals (including As, Sb and Se), Hg, MeHg, CrVI, BTEX, PHC (F1-F4) and/or PAHs. The results of the analytical testing are presented in Tables 8 to 12. The laboratory certificate of analysis is provided in Appendix 1.

TABLE 8 - Analytical Test Results – Soil
Metals

Parameter	MDL (µg/g)	Soil Samples (µg/g)					MECP Table 3 Residential Standards (µg/g)
		May 14, 2021	May 17, 2021				
		BH1-21-SS5/6	BH2-21-SS4	BH3-21-SS4/5	BH4-21-SS2	DUP[1]	
Antimony	1.0	2.0	1.5	nd	nd	nd	7.5
Arsenic	1.0	4.5	7.4	6.2	2.7	5.2	18
Barium	1.0	**584**	159	150	106	132	390
Beryllium	0.5	nd	nd	0.5	nd	0.5	4
Boron	5.0	19.0	8.8	8.4	5.5	6.8	120
Cadmium	0.5	nd	0.8	nd	nd	nd	1.2
Chromium	5.0	22.6	24.1	25.7	16.0	24.2	160
Chromium (VI)	0.2	nd	nd	nd	nd	nd	8
Cobalt	1.0	5.2	6.0	5.7	5.4	5.2	22
Copper	5.0	17.3	43.2	16.3	20.9	15.9	140
Lead	1.0	61.9	**212**	72.4	21.8	78.1	120
Mercury	0.1	0.2	**1.3**	**0.5**	nd	**0.4**	0.27
Molybdenum	1.0	2.4	1.2	1.2	nd	1.0	6.9
Nickel	5.0	11.6	14.8	16.3	9.6	15.3	100
Selenium	1.0	nd	nd	nd	nd	nd	2.4
Silver	0.3	nd	0.3	nd	nd	nd	20
Thallium	1.0	nd	nd	nd	nd	nd	1
Uranium	1.0	nd	nd	nd	nd	nd	23
Vanadium	10.0	28.7	25.6	31.4	17.7	30.3	86
Zinc	20.0	261	271	67.4	103	69.3	340

Notes:
- MDL – Method Detection Limit
- nd – not detected above the MDL
- **Bold and underlined –** Results exceed selected MECP standard
- 1 – Duplicate of sample BH3-21-SS4/5

TABLE 8 Continued - Analytical Test Results – Soil
Metals

Parameter	MDL (µg/g)	Soil Samples (µg/g)					MECP Table 3 Residential Standards (µg/g)
		June 15, 2021					
		TP2-21-GS4	TP3-21-GS3	TP4-21-GS2	TP6-21-GS5	DUP4[2]	
Antimony	1.0	nd	2.1	nd	2.0	nd	7.5
Arsenic	1.0	3.2	**22.3**	3.9	5.0	3.2	18
Barium	1.0	190	181	149	90.9	121	390
Beryllium	0.5	nd	0.7	nd	nd	nd	4
Boron	5.0	8.7	6.9	7.1	9.3	5.5	120
Cadmium	0.5	nd	**3.1**	nd	nd	nd	1.2
Chromium	5.0	17.6	20.6	15.1	18.6	12.7	160
Chromium (VI)	0.2	nd	nd	nd	nd	nd	8
Cobalt	1.0	4.9	7.4	4.9	5.2	4.3	22
Copper	5.0	11.4	51.5	11.3	25.8	10.5	140
Lead	1.0	11.1	**270**	17.8	**136**	17.8	120
Mercury	0.1	nd	**1.0**	0.1	0.2	0.1	0.27
Molybdenum	1.0	nd	2.3	nd	2.3	nd	6.9
Nickel	5.0	12.4	17.8	10.9	12.8	9.7	100
Selenium	1.0	nd	**4.3**	nd	nd	nd	2.4
Silver	0.3	nd	nd	nd	nd	nd	20
Thallium	1.0	nd	nd	nd	nd	nd	1
Uranium	1.0	nd	nd	nd	nd	nd	23
Vanadium	10.0	20.1	26.4	22.5	24.3	18.0	86
Zinc	20.0	27.2	**1680**	48.6	161	47.7	340

Notes:
- MDL – Method Detection Limit
- nd – not detected above the MDL
- **Bold and underlined –** Results exceed selected MECP standard
- 2 – Duplicate of sample TP4-21-GS2

TABLE 9 - Analytical Test Results – Soil
Methyl Mercury

Parameter	MDL (µg/g)	Soil Samples (µg/g)			MECP Table 3 Residential Standards (µg/g)
		June 15, 2021			
		TP1-21-GS4	TP7-21-GS6	TP8-21-GS5	
Methyl Mercury	0.000050	nd	0.000176	0.000092	0.0084

Notes:
- MDL – Method Detection Limit
- nd – not detected above the MDL

Arsenic, barium, cadmium, lead, mercury, selenium and/or zinc concentrations in Samples BH1-21-SS5/6, BH2-21-SS4, BH3-21-SS4/5, TP3-21-GS3 and TP6-21-GS5 exceed the MECP Table 3 Standards. The remaining metal concentrations in the soil samples analysed are in compliance with the selected MECP Table 3 standards. The analytical results for metals tested in soil are shown on Drawing PE5267-4 – Analytical Testing Plan – Soil (Metals).

TABLE 10 - Analytical Test Results – Soil
VOCs

Parameter	MDL (µg/g)	Soil Sample (µg/g) June 15, 2021 TP1-21-GS3	MECP Table 3 Residential Standards (µg/g)
Acetone	0.50	nd	16
Benzene	0.02	nd	0.21
Bromodichloromethane	0.05	nd	13
Bromoform	0.05	nd	0.27
Bromomethane	0.05	nd	0.05
Carbon Tetrachloride	0.05	nd	0.05
Chlorobenzene	0.05	nd	2.4
Chloroform	0.05	nd	0.05
Dibromochloromethane	0.05	nd	9.4
Dichlorodifluoromethane	0.05	nd	16
1,2-Dichlorobenzene	0.05	nd	3.4
1,3-Dichlorobenzene	0.05	nd	4.8
1,4-Dichlorobenzene	0.05	nd	0.083
1,1-Dichloroethane	0.05	nd	3.5
1,2-Dichloroethane	0.05	nd	0.05
1,1-Dichloroethylene	0.05	nd	0.05
cis-1,2-Dichloroethylene	0.05	nd	3.4
trans-1,2-Dichloroethylene	0.05	nd	0.084
1,2-Dichloropropane	0.05	nd	0.05
1,3-Dichloropropene, total	0.05	nd	0.05
Ethylbenzene	0.05	nd	2
Ethylene dibromide (dibromoethane, 1,2-)	0.05	nd	0.05
Hexane	0.05	nd	2.8
Methyl Ethyl Ketone (2-Butanone)	0.50	nd	16
Methyl Isobutyl Ketone	0.50	nd	1.7
Methyl tert-butyl ether	0.05	nd	0.75
Methylene Chloride	0.05	nd	0.1
Styrene	0.05	nd	0.7
1,1,1,2-Tetrachloroethane	0.05	nd	0.058
1,1,2,2-Tetrachloroethane	0.05	nd	0.05
Tetrachloroethylene	0.05	nd	0.28
Toluene	0.05	nd	2.3
1,1,1-Trichloroethane	0.05	nd	0.38
1,1,2-Trichloroethane	0.05	nd	0.05
Trichloroethylene	0.05	nd	0.061
Trichlorofluoromethane	0.05	nd	4
Vinyl Chloride	0.02	nd	0.02
Xylenes, total	0.05	nd	3.1

Notes:
- MDL – Method Detection Limit
- nd – not detected above the MDL

No VOC parameters were detected in the soil sample analyzed. The results are in compliance with the selected MECP Table 3 standards. The analytical results for VOCs tested in soil are shown on Drawing PE5267-5 – Analytical Testing Plan – Soil (VOCs and BTEX).

TABLE 11 - Analytical Test Results – Soil
BTEX

Parameter	MDL (µg/g)	Soil Samples (µg/g)			MECP Table 3 Residential Standards (µg/g)
		May 14, 2021	May 17, 2021	June 15, 2021	
		BH1-21-SS3	BH3-21-SS2	TP2-21-GS4	
Benzene	0.02	nd	nd	nd	0.21
Toluene	0.05	nd	nd	nd	2
Ethylbenzene	0.05	nd	nd	nd	2.3
Xylenes	0.05	nd	nd	nd	3.1

Notes:
- MDL – Method Detection Limit
- nd – not detected above the MDL

No BTEX parameters were detected in the soil samples analyzed. The results are in compliance with the selected MECP Table 3 standards. The analytical results for BTEX tested in soil are shown on Drawing PE5267-5 – Analytical Testing Plan – Soil (VOCs and BTEX).

TABLE 12 - Analytical Test Results – Soil
PHCs F_1-F_4

Parameter	MDL (µg/g)	Soil Samples (µg/g)				MECP Table 3 Residential Standards (µg/g)
		May 14, 2021	May 17, 2021	June 15, 2021		
		BH1-21-SS3	BH3-21-SS2	TP1-21-GS3	TP2-21-GS4	
PHC F_1	7	nd	nd	nd	nd	55
PHC F_2	4	nd	7	5	5	98
PHC F_3	8	43	53	**386**	24	300
PHC F_4	6	29	37	134	15	2800

Notes:
- MDL – Method Detection Limit
- nd – not detected above the MDL
- **Bold and underlined –** Results exceed selected MECP standard

The PHC F_3 concentrations in sample TP1-21-GS3 exceeds the MECP Table 3 Standard. The remaining PHC concentrations in the soil samples analysed are in compliance with the selected MECP Table 3 standards. The analytical results for PHCs tested in soil are shown on Drawing PE5267-6 – Analytical Testing Plan – Soil (PHCs).

TABLE 13 - Analytical Test Results – Soil
PAHs

Parameter	MDL (µg/g)	Soil Sample (µg/g)					MECP Table 3 Residential Standards (µg/g)
		May 14, 2021	May 17, 2021				
		BH1-21-SS5/6	BH2-21-SS4	BH3-21-SS4/5	BH4-21-SS2	DUP[1]	
Acenaphthene	0.02	0.27	nd	nd	nd	0.03	7.9
Acenaphthylene	0.02	**0.23**	0.15	0.02	0.14	0.04	0.15
Anthracene	0.02	**0.75**	0.11	0.04	0.09	0.09	0.67
Benzo[a]anthracene	0.02	**1.50**	0.24	0.12	0.18	0.21	0.5
Benzo[a]pyrene	0.02	**1.38**	**0.35**	0.15	0.23	0.20	0.3
Benzo[b]fluoranthene	0.02	**1.29**	0.31	0.16	0.26	0.24	0.78
Benzo[g,h,i]perylene	0.02	0.70	0.25	0.09	0.19	0.12	6.6
Benzo[k]fluoranthene	0.02	0.75	0.16	0.09	0.11	0.12	0.78
Chrysene	0.02	1.44	0.22	0.16	0.18	0.19	7
Dibenzo[a,h]anthracene	0.02	**0.11**	0.06	nd	0.04	0.03	0.1
Fluoranthene	0.02	**2.89**	0.39	0.24	0.24	0.44	0.69
Fluorene	0.02	0.26	nd	nd	nd	0.03	62
Indeno[1,2,3-cd]pyrene	0.02	**0.66**	0.22	0.08	0.15	0.11	0.38
1-Methylnaphthalene	0.02	0.13	nd	nd	0.12	nd	0.99
2-Methylnaphthalene	0.02	0.13	0.03	nd	0.17	0.03	0.99
Methylnaphthalene (1&2)	0.04	0.29	nd	nd	0.29	0.05	0.99
Naphthalene	0.01	0.21	0.04	0.02	0.11	0.03	0.6
Phenanthrene	0.02	2.78	0.23	0.17	0.13	0.35	6.2
Pyrene	0.02	2.32	0.36	0.21	0.22	0.38	78

Notes:
- MDL – Method Detection Limit
- nd – not detected above the MDL
- **Bold and underlined –** Results exceed selected MECP standard
- 1 – Duplicate of sample BH3-21-SS4/5

TABLE 13 Continued - Analytical Test Results – Soil
PAHs

Parameter	MDL (µg/g)	Soil Sample (µg/g)					MECP Table 3 Residential Standards (µg/g)
		June 15, 2021					
		TP2-21-GS4	TP3-21-GS3	TP5-21-GS2	TP6-21-GS5	DUP3[1]	
Acenaphthene	0.02	nd	**15.5**	1.42	nd	**11.0**	7.9
Acenaphthylene	0.02	nd	**1.43**	**1.01**	**0.45**	**1.31**	0.15
Anthracene	0.02	nd	**34.0**	**2.40**	0.59	**32.9**	0.67
Benzo[a]anthracene	0.02	nd	**50.9**	**6.74**	**1.11**	**43.6**	0.5
Benzo[a]pyrene	0.02	nd	**48.5**	**7.22**	**1.25**	**38.9**	0.3
Benzo[b]fluoranthene	0.02	nd	**43.0**	**7.37**	**1.29**	**35.9**	0.78
Benzo[g,h,i]perylene	0.02	nd	**23.3**	3.95	0.81	**18.5**	6.6
Benzo[k]fluoranthene	0.02	nd	**23.6**	**4.47**	0.59	**19.2**	0.78
Chrysene	0.02	nd	**52.4**	**7.59**	1.41	**44.0**	7
Dibenzo[a,h]anthracene	0.02	nd	**6.01**	**1.07**	nd	**5.30**	0.1
Fluoranthene	0.02	nd	**123**	**18.7**	**2.49**	**105**	0.69
Fluorene	0.02	nd	12.8	1.23	nd	15.7	62
Indeno[1,2,3-cd]pyrene	0.02	nd	**21.1**	**3.61**	**0.67**	**17.0**	0.38

TABLE 13 Continued - Analytical Test Results – Soil PAHs							
1-Methylnaphthalene	0.02	nd	**3.91**	**1.96**	nd	**3.72**	0.99
2-Methylnaphthalene	0.02	nd	**5.39**	**2.43**	nd	**5.42**	0.99
Methylnaphthalene (1&2)	0.04	nd	**9.30**	**4.39**	nd	**9.15**	0.99
Naphthalene	0.01	nd	**9.72**	**3.10**	0.36	**10.1**	0.6
Phenanthrene	0.02	nd	**123**	**15.7**	2.18	**115**	6.2
Pyrene	0.02	nd	**97.6**	15.2	2.07	**78.9**	78

Notes:
- MDL – Method Detection Limit
- nd – not detected above the MDL
- **Bold and underlined –** Results exceed selected MECP standard
- 1 – Duplicate of sample TP3-21-GS3

Various PAH parameter concentrations in Samples BH1-21-SS5/6, BH2-21-SS4, TP23-21-GS3, TP5-21-GS2 and TP6-21-GS5 exceed the MECP Table 3 Standards. The remaining PAH concentrations in the soil samples analysed are in compliance with the selected MECP Table 3 standards. The analytical results for PAHs tested in soil are shown on Drawing PE5267-7 – Analytical Testing Plan – Soil (PAHs).

The maximum concentrations of analyzed parameters in the soil at the Phase II Property are summarized in Table 14.

TABLE 14 - Maximum Concentrations – Soil			
Parameter	**Maximum Concentration (µg/g)**	**Sample ID**	**Depth Interval (m BGS)**
Antimony	2.1	TP3-21-GS3	0.5-0.7; Fill Material
Arsenic	**22.3**	TP3-21-GS3	0.5-0.7; Fill Material
Barium	**584**	BH1-21-SS5/6	3.05 - 4.42; Fill Material
Beryllium	0.7	TP3-21-GS3	0.5-0.7; Fill Material
Boron	19.0	BH1-21-SS5/6	3.05 - 4.42; Fill Material
Cadmium	**3.1**	TP3-21-GS3	0.5-0.7; Fill Material
Chromium	25.7	BH3-21-SS4/5	2.29 - 3.66; Fill Material
Cobalt	7.4	TP3-21-GS3	0.5-0.7; Fill Material
Copper	51.5	TP3-21-GS3	0.5-0.7; Fill Material
Lead	**270**	TP3-21-GS3	0.5-0.7; Fill Material
Mercury	**1.3**	BH2-21-SS4	2.29 - 2.62; Fill Material
Molybdenum	2.4	BH1-21-SS5/6	3.05 - 4.42; Fill Material
Nickel	17.8	TP3-21-GS3	0.5-0.7; Fill Material
Selenium	**4.3**	TP3-21-GS3	0.5-0.7; Fill Material
Silver	0.3	BH2-21-SS4	2.29 - 2.62; Fill Material
Vanadium	31.4	BH3-21-SS4/5	2.29 - 3.66; Fill Material
Zinc	**1680**	TP3-21-GS3	0.5-0.7; Fill Material
PHC F_2	7	BH3-21-SS2	0.76 - 1.37; Fill Material
PHC F_3	**386**	TP1-21-GS3	1.7-1.9; Fill Material
PHC F_4	134	TP1-21-GS3	1.7-1.9; Fill Material
Acenaphthene	15.5	TP3-21-GS3	0.5-0.7; Fill Material
Acenaphthylene	1.43	TP3-21-GS3	0.5-0.7; Fill Material
Anthracene	34.0	TP3-21-GS3	0.5-0.7; Fill Material

TABLE 14 - Maximum Concentrations – Soil			
Benzo[a]anthracene	50.9	TP3-21-GS3	0.5-0.7; Fill Material
Benzo[a]pyrene	48.5	TP3-21-GS3	0.5-0.7; Fill Material
Benzo[b]fluoranthene	43.0	TP3-21-GS3	0.5-0.7; Fill Material
Benzo[g,h,i]perylene	23.3	TP3-21-GS3	0.5-0.7; Fill Material
Benzo[k]fluoranthene	23.6	TP3-21-GS3	0.5-0.7; Fill Material
Chrysene	52.4	TP3-21-GS3	0.5-0.7; Fill Material
Dibenzo[a,h]anthracene	6.01	TP3-21-GS3	0.5-0.7; Fill Material
Fluoranthene	123	TP3-21-GS3	0.5-0.7; Fill Material
Fluorene	15.7	DUP3 (TP3-21-GS3)	0.5-0.7; Fill Material
Indeno[1,2,3-cd]pyrene	21.1	TP3-21-GS3	0.5-0.7; Fill Material
1-Methylnaphthalene	3.91	TP3-21-GS3	0.5-0.7; Fill Material
2-Methylnaphthalene	5.42	DUP3 (TP3-21-GS3)	0.5-0.7; Fill Material
Methylnaphthalene (1&2)	9.30	TP3-21-GS3	0.5-0.7; Fill Material
Naphthalene	10.1	DUP3 (TP3-21-GS3)	0.5-0.7; Fill Material
Phenanthrene	123	TP3-21-GS3	0.5-0.7; Fill Material
Pyrene	97.6	TP3-21-GS3	0.5-0.7; Fill Material

All remaining parameter results were non-detect. The laboratory Certificates of Analysis are provided in Appendix 1.

5.6 Groundwater Quality

Groundwater samples (including two duplicates) from monitoring wells installed in BH1 through BH4 were submitted for laboratory analysis of metals (including Hg and CrVI), BTEX, PHC (F1-F4) and/or PAHs. The groundwater samples were obtained from the screened intervals noted in Table 3.

The results of the analytical testing are presented in Tables 15 to 18. The laboratory certificates of analysis are provided in Appendix 1.

TABLE 15 - Analytical Test Results – Groundwater
Metals

Parameter	MDL (µg/g)	Groundwater Samples (µg/g)				MECP Table 3 Residential Standards (µg/g)
		May 25, 2021				
		MW1-21-GW1	MW2-21-GW1	MW3-21-GW1	DUP2[1]	
Antimony	0.5	nd	nd	nd	nd	20,000
Arsenic	1	nd	nd	nd	nd	1,900
Barium	1	40	629	65	701	29,000
Beryllium	0.5	nd	nd	nd	nd	67
Boron	10	137	74	39	87	45,000
Cadmium	0.1	nd	nd	nd	nd	2.7
Chromium	1	nd	nd	nd	nd	810
Chromium (VI)	10	nd	nd	nd	nd	140
Cobalt	0.5	1.2	1.2	0.6	nd	66
Copper	0.5	3.3	4.9	3.5	4.8	87

TABLE 15 - Analytical Test Results – Groundwater
Metals

Parameter	MDL (µg/g)	Groundwater Samples (µg/g)				MECP Table 3 Residential Standards (µg/g)
		May 25, 2021				
		MW1-21-GW1	MW2-21-GW1	MW3-21-GW1	DUP2[1]	
Lead	0.1	nd	nd	nd	0.1	25
Mercury	0.1	nd	nd	nd	nd	0.29
Molybdenum	0.5	4.1	2.9	0.9	3.2	9,200
Nickel	1	8	4	7	4	490
Selenium	1	6	nd	2	nd	63
Silver	0.1	nd	nd	nd	nd	1.5
Sodium	200	455,000	228,000	289,000	237,000	2,300,000
Thallium	0.1	nd	0.1	nd	0.2	510
Uranium	0.1	2.8	3.8	4.7	4.1	420
Vanadium	0.5	nd	0.5	nd	0.6	250
Zinc	5	10	17	9	9	1,100

Notes:
- MDL – Method Detection Limit
- nd – not detected above the MDL
- 1 – Duplicate of sample MW2-21-GW1

All detected metal concentrations in the groundwater samples analysed are in compliance with the selected MECP Table 3 standards. The analytical results for groundwater tested are shown on Drawing PE5267-8 – Analytical Testing Plan – Groundwater.

TABLE 16 - Analytical Test Results – Groundwater
BTEX

Parameter	MDL (µg/L)	Groundwater Sample (µg/L)	MECP Table 3 Standards (µg/L)
		May 25, 2021	
		MW3-21-GW1	
Benzene	0.5	nd	44
Toluene	0.5	nd	18,000
Ethylbenzene	0.5	nd	2,300
Xylenes	0.5	nd	4,200

Notes:
- MDL – Method Detection Limit
- nd – not detected above the MDL

No detectable BTEX concentrations were identified in the groundwater sample analysed. As such, the results are in compliance with the selected MECP Table 3 standards. The analytical results for groundwater tested are shown on Drawing PE5267-8 – Analytical Testing Plan – Groundwater.

TABLE 17 - Analytical Test Results – Groundwater
PHCs

Parameter	MDL (µg/L)	Groundwater Sample (µg/L)	MECP Table 3 Standards (µg/L)
		May 25, 2021	
		MW3-21-GW1	
PHC F_1	25	nd	750
PHC F_2	100	nd	150
PHC F_3	100	nd	500
PHC F_4	100	nd	500

Notes:
- MDL – Method Detection Limit
- nd – not detected above the MDL

No detectable PHC concentrations were identified in the groundwater sample analysed; the results comply with the MECP Table 3 standards. The analytical results for groundwater tested are shown on Drawing PE5267-8 – Analytical Testing Plan – Groundwater.

TABLE 18 - Analytical Test Results – Groundwater
PAHs

Parameter	MDL (µg/g)	Groundwater Samples (µg/g)				MECP Table 3 Residential Standards (µg/g)
		May 25, 2021				
		MW1-21-GW1	MW2-21-GW1	MW4-21-GW1	DUP1[1]	
Acenaphthene	0.05	nd	nd	nd	nd	600
Acenaphthylene	0.05	nd	nd	nd	nd	1.8
Anthracene	0.01	nd	nd	nd	nd	2.4
Benzo[a]anthracene	0.01	nd	nd	nd	nd	4.7
Benzo[a]pyrene	0.01	nd	nd	nd	nd	0.81
TABLE 18 - Analytical Test Results – Groundwater PAHs						
Benzo[b]fluoranthene	0.05	nd	nd	nd	nd	0.75
Benzo[g,h,i]perylene	0.05	nd	nd	nd	nd	0.2
Benzo[k]fluoranthene	0.05	nd	nd	nd	nd	0.4
Chrysene	0.05	nd	nd	nd	nd	1
Dibenzo[a,h]anthracene	0.05	nd	nd	nd	nd	0.52
Fluoranthene	0.01	0.04	nd	nd	nd	130
Fluorene	0.05	nd	nd	nd	nd	400
Indeno[1,2,3-cd]pyrene	0.05	nd	nd	nd	nd	0.2
Methylnapthalene (1&2)	0.10	nd	nd	nd	nd	1,800
Naphthalene	0.05	0.34	nd	nd	nd	1,400
Phenanthrene	0.05	0.08	nd	nd	nd	580
Pyrene	0.01	0.04	nd	nd	nd	68

Notes:
- MDL – Method Detection Limit
- nd – not detected above the MDL
- 1 – Duplicate of sample MW4-21-GW1

Several PAH parameters were identified in Sample MW1-21-GW1 at concentrations below the MECP Table 3 standards. Otherwise, no PAH parameters were detected in the groundwater samples analysed. The analytical results for groundwater tested are shown on Drawing PE5267-8 – Analytical Testing Plan – Groundwater.

5.7 Quality Assurance and Quality Control Results

All samples submitted as part of the Phase II ESA were handled in accordance with the Analytical Protocol with respect to preservation method, storage requirement, and container type. As per Subsection 47(3) of O.Reg. 153/04, as amended under the Environmental Protection Act, a Certificate of Analysis has been received for each sample submitted for analysis and all Certificates of Analysis are appended to this report.

Duplicate soil and groundwater samples from BH1-21-SS5, MW2-21-GW1 and MW4-21-GW1 were submitted for laboratory analysis of metals (including Hg and CrVI), BTEX, PHCs (F1-F4) and/or PAHs.

The duplicates were collected with the intent of calculating the relative percent difference (RPD) between duplicate sample values, as a way of assessing the quality of the analytical test results. Several parameter concentrations were not detected in either or both the original sample and duplicate. The RPD values are therefore considered to be 0% and therefore meet the 20% target.

The RPD calculations for the original soil and duplicate sample are provided in Tables 19 to 20.

Table 19 - QA/QC Calculations – Soil

Parameter	MDL (µg/L)	BH3-21-SS4/5	DUP (BH3-21-SS4/5)	RPD (%)	QA/QC Result
Antimony	1.0	nd	nd	0	Meets Target
Arsenic	1.0	6.2	5.2	17.5	Meets Target
Barium	1.0	150	132	12.8	Meets Target
Beryllium	0.5	0.5	0.5	0	Meets Target
Boron	5.0	8.4	6.8	21.0	Does Not Meet Target
Cadmium	0.5	nd	nd	0	Meets Target
Chromium	5.0	25.7	24.2	6.0	Meets Target
Chromium (VI)	0.2	nd	nd	0	Meets Target
Cobalt	1.0	5.7	5.2	9.2	Meets Target
Copper	5.0	16.3	15.9	2.5	Meets Target
Lead	1.0	72.4	78.1	7.6	Meets Target
Mercury	0.1	**0.5**	**0.4**	22.2	Does Not Meet Target
Molybdenum	1.0	1.2	1.0	18.2	Meets Target
Nickel	5.0	16.3	15.3	6.3	Meets Target
Selenium	1.0	nd	nd	0	Meets Target
Silver	0.3	nd	nd	0	Meets Target
Thallium	1.0	nd	nd	0	Meets Target
Uranium	1.0	nd	nd	0	Meets Target
Vanadium	10.0	31.4	30.3	3.6	Meets Target
Zinc	20.0	67.4	69.3	2.8	Meets Target
Acenaphthene	0.02	nd	0.03	40	Does Not Meet Target
Acenaphthylene	0.02	0.02	0.04	66.7	Does Not Meet Target
Anthracene	0.02	0.04	0.09	76.9	Does Not Meet Target
Benzo[a]anthracene	0.02	0.12	0.21	54.5	Does Not Meet Target
Benzo[a]pyrene	0.02	0.15	0.20	28.6	Does Not Meet Target
Benzo[b]fluoranthene	0.02	0.16	0.24	40	Does Not Meet Target
Benzo[g,h,i]perylene	0.02	0.09	0.12	28.6	Does Not Meet Target
Benzo[k]fluoranthene	0.02	0.09	0.12	28.6	Does Not Meet Target
Chrysene	0.02	0.16	0.19	17.7	Meets Target
Dibenzo[a,h]anthracene	0.02	nd	0.03	40	Does Not Meet Target
Fluoranthene	0.02	0.24	0.44	58.8	Does Not Meet Target
Fluorene	0.02	nd	0.03	0	Meets Target
Indeno[1,2,3-cd]pyrene	0.02	0.08	0.11	31.6	Does Not Meet Target
1-Methylnaphthalene	0.02	nd	nd	0	Meets Target
2-Methylnaphthalene	0.02	nd	0.03	0	Meets Target
Methylnaphthalene(1&2)	0.04	nd	0.05	0	Meets Target
Naphthalene	0.01	0.02	0.03	40	Does Not Meet Target
Phenanthrene	0.02	0.17	0.35	69.2	Does Not Meet Target
Pyrene	0.02	0.21	0.38	57.6	Does Not Meet Target

Notes:

- MDL – Method Detection Limit
- nd – not detected above the MDL
- **Bold and underlined –** Results exceed selected MECP standard

Table 19 Continued - QA/QC Calculations – Soil					
Parameter	**MDL (µg/L)**	**TP3-21-GS3**	**DUP3 (TP3-21-GS3)**	**RPD (%)**	**QA/QC Result**
Acenaphthene	0.02	**15.5**	**11.0**	40.0	Does Not Meet Target
Acenaphthylene	0.02	**1.43**	**1.31**	8.8	Meets Target
Anthracene	0.02	**34.0**	**32.9**	3.3	Meets Target
Benzo[a]anthracene	0.02	**50.9**	**43.6**	15.4	Meets Target
Benzo[a]pyrene	0.02	**48.5**	**38.9**	22.0	Does Not Meet Target
Benzo[b]fluoranthene	0.02	**43.0**	**35.9**	18.0	Does Not Meet Target
Benzo[g,h,i]perylene	0.02	**23.3**	**18.5**	23.0	Meets Target
Benzo[k]fluoranthene	0.02	**23.6**	**19.2**	20.6	Meets Target
Chrysene	0.02	**52.4**	**44.0**	17.4	Meets Target
Dibenzo[a,h]anthracene	0.02	**6.01**	**5.30**	12.6	Meets Target
Fluoranthene	0.02	**123**	**105**	15.8	Meets Target
Fluorene	0.02	12.8	15.7	20.4	Meets Target
Indeno[1,2,3-cd]pyrene	0.02	**21.1**	**17.0**	21.5	Does Not Meet Target
1-Methylnaphthalene	0.02	**3.91**	**3.72**	5.0	Meets Target
2-Methylnaphthalene	0.02	**5.39**	**5.42**	0.6	Meets Target
Methylnaphthalene(1&2)	0.04	**9.30**	**9.15**	1.6	Meets Target
Naphthalene	0.01	**9.72**	**10.1**	3.8	Meets Target
Phenanthrene	0.02	**123**	**115**	6.7	Meets Target
Pyrene	0.02	**97.6**	**78.9**	21.2	Does Not Meet Target

Notes:
- MDL – Method Detection Limit
- nd – not detected above the MDL
- **Bold and underlined –** Results exceed selected MECP standard

Table 19 Continued - QA/QC Calculations – Soil					
Parameter	**MDL (µg/L)**	**TP4-21-GS2**	**DUP4 (TP4-21-GS2)**	**RPD (%)**	**QA/QC Result**
Antimony	1.0	nd	nd	0	Meets Target
Arsenic	1.0	3.9	3.2	19.7	Meets Target
Barium	1.0	149	121	20.7	Does Not Meet Target
Beryllium	0.5	nd	nd	0	Meets Target
Boron	5.0	7.1	5.5	25.4	Does Not Meet Target
Cadmium	0.5	nd	nd	0	Meets Target
Chromium	5.0	15.1	12.7	17.3	Meets Target
Chromium (VI)	0.2	nd	nd	0	Meets Target
Cobalt	1.0	4.9	4.3	13.0	Meets Target
Copper	5.0	11.3	10.5	7.3	Meets Target
Lead	1.0	17.8	17.8	0	Meets Target
Mercury	0.1	0.1	0.1	0	Meets Target
Molybdenum	1.0	nd	nd	0	Meets Target
Nickel	5.0	10.9	9.7	11.7	Meets Target
Selenium	1.0	nd	nd	0	Meets Target
Silver	0.3	nd	nd	0	Meets Target
Thallium	1.0	nd	nd	0	Meets Target
Uranium	1.0	nd	nd	0	Meets Target
Vanadium	10.0	22.5	18.0	22.2	Does Not Meet Target

Table 19 Continued - QA/QC Calculations – Soil					
Parameter	**MDL (µg/L)**	**TP4-21-GS2**	**DUP4 (TP4-21-GS2)**	**RPD (%)**	**QA/QC Result**
Zinc	20.0	48.6	47.7	1.9	Meets Target

Notes:
- MDL – Method Detection Limit
- nd – not detected above the MDL
- **Bold and underlined –** Results exceed selected MECP standard

Table 20 - QA/QC Calculations – Groundwater					
MW2-21-GW1					
Parameter	**MDL (µg/L)**	**MW2-21-GW1**	**DUP2 (MW2-21-GW1)**	**RPD (%)**	**QA/QC Result**
Antimony	0.5	nd	nd	0	Meets Target
Arsenic	1	nd	nd	0	Meets Target
Barium	1	629	701	10.8	Meets Target
Beryllium	0.5	nd	nd	0	Meets Target
Boron	10	74	87	16.1	Meets Target
Cadmium	0.1	nd	nd	0	Meets Target
Chromium	1	nd	nd	0	Meets Target
Chromium (VI)	10	nd	nd	0	Meets Target
Cobalt	0.5	1.2	nd	0	Meets Target
Copper	0.5	4.9	4.8	2.06	Meets Target
Lead	0.1	nd	0.1	0	Meets Target
Mercury	0.1	nd	nd	0	Meets Target
Molybdenum	0.5	2.9	3.2	9.8	Meets Target
Nickel	1	4	4	0	Meets Target
Selenium	1	nd	nd	0	Meets Target
Silver	0.1	nd	nd	0	Meets Target
Sodium	200	228,000	237,000	3.9	Meets Target
Thallium	0.1	0.1	0.2	66.7	Does Not Meet Target
Uranium	0.1	3.8	4.1	7.6	Meets Target
Vanadium	0.5	0.5	0.6	18.2	Meets Target
Zinc	5	17	9	61.5	Does Not Meet Target

Notes:
- MDL – Method Detection Limit
- nd – not detected above the MDL

Table 20 Continued - QA/QC Calculations – Groundwater					
Parameter	**MDL (µg/L)**	**MW4-21-GW1**	**DUP1 (MW4-21-GW1)**	**RPD (%)**	**QA/QC Result**
Acenaphthene	0.05	nd	nd	0	Meets Target
Acenaphthylene	0.05	nd	nd	0	Meets Target
Anthracene	0.01	nd	nd	0	Meets Target
Benzo[a]anthracene	0.01	nd	nd	0	Meets Target
Benzo[a]pyrene	0.01	nd	nd	0	Meets Target
Benzo[b]fluoranthene	0.05	nd	nd	0	Meets Target
Benzo[g,h,i]perylene	0.05	nd	nd	0	Meets Target

Table 20 Continued - QA/QC Calculations – Groundwater					
Parameter	**MDL (µg/L)**	**MW4-21-GW1**	**DUP1 (MW4-21-GW1)**	**RPD (%)**	**QA/QC Result**
Benzo[k]fluoranthene	0.05	nd	nd	0	Meets Target
Chrysene	0.05	nd	nd	0	Meets Target
Dibenzo[a,h]anthracene	0.05	nd	nd	0	Meets Target
Fluoranthene	0.01	nd	nd	0	Meets Target
Fluorene	0.05	nd	nd	0	Meets Target
Indeno[1,2,3-cd]pyrene	0.05	nd	nd	0	Meets Target
Methylnaphthalene(1&2)	0.10	nd	nd	0	Meets Target
Naphthalene	0.05	nd	nd	0	Meets Target
Phenanthrene	0.05	nd	nd	0	Meets Target
Pyrene	0.01	nd	nd	0	Meets Target

Notes:
- MDL – Method Detection Limit
- nd – not detected above the MDL

Typically, RPD values below 20% are considered to be of satisfactory quality. The relative percent difference (RPD) results calculated for several soil parameters fell outside of the acceptable range of 20%. It is not uncommon that very small concentrations or values will yield higher RPD values, and as such, the RPD value is not an accurate measure in these cases.

Despite the exceeded RPD values calculated for samples BH3-21-SS4/5, TP3-21-GS3, TP4-21-GS2 and MW2-21-GW1 between the original and duplicate samples, it should be noted that the individual metal and PAH parameters detected appear to be consistent between the two samples. Furthermore, the concentration of the majority of the detected metal and PAH parameters were well within the selected MECP Table 3 standards in both samples by a large margin (except for Mercury which was in excess of the standard). As a result, it is our opinion that the decision-making usefulness of the samples is not considered to be impaired, and thus the quality of the field data collected during this remediation is considered to be sufficient to meet the overall objectives of this assessment.

5.8 Phase II Conceptual Site Model

The following section has been prepared in accordance with the requirements of O.Reg. 153/04, as amended by the Environmental Protection Act. Conclusions and recommendations are discussed in a subsequent section.

Potentially Contaminating Activity and Areas of Potential Environmental Concern

Based on the results of the Phase I ESA completed for the subject property, 51 PCAs were identified, nine of which represent APECs on the Phase II Property. The APECs on the Phase II Property are as follows:

- APEC 1: Resulting from the historical presence of an on-site warehouse/workshop (PCA #N/A);
- APEC 2: Resulting from the historical presence of on-site coal storage (PCA #N/A).
- APEC 3: Resulting from the historical presence of on-site coal storage (PCA #N/A).
- APEC 4: Resulting from the historical presence of an on-site garage (PCA #52).
- APEC 5: Resulting from the use of de-icing salt associated with on-site and adjacent roadways (PCA #N/A).
- APEC 6: Resulting from the historical presence of an on-site railway spur line (PCA #46).
- APEC 7: Resulting from the presence of fill material of unknown quality (PCA #30).
- APEC 8: Resulting from the historical presence of an off-site rail yard and rail lines (PCA #46).
- APEC 9: Resulting from the historical presence of off-site coal storage (PCA #N/A).

Contaminants of Potential Concern

The following CPCs are identified with respect to the Phase II Property:

- ❒ Metals (including Arsenic (As,), Antimony (Sb) and Selenium);
- ❒ Mercury (Hg);
- ❒ Hexavalent Chromium;
- ❒ Volatile Organic Compounds (VOCs);
- ❒ Benzene, Toluene, Ethylbenzene, and Xylenes (BTEX);
- ❒ Petroleum Hydrocarbons, fractions 1 - 4 (PHCs F_1-F_4); and
- ❒ Polycyclic Aromatic Hydrocarbons (PAHs).

Subsurface Structures and Utilities

A small basement crawl space is present beneath the northwestern portion of the on-site vacant building. Multiple underground utilities were identified on the Phase I Property including electrical, gas, water, sewer and telecommunication lines.

Based on standard practice for subsurface utility installation, service trenches are expected to be present approximately 1 to 2 m below existing grade. In general, trench backfill may provide a preferential pathway for contaminant transport if the water table is at or above the base of the trenches. Based on the findings of the Phase II ESA, groundwater on the Phase II Property complies with the MECP Table 3 standards and is located within the bedrock, 5.6 to 9.0 m below ground surface. Therefore subsurface structures and utilities are not expected to have had the potential to impact contaminant distribution.

Physical Setting

Site Stratigraphy

The stratigraphy of the Phase II Property generally consists of:

- ❒ Topsoil, encountered at depths ranging from approximately 0.00 to 5.00 m below ground surface
- ❒ Fill material, consisting of brown silty sand with crushed stone, trace concrete, brick and clay; encountered at depths ranging from approximately 0.00 to 5.00 m below ground surface

- Very stiff to stiff, brown silty clay; encountered in BH3-21 from approximately 4.27 to 5.18 m below ground surface;
- Glacial till, consisting of brown to grey silty clay with sand, gravel, cobbles and boulders; encountered in BH3-21 from approximately 5.18 to 7.01 m below ground surface;
- Limestone bedrock, encountered at depths ranging from approximately 2.62 to 7.01 m below ground surface.

The site stratigraphy, from ground surface to the deepest aquifer or aquitard investigated, is provided in the Soil Profile and Test Data Sheets in Appendix 1.

Hydrogeological Characteristics

Groundwater at the Phase II Property was encountered within the bedrock or the overburden in BH3-21. During the most recent groundwater monitoring event, groundwater flow was measured in a northwestern direction, with a hydraulic gradient of 0.06 m/m. Groundwater contours are shown on Drawing PE5267-3 – Groundwater Contour Plan.

Approximate Depth to Bedrock

Bedrock was confirmed within all four boreholes at depths ranging from approximately 2.62 to 7.01 m below ground surface, as determined by rock coring activities conducted in three of the boreholes at the time of the drilling program.

Approximate Depth to Water Table

The depth to the water table at the subject site varies between approximately 5.60 to 9.00 m below existing grade.

Sections 41 and 43.1 of the Regulation

Section 41 of the Regulation does not apply to the Phase II Property, in that the subject property is not within 30m of an environmentally sensitive area, and the pH of surface soil is between 5 and 9.

Section 43.1 of the Regulation does not apply to the subject site as bedrock is not located less than 2 m below ground surface.

Fill Placement

Fill material, consisting of brown silty sand with crushed stone, trace concrete, brick and clay was identified throughout the entire Phase II Property.

Existing Buildings and Structures

The Phase II Property is currently occupied by a vacant building located on the southeastern portion of the subject site. The subject building was constructed as early as 1878.

Proposed Buildings and Other Structures

The proposed site development for the Phase II Property will consist of a residential high rise building with two underground parking levels. Associated access lanes, walkways and hardscaped areas are also anticipated as part of the development. It is expected that the proposed buildings will be municipally serviced.

Areas of Natural Scientific Interest and Water Bodies

There are no areas of natural and scientific interest or waterbodies on the Phase II Property or within the 250 m study area.

Environmental Condition

Areas Where Contaminants are Present

Based on the findings of this Phase II ESA, soil (fill material) impacted with metal parameters, arsenic and selenium, mercury, PAH parameters and/or PHC (F_3) concentrations exceeding the MECP Table 3 standards, was present on the northern, central and southwestern portions of the Phase II Property. Based on the non-homogenous nature of the fill material, it is expected that impacted soil is present in pockets across the entire Phase II Property.

Groundwater beneath the Phase II Property was determined to comply with the MECP Table 3 standards.

Types of Contaminants

Based on the findings of this Phase II ESA, soil contaminants at the Phase II Property include the following:

- Metals (barium, cadmium, lead and zinc);

- ❒ Arsenic and selenium;
- ❒ Mercury;
- ❒ PHCs (F_3); and
- ❒ PAHs (acenapthene, acenapthylene, anthracene, benzo[a]anthracene, benzo[a]pyrene, benzo[b]fluoranthene, benzo[g,h,i]perylene, benzo[k]fluoranthene, chrysene, dibenzo[a,h]anthracene, fluoranthene, indeno[1,2,3-cd]pyrene, methylnapthalene (1&2), naphthalene, phenanthrene, pyrene)

The groundwater at the Phase II Property complies with the MECP Table 3 standards.

Contaminated Media

The soil (fill material) across the Phase II Property is impacted with parameter concentrations exceeding the MECP Table 3 standards.

Groundwater beneath the Phase II Property complies with the MECP Table 3 standards.

What Is Known About Areas Where Contaminants Are Present

Based on the findings of this Phase II ESA, impacted soil was identified at test holes BH1-21, BH2-21, BH3-21, TP1-21-GS3, TP3-21-GS3, TP5-21-GS2 and TP6-21-GS5. Based on the nature of the fill material, pockets of metal (including As, Sb, Se), mercury, PHC and/or PAH impacts are anticipated to be present across the Phase II Property.

The impacted soil identified on the Phase II Property is interpreted to be associated with historical uses in combination with the historical importation of poor-quality fill material.

Distribution and Migration of Contaminants

A layer of impacted fill material was identified throughout the subject site. This layer was observed to range from approximately 2.62 to 5.00 m thick. Based on the observations made during the field program, in conjunction with analytical test results, it is expected that the majority of the fill material is impacted with metals and/or PAHs.

Based on the findings of the Phase II ESA, groundwater beneath the site was in compliance with the MECP Table 3 standards. Given the clean groundwater

results in combination with the low solubility of metal, mercury and PAH parameters, no significant distribution or migration of contaminants is considered to have occurred on the Phase II Property.

Discharge of Contaminants

The metals and PAH impacted fill material identified on the Phase II Property is considered to be the result of the historical uses of the property as a coal storage yard/area, on site railway spur line and road way or from the importation of fill material of a poor quality.

Climatic and Meteorological Conditions

In general, climatic and meteorological conditions have the potential to affect contaminant distribution. Two ways by which climatic and meteorological conditions may affect contaminant distribution include the downward leaching of contaminants by means of the infiltration of precipitation, and the migration of contaminants via groundwater levels and/or flow, which may fluctuate seasonally.

Based on the results of the Phase II ESA, downward leaching may have affected contaminant distribution at the Phase II Property. However, given the low solubility of metal and PAH parameters, no significant distribution or migration of contaminants is considered to have occurred.

Site groundwater was in compliance with the MECP Table 3 standards; as such, migration of contaminants via groundwater levels and/or flow is not considered to have occurred on the Phase II Property.

Potential for Vapour Intrusion

Given the non-volatile nature of the impacts identified in the soil, the potential for vapour intrusion into the current site building is considered to be low.

As part of the site redevelopment for the proposed building, all impacted soil on the RSC Property will be excavated and disposed off-site. Given the groundwater beneath the site is clean, once the impacted soil is removed, there will be no anticipated potential for vapour intrusion into future subsurface structures and utilities at the Phase II Property.

6.0 CONCLUSIONS

Assessment

A Phase II ESA was conducted for the northeast portion of the property addressed 70 Nicholas Street, in the City of Ottawa, Ontario. The purpose of the Phase II ESA was to address potentially contaminating activities (PCAs) that were identified during the Phase I ESA and considered to result in areas of potential environmental concern (APECs) on the Phase II Property.

The Phase II ESA was carried out in conjunction with a geotechnical investigation and consisted of the placement of four boreholes and nine test pits. All boreholes were constructed with groundwater monitoring wells. The general soil profile encountered during the field program consisted of a silty sand fill layer, over a layer of clay followed by glacial till (on the southwest corner of the site only), followed by limestone bedrock. No unusual staining or odour was noted at the time of the field program. Deleterious material identified in the fill material consists of construction debris, coal, brick, concrete and a layer of asphalt in TP7-21.

A total of 17 soil samples were submitted for laboratory analysis of Metals (including methyl mercury), Volatile Organic Compounds (VOCs), Benzene, Toluene, Ethylbenzene and Xylenes (BTEX), Petroleum Hydrocarbons (PHCs, Fractions F_1-F_4) and/or Polycyclic Aromatic Hydrocarbons (PAHs). No VOC or BTEX concentrations identified in the samples analysed. Concentrations of metals (including As, Sb, Se), Hg, PAH and/or PHC (F_3) parameters exceeding the MECP Table 3 standards were identified in soil Samples BH1-21-SS5/6, BH2-21-SS4, BH3-21-SS4/5 TP1-21-GS3, TP3-21-GS3, TP5-21-GS2 and TP6-21-GS5. Based on Hg results, MeHg was analyzed and determined to comply with the MECP Table 3 standards.

Groundwater samples from monitoring wells BH1-21, BH2-21, BH3-21 and BH4-21 were collected during the May 25, 2021 sampling event. No sheen, free product or odour was noted during the groundwater sampling event.

Groundwater samples were analyzed for Metals, BTEX, PHCs and/or PAHs. All groundwater results comply with the selected MECP Table 3 Residential Standards.

Recommendations

Soil

Based on the findings of the Phase II ESA, it is anticipated that fill material impacted with metals, mercury, PAHs and/or PHC (F_3) exceeding the MECP Table 3 standards is present across the Phase II Property at depths extending up to approximately 5.0m below grade. It is our understanding that the Phase II Property will be redeveloped with a residential multi-story building with 2 levels of underground parking.

It is recommended that an environmental site remediation program, involving the removal of all impacted fill material be completed prior to site redevelopment. Prior to off-site disposal of the impacted soil at a licenced landfill site, a leachate analysis of a representative sample of contaminated soil must be conducted in accordance with Ontario Regulation 347/558.

It is also recommended that Paterson personnel be onsite during construction activities to direct the excavation and segregation of impacted soil and to conduct additional delineation or confirmatory sampling as required.

Any clean soil that requires removal from the Phase II Property for construction purposes must be handled in accordance with Ontario Regulation 406/19: On-Site and Excess Soil Management.

Groundwater

It is recommended that the monitoring wells installed on the Phase II Property remain viable for future monitoring, if required. It is expected that groundwater monitoring wells will be abandoned in accordance with O.Reg.903 at the time of the construction excavation.

7.0 STATEMENT OF LIMITATIONS

This Phase II - Environmental Site Assessment report has been prepared under the supervision of a Qualified Person, in general accordance with O.Reg. 153/04, as amended, and meets the requirements of CSA Z769-00. The conclusions presented herein are based on information gathered from a limited sampling and testing program. The test results represent conditions at specific test locations at the time of the field program.

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 of the test holes themselves.

Should any conditions be encountered at the subject site and/or historical information that differ from our findings, we request that we be notified immediately in order to allow for a reassessment.

This report was prepared for the sole use of The Cadillac Fairview Corporation Limited. Notification from The Cadillac Fairview Corporation Limited and Paterson Group will be required to release this report to any other party.

Paterson Group Inc.

Jeremy Camposarcone, B. Eng.

Karyn Munch, P.Eng., Q.P.ESA

Report Distribution:

- ❒ The Cadillac Fairview Corporation Limited
- ❒ Paterson Group

FIGURES

FIGURE 1 – KEY PLAN

DRAWING PE5267-1 – SITE PLAN

DRAWING PE5267-2 – SURROUNDING LAND USE PLAN

DRAWING PE5267-3 – TEST HOLE LOCATION PLAN

DRAWING PE5267-4 – ANALYTICAL TESTING PLAN – SOIL (METALS)

DRAWING PE5267-4A – CROSS SECTION A-A' – SOIL (METALS)

DRAWING PE5267-4B – CROSS SECTION B-B' – SOIL (METALS)

DRAWING PE5267-5– ANALYTICAL TESTING PLAN – SOIL (VOCS AND BTEX)

DRAWING PE5267-5A – CROSS SECTION A-A' – SOIL (VOCS AND BTEX)

DRAWING PE5267-5B – CROSS SECTION B-B' – SOIL (VOCS AND BTEX)

DRAWING PE5267-6 – ANALYTICAL TESTING PLAN – SOIL (PHCS)

DRAWING PE5267-6A – CROSS SECTION A-A' – SOIL (PHCS)

DRAWING PE5267-6B – CROSS SECTION B-B' – SOIL (PHCS)

DRAWING PE5267-7 – ANALYTICAL TESTING PLAN – SOIL (PAHS)

DRAWING PE5267-7A – CROSS SECTION A-A' – SOIL (PAHS)

DRAWING PE5267-7B – CROSS SECTION B-B' – SOIL (PAHS)

DRAWING PE5267-8 – ANALYTICAL TESTING PLAN – GROUNDWATER

DRAWING PE5267-8A – CROSS-SECTION A – A' – GROUNDWATER

DRAWING PE5267-8B – CROSS-SECTION B – B' – GROUNDWATER

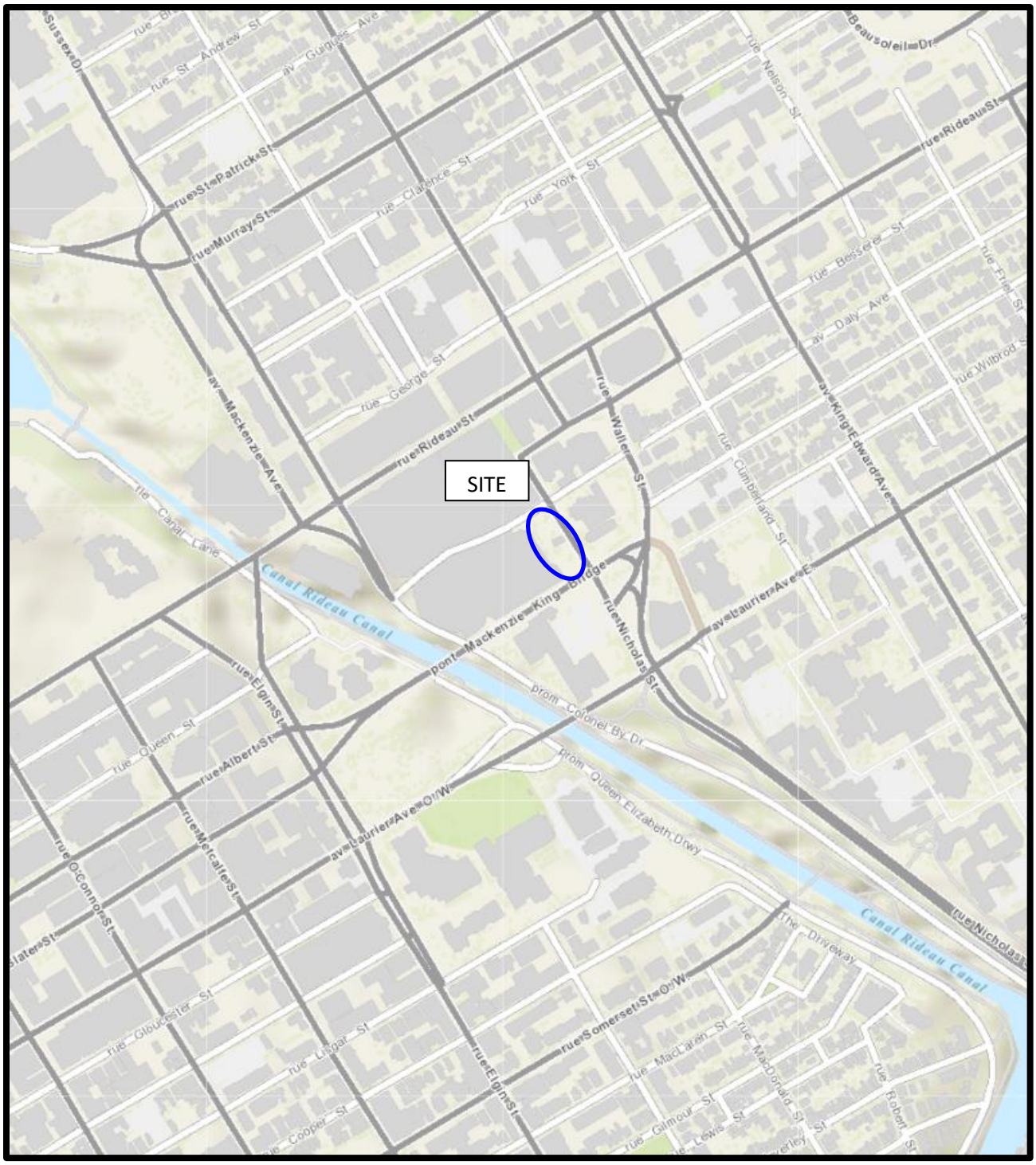
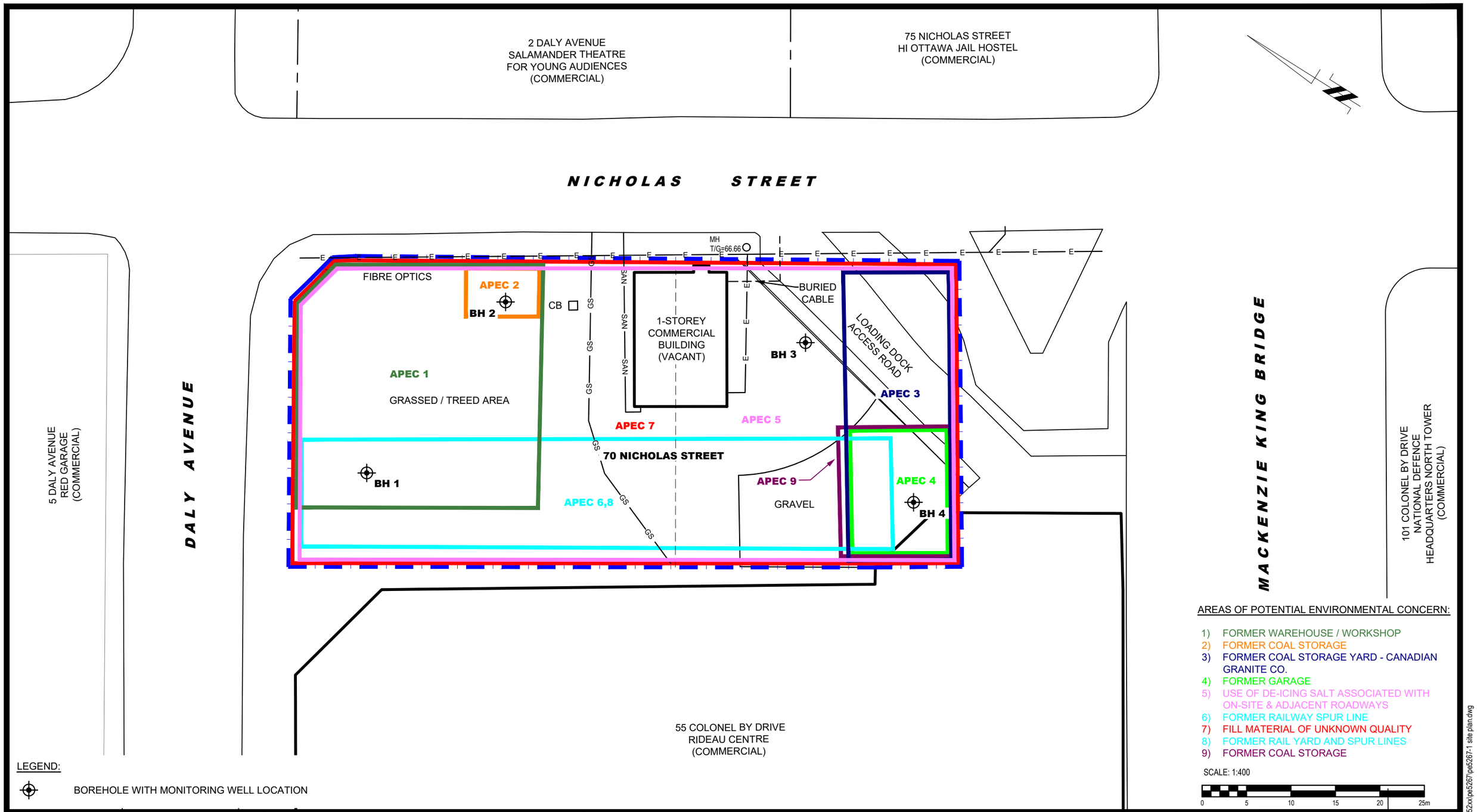


FIGURE 1

KEY PLAN



AREAS OF POTENTIAL ENVIRONMENTAL CONCERN:

1) FORMER WAREHOUSE / WORKSHOP
2) FORMER COAL STORAGE
3) FORMER COAL STORAGE YARD - CANADIAN GRANITE CO.
4) FORMER GARAGE
5) USE OF DE-ICING SALT ASSOCIATED WITH ON-SITE & ADJACENT ROADWAYS
6) FORMER RAILWAY SPUR LINE
7) FILL MATERIAL OF UNKNOWN QUALITY
8) FORMER RAIL YARD AND SPUR LINES
9) FORMER COAL STORAGE

SCALE: 1:400

0 5 10 15 20 25m

LEGEND:

BOREHOLE WITH MONITORING WELL LOCATION

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NO.	REVISIONS	DATE	INITIAL

THE CADILLAC FAIRVIEW CORPORATION LIMITED

PHASE I - ENVIRONMENTAL SITE ASSESSMENT
70 NICHOLAS STREET

OTTAWA, ONTARIO

Title:

SITE PLAN

Scale: 1:400	Date: 08/2021
Drawn by: YA	Report No.: PE5267-1
Checked by: JC	Dwg. No.: PE5267-1
Approved by: KM	Revision No.:

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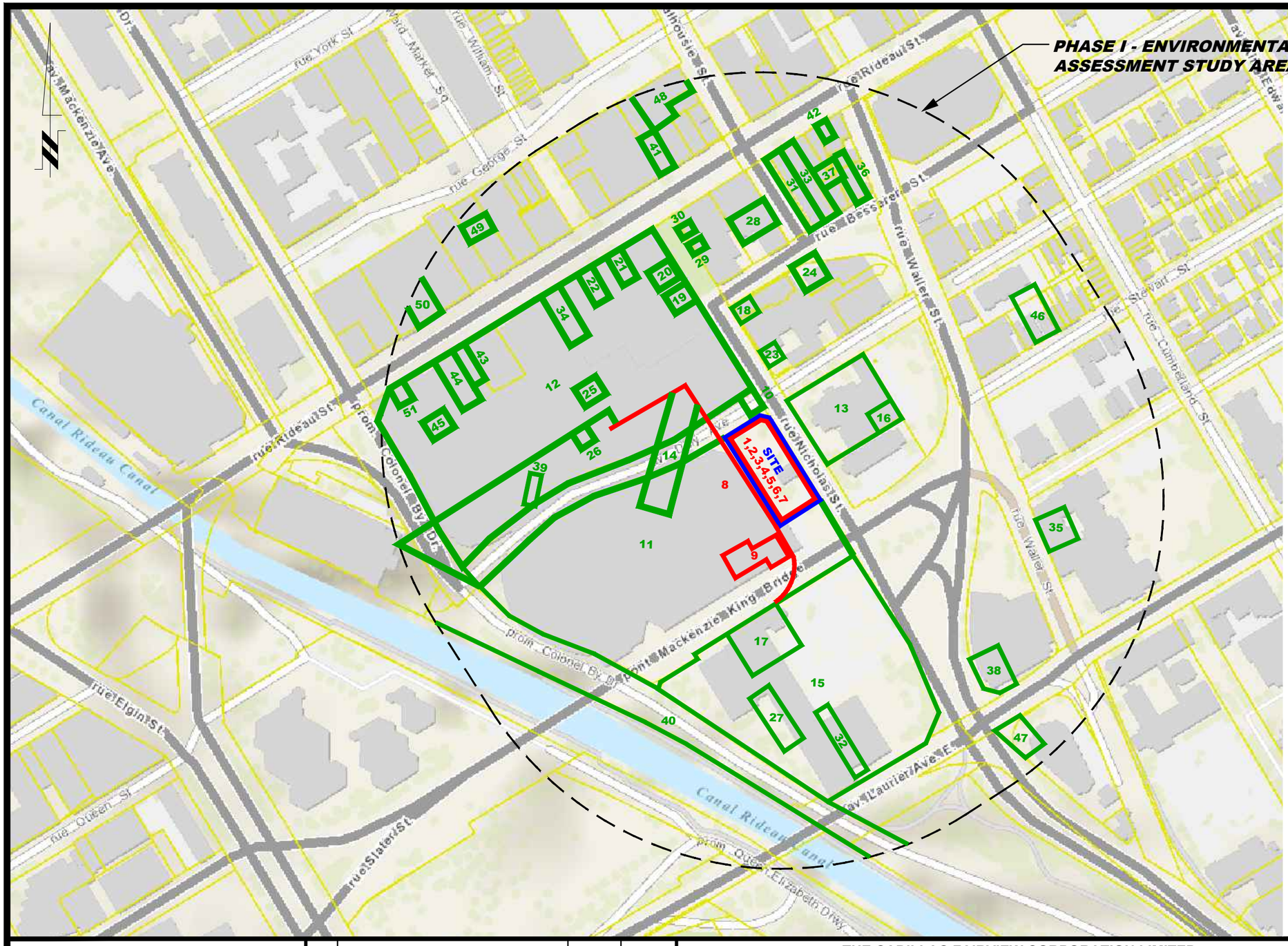

POTENTIALLY CONTAMINATING ACTIVITIES:

1) ON-SITE- FORMER WAREHOUSE / WORKSHOP
2) ON-SITE- FORMER COAL STORAGE
3) ON-SITE- FORMER COAL STORAGE YARD - CANADIAN GRANITE CO.
4) ON-SITE- FORMER GARAGE
5) ON-SITE- USE OF DE-ICING SALT ASSOCIATED WITH ON-SITE & ADJACENT ROADWAYS.
6) ON-SITE- FORMER RAILWAY SPUR LINE
7) ON-SITE- FILL MATERIAL OF UNKNOWN QUALITY
8) 55 COLONEL BY DRIVE- FORMER RAIL YARD AND SPUR LINES
9) PART OF 55 COLONEL BY DRIVE- FORMER COAL STORAGE
10) DALY AVENUE- FORMER OIL STORAGE
11) 55 COLONEL BY DRIVE- EXISTING RETAIL MALL (VARIOUS ASSOCIATED WASTE GENERATOR RECORDS
12) 50 RIDEAU STREET- EXISTING RETAIL MALL (VARIOUS ASSOCIATED WASTE GENERATOR RECORDS AND SEVERAL SPILL RECORDS)
13) 2 DALY STREET- EXISTING BOOK PUBLISHER AND SPILL RECORDS
14) FORMER COAL STORAGE- 2 DALY AVENUE
15) 101 COLONEL BY DRIVE- EXISTING DEPARTMENT OF NATIONAL DEFENCE HEADQUARTERS (VARIOUS ASSOCIATED WASTE GENERATOR RECORDS AND SEVERAL SPILL RECORDS)
16) 2 DALY AVENUE- FORMER COAL STORAGE
17) 101 COLONEL BY DRIVE- FORMER INDUSTRIAL FACILITY (CANADIAN GRANITE CO.)
18) 25 NICHOLAS STREET- FORMER CLEANERS
19) 10 RIDEAU STREET- FORMER PAINT AND OIL STORAGE
20) 10 RIDEAU STREET- FORMER CLEANERS
21) 10 RIDEAU STREET- FORMER INDUSTRIAL FACILITY (FURRIER)
22) 10 RIDEAU STREET- FORMER CLEANERS
23) 33 NICHOLAS STREET- FORMER COAL STORAGE
24) 130 BESSERER STREET- FORMER PAINT STORAGE
25) 10 RIDEAU STREET- FORMER MACHINE SHOP
26) 10 RIDEAU STREET- FORMER PRINTERS
27) 101 COLONEL BY DRIVE- FORMER COAL STORAGE
28) 156 RIDEAU STREET- EXISTING PRINTERS
29) 1 NICHOLAS STREET- FORMER CLEANERS AND COAL STORAGE
30) 1 NICOLAS STREET- FORMER BOOK PUBLISHER
31) 168 RIDEAU STREET- FORMER CLEANERS
32) 101 COLONEL BY DRIVE- FORMER BOAT MANUFACTURER
33) 172 RIDEAU STREET- FORMER AUTOMOTIVE SERVICE GARAGE
34) 101 RIDEAU STREET- FORMER HARNESS AND TRUNK MANUFACTURER
35) 550 CUMBERLAND STREET- FORMER MACHINE SHOP
36) 147 BESSERER STREET- FORMER PAINT STORAGE
37) 143 BESSERER WEST STREET- FORMER PAINT STORAGE
38) 55 LAURIER AVENUE EAST- FORMER RETAIL FUEL OUTLET WITH 3 UNDERGROUND STORAGE TANKS
39) 10 RIDEAU STREET- FORMER OIL STORE
40) COLONEL BY DRIVE- FORMER RAILWAY SPUR LINES
41) 139 RIDEAU STREET- FORMER PAINT STORAGE
42) 184 RIDEAU STREET- FORMER CLEANERS
43) 10 RIDEAU STREET- FORMER INDUSTRIAL FACILITY (FURRIER)
44) 10 RIDEAU STREET- FORMER INDUSTRIAL FACILITY (PAINT STORAGE)
45) 10 RIDEAU STREET- FORMER MACHINE SHOP
46) 15 STEWART STREET- FORMER INDUSTRIAL FACILITY (BLACKSMITH AND PAINT STORAGE)
47) 50 LAURIER AVENUE EAST- FORMER RETAIL FUEL OUTLET WITH 2 UNDERGROUND STORAGE TANKS
48) 366 DALHOUSIE STREET- FORMER PRINTERS
49) 87 RIDEAU STREET- FORMER PRINTERS
50) 73 RIDEAU STREET- FORMER FURRIER
51) 10 RIDEAU STREET- FORMER INDUSTRIAL FACILITY (JEWELRY MANUFACTURING)

SCALE: 1:3000

0 25 50 75 100 125 150 200m

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NO.	REVISIONS	DATE	INITIAL

THE CADILLAC FAIRVIEW CORPORATION LIMITED

PHASE I - ENVIRONMENTAL SITE ASSESSMENT
70 NICHOLAS STREET

OTTAWA, ONTARIO

Title:

SURROUNDING LAND USE PLAN

Scale: 1:3000	Date: 08/2021
Drawn by: YA	Report No.: PE5267-1
Checked by: JC	Dwg. No.: PE5267-2
Approved by: KM	Revision No.:

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Geotechnical Engineering

Environmental Engineering

Hydrogeology

Geological Engineering

Materials Testing

Building Science

patersongroup

Phase II - Environmental Site Assessment

70 Nicholas Street
Ottawa, Ontario

Prepared For

The Cadillac Fairview Corporation Limited

November 9, 2021

Report: PE5267-2

Paterson Group Inc.

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EXECUTIVE SUMMARY

Assessment

A Phase II ESA was conducted for the northeast portion of the property addressed 70 Nicholas Street, in the City of Ottawa, Ontario. The purpose of the Phase II ESA was to address potentially contaminating activities (PCAs) that were identified during the Phase I ESA and considered to result in areas of potential environmental concern (APECs) on the Phase II Property.

The Phase II ESA was carried out in conjunction with a geotechnical investigation and consisted of the placement of four boreholes and nine test pits. All boreholes were constructed with groundwater monitoring wells. The general soil profile encountered during the field program consisted of a silty sand fill layer, over a layer of clay followed by glacial till (on the southwest corner of the site only), followed by limestone bedrock. No unusual staining or odour was noted at the time of the field program. Deleterious material identified in the fill material consists of construction debris, coal, brick, concrete and a layer of asphalt in TP7-21.

A total of 17 soil samples were submitted for laboratory analysis of Metals (including methyl mercury), Volatile Organic Compounds (VOCs), Benzene, Toluene, Ethylbenzene and Xylenes (BTEX), Petroleum Hydrocarbons (PHCs, Fractions F_1-F_4) and/or Polycyclic Aromatic Hydrocarbons (PAHs). No VOC or BTEX concentrations identified in the samples analysed. Concentrations of metals (including As, Sb, Se), Hg, PAH and/or PHC (F_3) parameters exceeding the MECP Table 3 standards were identified in soil Samples BH1-21-SS5/6, BH2-21-SS4, BH3-21-SS4/5 TP1-21-GS3, TP3-21-GS3, TP5-21-GS2 and TP6-21-GS5. Based on Hg results, MeHg was analyzed and determined to comply with the MECP Table 3 standards.

Groundwater samples from monitoring wells BH1-21, BH2-21, BH3-21 and BH4-21 were collected during the May 25, 2021 sampling event. No sheen, free product or odour was noted during the groundwater sampling event.

Groundwater samples were analyzed for Metals, BTEX, PHCs and/or PAHs. All groundwater results comply with the selected MECP Table 3 Residential Standards.

Recommendations

Soil

Based on the findings of the Phase II ESA, it is anticipated that fill material impacted with metals, mercury, PAHs and/or PHC (F_3) exceeding the MECP Table 3 standards is present across the Phase II Property at depths extending up to approximately 5.0m

below grade. It is our understanding that the Phase II Property will be redeveloped with a residential multi-story building with 2 levels of underground parking.

It is recommended that an environmental site remediation program, involving the removal of all impacted fill material be completed prior to site redevelopment. Prior to off-site disposal of the impacted soil at a licenced landfill site, a leachate analysis of a representative sample of contaminated soil must be conducted in accordance with Ontario Regulation 347/558.

It is also recommended that Paterson personnel be onsite during construction activities to direct the excavation and segregation of impacted soil and to conduct additional delineation or confirmatory sampling as required.

Any clean soil that requires removal from the Phase II Property for construction purposes must be handled in accordance with Ontario Regulation 406/19: On-Site and Excess Soil Management.

Groundwater

It is recommended that the monitoring wells installed on the Phase II Property remain viable for future monitoring, if required. It is expected that groundwater monitoring wells will be abandoned in accordance with O.Reg.903 at the time of the construction excavation.

1.0 INTRODUCTION

At the request of The Cadillac Fairview Corporation Limited, Paterson Group (Paterson) conducted a Phase II Environmental Site Assessment for the northeast portion of the property addressed 70 Nicholas Street, in the City of Ottawa, Ontario. The purpose of this Phase II ESA is to address areas of potential environmental concern (APECs) identified on the Phase II Property during the Phase I ESA conducted by Paterson in June of 2021.

1.1 Site Description

Address:	70 Nicholas Street, Ottawa, Ontario
Location:	The Phase II Property is located on the west side of Nicholas Street between Daly Avenue and the Mackenzie King Bridge, in the City of Ottawa. The Phase I Property is shown on Figure 1 - Key Plan following the body of this report.
Latitude and Longitude:	45° 25' 30" N, 75° 41' 22" W

Site Description:

Configuration:	Irregular
Site Area:	0.27 ha (approximate)
Zoning:	Mixed Use Downtown Zone

1.2 Property Ownership

Paterson was engaged to conduct this Phase I ESA by Mr. Aaron Cameron of The Cadillac Fairview Corporation Limited. Mr. Cameron can be reached by telephone at 416-566-9200.

1.3 Current and Proposed Future Uses

The Phase II Property is currently occupied by a vacant building. It is our understanding that the Phase II Property redevelopment will consist of a residential high rise building with two underground parking levels. Associated access lanes, walkways and hardscaped areas are also anticipated as part of the development. It is expected that the proposed buildings will be municipally serviced.

1.4 Applicable Site Condition Standard

The site condition standards for the 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), April 2011. The MECP selected Table 3 Standards are based on the following considerations:

- ❒ Coarse-grained soil conditions
- ❒ Full depth generic site conditions
- ❒ Non-potable groundwater conditions
- ❒ Residential land use

Section 35 of O.Reg. 153/04 does apply to the Phase II Property in that the property relies upon municipal drinking water.

Section 41 of O.Reg. 153/04 does not apply to the Phase II Property, as the property is not within 30m of an environmentally sensitive area and the pH of the soil at the property is between 5 and 9 for surface soil and between 5 and 11 for sub-surface soil.

Section 43.1 of O.Reg. 153/04 does not apply to the Phase II Property in that the property is not a Shallow Soil property and the property is not within 30m of a water body.

The intended use of the Phase II Property is residential; therefore, the Residential Standards have been selected for the purpose of this Phase II ESA.

2.0 BACKGROUND INFORMATION

2.1 Physical Setting

The Phase II Property is located on the west side of Nicholas Street, between Daly Avenue and the Mackenzie King Bridge, in the City of Ottawa, Ontario. The Phase II Property is situated in a mixed-use downtown zone consisting of primarily commercial with some residential land use. The setting of the Phase II Property is shown on Drawing PE5267-2 – Surrounding Land Use Plan.

At the time of the Phase II ESA, the Phase II Property was occupied by a vacant building on the east-central portion. The building was constructed circa 1878 with a stone foundation and consists of one storey with a small basement crawl space.

The remainder of the Phase II Property consists of an access road to a (off-site) truck loading area across the southeast portion and vacant grassed/treed land on the remaining areas.

Site topography slopes down to the east, in the direction of Nicholas Street. The regional topography in the general area of the Phase II Property slopes downward to the north-northwest, towards the Ottawa River. Site drainage consists primarily of infiltration and surface runoff to catch basins on site and along adjacent roadways. Multiple underground utilities were identified on the Phase I Property including electrical, gas, water, sewer and telecommunication lines.

2.2 Past Investigations

Paterson completed a Phase I ESA in June of 2021 for the Phase II Property. Based on the findings of the Phase I ESA, several on and off-site PCAs were considered to result in APECs on the Phase II Property as shown in Table 1.

Table 1
Areas of Potential Environmental Concern

Area of Potential Environmental Concern	Location of Area of Potential Environmental Concern with respect to Phase I Property	Potentially Contaminating Activity	Location of PCA (on-site or off-site)	Contaminants of Potential Concern	Media Potentially Impacted (Groundwater, Soil, and/or Sediment)
APEC 1 (former warehouse / workshop)	Northern portion of the Phase I Property	Other – associated with the former warehouse and workshop	On-site	BTEX PHCs (F_1-F_4)	Soil Groundwater
APEC 2 (former coal storage)	Northeast portion of the Phase I Property	Other – former coal storage	On-site	Metals As, Sb, Se Hg, CrVI PAH	Soil Groundwater
APEC 3 (former coal storage – Canadian Granite Co.)	Northeast portion of the Phase I Property	Other – former coal storage	On-site	Metals As, Sb, Se Hg, CrVI PAH	Soil Groundwater

Table 1 Continued
Areas of Potential Environmental Concern

Area of Potential Environmental Concern	Location of Area of Potential Environmental Concern with respect to Phase I Property	Potentially Contaminating Activity	Location of PCA (on-site or off-site)	Contaminants of Potential Concern	Media Potentially Impacted (Groundwater, Soil, and/or Sediment)
APEC 4 (former garage)	Southwest portion of the Phase I Property	PCA 52 - Storage, maintenance, fuelling and repair of equipment, vehicles and material used to maintain transportation systems	On-site	BTEX PHCs (F_1-F_4) VOCs	Soil Groundwater
APEC 5[1] (use of de-icing salt associated with on-site and adjacent roadways)	South portion of the Phase I Property	Other - use of salt for de-icing purposes	On-site	EC SAR	Soil
APEC 6 (former railway spur line)	Western portion of the Phase I Property	PCA 46 – Rail Yards, Tracks and Spurs	On-site	Metals As, Sb, Se Hg, CrVI PAH PHCs (F_1-F_4)	Soil Groundwater
APEC 7 (fill material of unknown quality)	Potentially across the Phase I Property	PCA 30 - Importation of Fill Material of Unknown Quality	On-site	Metals As, Sb, Se Hg, CrVI PAHs PHCs (F_1-F_4)	Soil (Fill Material)
APEC 8 (former rail yard and rail lines)	West portion of the Phase I Property	PCA 46 – Rail Yards, Tracks and Spurs	Off-site	Metals As, Sb, Se Hg, CrVI PAH PHCs (F_1-F_4)	Groundwater
APEC 9 (former coal storage)	West portion of the Phase I Property	Other – former coal storage	Off-site	Metals As, Sb, Se Hg, CrVI PAH	Groundwater

Notes:
1 – In accordance with Section 49.1 of Ontario Regulation 153/04 standards are deemed to be met if an applicable site condition standard is exceeded at a property solely because the qualified person has determined, based on a phase two environmental site assessment, that a substance has been applied to surfaces for the safety of vehicular or pedestrian traffic under conditions of snow or ice or both. As further discussed in the Phase II CSM, the exemption outlined in Section 49.1 is being relied upon with respect to the RSC Property.

The rationale for identifying the above PCAs is based on fire insurance plans, city directories, aerial photographs, field observations, and personal interviews. A Phase II ESA was recommended to address the aforementioned APECs.

3.0 SCOPE OF INVESTIGATION

3.1 Overview of Site Investigation

The subsurface investigation was conducted during the interim of May 14 through May 17, 2021 and June 15, 2021, in conjunction with a Geotechnical Investigation. The field program consisted of drilling four boreholes to address the APECs identified on the Phase II Property. All four of the boreholes (BH1-21 through BH4-21) were instrumented with groundwater monitoring wells. Boreholes were drilled to a maximum depth of 10.62 m below the ground surface (mbgs).

Additionally, nine test pits were placed across the Phase I Property to assess the quality of the fill material.

3.2 Media Investigated

During the subsurface investigation, soil samples and groundwater samples were obtained and submitted for laboratory analysis. The rationale for sampling and analyzing these media is based on the Contaminants of Potential Concern identified in the Phase I ESA.

The contaminants of potential concern for the soil and groundwater on the subject site include the following:

- Metals (including Arsenic (As,), Antimony (Sb) and Selenium);
- Mercury (Hg);
- Hexavalent Chromium;
- Volatile Organic Compounds (VOCs);
- Benzene, Toluene, Ethylbenzene, and Xylenes (BTEX);
- Petroleum Hydrocarbons, fractions 1 - 4 (PHCs F_1-F_4); and
- Polycyclic Aromatic Hydrocarbons (PAHs).

3.3 Phase I Conceptual Site Model

Geological and Hydrogeological Setting

The Geological Survey of Canada website on the Urban Geology of the National Capital Area was consulted as part of this assessment. Based on this information, the bedrock in the area of the Phase I Property consists of interbedded limestone and shale of the Verulam Formation. Based on the maps, the thickness of the overburden ranges from 5 to 10 m and consists of plain till. Groundwater flow is expected to reflect regional topography and flow in a northwesterly direction toward the Ottawa River.

Buildings and Structures

The central portion of the Phase I Property is occupied by a vacant building. The building is storey and constructed with a stone foundation. A crawl space is present beneath the northwestern portion of the building. The exterior of the building is finished with brick, stone and a sloped shingle-style roof. The building was constructed circa 1878 and was most recently heated with electric baseboard heaters. No other buildings or structures are present on the Phase I Property.

Subsurface Structures and Utilities

A small basement crawl space is present beneath the northwestern portion of the building. Multiple underground utilities were identified on the Phase I Property including electrical, gas, water, sewer and telecommunication lines.

Water Bodies

No water bodies are present on the Phase I Property. The closest water body is the Rideau Canal, located approximately 200 m northwest of the Phase I Property.

Areas of Natural Significance

No areas of natural significance were identified on the Phase I Property or in the Phase I ESA Study Area.

Drinking Water Wells

No potable well records were identified for the Phase I Property or the Phase I Study Area.

Monitoring Well Records

No monitoring well records were identified on the Phase I Property. A total of 13 well records were identified for properties within the Phase I Study Area. All of the reported well records were dated between 2010 and 2018. A monitoring well record for the property addressed 2 Daly Avenue, approximately 15 m east of the Phase I Property was identified. Five monitoring well records were identified for the properties addressed 70 & 90 Waller Street, approximately 125 m northeast of the Phase I Property.

The monitoring well records identified within the Phase I Study Area are not considered to represent a concern to the Phase I Property based on their respective separation distances.

Neighbouring Land Use

Neighbouring land use in the Phase I Study Area is primarily commercial with some residential land use.

Potentially Contaminating Activities

As per section 7.1 of this report, seven PCAs were identified on the Phase I Property and pertain to a historical post office warehouse/workshop, two separate historical coal storage locations, a historical railway spur line, the use of de-icing salt (on the former roadway through the south portion of the Phase I Property and adjacent roadways), a former garage and fill material of unknown quality throughout the Phase I Property. The seven identified PCAs result in seven APECs for the Phase I Property.

Two off-site PCAs that result in APECs for the Phase I Property were identified within the Study Area. The PCAs include a historical rail yard with associated rail lines and coal storage located adjacent to the west of the Phase I Property. The remaining 42 off-site PCAs identified within the Phase I Study Area are not considered to result in APECs on the subject property due to their respective separation distances and/or cross/down gradient orientations with respect to the Phase I Property.

Areas of Potential Environmental Concern

Nine APECs were identified on the subject site, seven of which resulted from on-site activities including a historical post office warehouse/workshop, two separate historical coal storages, a historical railway spur line, the use of de-icing salt, a former garage and fill material of unknown quality throughout the Phase I

Property. The remaining two APECs are resultant of off-site activities and include a historical rail yard with associated rail lines and coal storage located adjacent to the west of the Phase I Property.

According to Section 49.1 of O.Reg. 153/04, if an applicable site condition standard is exceeded at a property solely because of the following reason, the applicable site condition standard is deemed not to be exceeded for the purpose of Part XV.1 of the Act: "The qualified person has determined, based on a phase one environmental site assessment or a phase two environmental site assessment, that a substance has been applied to surfaces for the safety of vehicular or pedestrian traffic under conditions of snow or ice or both."

In accordance with Section 49.1 of O.Reg. 153/04, any EC and SAR concentrations on the RSC Property that exceed the MECP Table 3 standards for a residential/institutional land use are deemed not to be exceeded for the purpose of Part XV.1 of the Act. This exemption is being relied on for APEC 5.

Contaminants of Potential Concern

The contaminants of potential concern (CPCs) associated with the aforementioned APECs are considered to be:

- Metals (including arsenic (As), antimony (Sb) and selenium (Se))
- Mercury (Hg)
- Hexavalent Chromium (Cr_{VI})
- Volatile Organic Compounds (VOCs)
- Benzene, Toluene, Ethylbenzene, Xylenes (BTEX)
- Petroleum Hydrocarbons (PHCs, Fractions F_1-F_4)
- Polycyclic Aromatic Hydrocarbons (PAHs)

Assessment of Uncertainty and/or Absence of Information

The information available for review as part of the preparation of this Phase I-ESA is considered to be sufficient to conclude that there are APECs on the Phase I Property which may potentially have impacted the Phase I Property. The presence of PCAs was confirmed by a variety of independent sources, and as such, the conclusions of this report are not affected by uncertainty which may be present with respect to the individual sources.

3.4 Deviations from Sampling and Analysis Plan

The Sampling and Analysis Plan for this project is included in Appendix 1 of this report.

3.5 Impediments

The depth of the test pits was impeded by large boulders and concrete in the fill material; test pits were completed on practical refusal.

4.0 INVESTIGATION METHOD

4.1 Subsurface Investigation

The subsurface investigation was completed in conjunction with a Geotechnical Investigation during the interim of May 14 through May 17, 2021 and June 15, 2021. The field program consisted of drilling four boreholes (BH1-21 through BH4-21) and excavating nine test pits (TP1-21 through TP9-21) across the Phase II Property.

The boreholes were drilled to a maximum depth of 10.62 m below ground surface (mbgs). Three of the four boreholes were cored into the bedrock and all four were completed as groundwater monitoring wells to access.

The boreholes and test pits were placed to address the aforementioned APECs presented in Table 1, and to provide coverage of the proposed building footprint for geotechnical purposes. The boreholes were drilled using a low-clearance drill rig operated by George Downing Estate Drilling of Hawkesbury, Ontario, under full-time supervision of Paterson personnel. The borehole locations are indicated on the attached Drawing PE5267-3 - Test Hole Location Plan.

4.2 Soil Sampling

A total of 24 soil samples were obtained from the boreholes by means of grab sampling from shallow auger flights and split spoon sampling. Split spoon samples were taken at approximate 0.76 m intervals. The depths at which split spoon and auger samples were obtained from the boreholes are shown as "**SS**" and "**AU**" on the Soil Profile and Test Data Sheets.

Upon refusal of the augers, boreholes BH1-21, BH2-21 and BH4-21 were advanced into bedrock using a diamond coring system. An additional 14 rock core samples were recovered and are shown as "**RC**" on the Soil Profile and Test Data Sheets.

During the test pit program, a total of 38 soil samples were obtained from the test pits by means of grab sampling. The depths at which grab samples were

obtained from the test holes are shown as "**G**" on the Soil Profile and Test Data Sheets.

The site stratigraphy generally consists of a layer of topsoil (0.1 to 0.2m thick) or engineered fill over (up to 0.5m thick) over a thick layer of fill material extending to depths up to approximately 5.0m below grade. The fill material primarily consists of brown silty sand with some clay and gravel. Fragments of concrete, brick, wood and/or coal were identified at each test hole location. A thin layer of silty clay (from 4.27 to 5.18 mbgs) followed by a silty clay glacial till (from 5.18 to 7.01 mbgs) was encountered in BH3-21 below the fill material. A layer of asphalt was encountered in TP7-21 from 0.5 to 0.6 mbgs. Limestone bedrock was encountered beneath the fill material or glacial till at BH3-21, at depths ranging from approximately 2.6 to 7.0m below grade.

Borehole and test pit locations are shown on Drawing PE5267-3 – Test Hole Location Plan.

4.3 Field Screening Measurements

Soil samples recovered at the time of sampling 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. Allowing the samples to stabilize to room temperature ensures consistency of readings between samples.

To measure the soil vapours, the analyser probe is inserted into the nominal headspace above the soil sample. A photoionization detector (PID) was used to measure the volatile organic vapour concentrations. The sample is agitated/manipulated gently as the measurement is taken. The peak reading registered within the first 15 seconds is recorded as the vapour measurement.

The organic vapour readings were generally below 20ppm and not considered to be indicative of potential contamination. A slightly elevated reading of 77.2ppm was identified for Sample BH2-21-SS2. These results were not considered to be indicative of potential significant contamination from volatile contaminants. Vapour readings are noted on the Soil Profile and Test Data Sheets in Appendix 1.

No olfactory indications of potential contamination were identified in the soil samples. Deleterious material identified in the fill material consists of construction debris, coal, brick, concrete and a layer of asphalt in TP7-21. The

results of the vapour survey are presented on the Soil Profile and Test Data sheets.

4.4 Groundwater Monitoring Well Installation

Four groundwater monitoring wells were installed on the Phase II Property as part of the subsurface investigation. The monitoring wells consisted of 32 mm diameter, Schedule 40 threaded PVC risers and screens. Monitoring well construction details are listed in Table 3 and are also presented on the Soil Profile and Test Data Sheets provided in Appendix 1.

Borehole locations and elevations were surveyed geodetically by Paterson personnel.

TABLE 3 - Monitoring Well Construction Details

Well ID	Ground Surface Elevation	Total Depth (m BGS)	Screened Interval (m BGS)	Sand Pack (m BGS)	Bentonite Seal (m BGS)	Casing Type
BH1-21	67.20	10.49	7.44-10.49	6.71-10.49	0.15-6.71	Stick-Up
BH2-21	66.14	10.62	7.57-10.62	6.10-10.62	0.15-6.10	Stick-Up
BH3-21	67.28	7.01	3.96-7.01	3.35-7.01	0.15-3.35	Stick-Up
BH4-21	66.89	10.36	7.31-10.36	6.71-10.36	0.15-6.71	Stick-Up

4.5 Field Measurement of Water Quality Parameters

Groundwater samples were collected on May 25, 2021. Water quality parameters were measured in the field using a multi-parameter analyzer. Parameters measured in the field include temperature, pH and electrical conductivity.

Field parameters were measured after each well volume purged. Wells were purged prior to sampling until at least three well volumes had been removed, the field parameters were relatively stable or the well was dry. Stabilized field parameter values are summarized in Table 4.

Table 4 - Field Measurement of Water Quality Parameters – May 25, 2021

Parameter	BH1-21	BH2-21	BH3-21	BH4-21
Temperature (°C)	22.3	20.7	20.0	21.7
pH	7.31	7.48	7.08	7.53
Electrical Conductivity (µS/cm)	1,980	2,010	2,450	2,380

4.6 Groundwater Sampling

Groundwater sampling protocols were followed using the MECP document entitled "Guidance on Sampling and Analytical Methods for Use at Contaminated Sites in Ontario", dated May 1996. Groundwater samples were obtained from each monitoring well, using dedicated sampling equipment. Standing water was purged from each well prior to sampling. Samples were stored in coolers to reduce analyte volatilization during transportation. Details of our standard operating procedure for groundwater sampling are provided in the Sampling and Analysis Plan in Appendix 1.

4.7 Analytical Testing

Based on the guidelines outlined in the Sampling and Analysis Plan appended to this report, the following soil and groundwater samples, as well as analyzed parameters are presented in Tables 5 and 6.

Table 5 - Testing Parameters for Submitted Soil Samples

Sample ID	Sample Depth & Stratigraphic Unit	Parameters Analyzed					Rationale
		Metals[1]	VOCs	BTEX	PHCs F_1-F_4	PAHs	
May 14, 2021							
BH1-21-SS3	1.52 - 2.13 m Brown Silty Sand (Fill Material)			X	X		Assess potential soil impacts resulting from the historical on-site spur line and off-site rail yard and rail tracks.
BH1-21-SS5/6	3.05 - 4.42 m Brown Silty Sand (Fill Material)	X				X	Assess potential soil impacts resulting from the historical on-site spur line and off-site rail yard and rail tracks.
May 17, 2021							
BH2-21-SS4	2.29 - 2.62 m Brown Silty Sand (Fill Material)	X				X	Assess potential soil impacts resulting from the presence of the historical on-site warehouse/workshop and coal storage.
BH3-21-SS2	0.76 – 1.37 m Brown Silty Sand (Fill Material)			X	X		Assess potential soil impacts resulting from the presence of the historical on-site garage and coal storage yard and the off-site coal storage.

Table 5 Continued - Testing Parameters for Submitted Soil Samples

Sample ID	Sample Depth & Stratigraphic Unit	Parameters Analyzed					Rationale
		Metals[1]	VOCs	BTEX	PHCs F_1-F_4	PAHs	
BH3-21-SS4/5	2.29 – 3.66 m Brown Silty Sand (Fill Material)	X				X	Assess potential soil impacts resulting from the presence of the historical on-site garage and coal storage yard and the off-site coal storage.
BH4-21-SS2	0.76 – 1.37 m Brown Silty Sand (Fill Material)	X				X	Assess potential soil impacts resulting from the presence of fill material.
DUP	2.29 – 3.66 m Brown Silty Sand (Fill Material)	X				X	Duplicate soil sample (BH3-21-SS4/5) for QA/QC purposes
June 25, 2021							
TP1-21-GS3	1.7 – 1.9 m Brown Silty Sand (Fill Material)		X		X		Delineation of previously identified impacts and further assessment of the fill material
TP1-21-GS4	2.3 – 2.5 m Brown Silty Sand (Fill Material)	X[2]					Delineation of previously identified impacts and further assessment of the fill material
TP2-21-GS4	1.7 – 1.9 m Brown Silty Sand (Fill Material)	X		X	X	X	Delineation of previously identified impacts and further assessment of the fill material
TP3-21-GS3	0.5 – 0.7 m Brown Silty Sand (Fill Material)	X				X	Delineation of previously identified impacts and further assessment of the fill material
TP4-21-GS2	0.7 – 0.8 m Brown Silty Sand (Fill Material)	X					Delineation of previously identified impacts and further assessment of the fill material
TP5-21-GS2	1.7 – 1.9 m Brown Silty Sand (Fill Material)					X	Delineation of previously identified impacts and further assessment of the fill material
TP6-21-GS5	1.7 – 1.9 m Brown Silty Sand (Fill Material)	X				X	Delineation of previously identified impacts and further assessment of the fill material
TP6-21-GS6	1.7 – 1.9 m Brown Silty Sand (Fill Material)	X[2]					Delineation of previously identified impacts and further assessment of the fill material
TP7-21-GS6	2.7 – 3.0 m Brown Silty Sand (Fill Material)	X[2]					Delineation of previously identified impacts and further assessment of the fill material

Table 5 Continued - Testing Parameters for Submitted Soil Samples							
TP8-21-GS5	2.5-2.7 Brown Silty Sand (Fill Material)	X[2]					Delineation of previously identified impacts and further assessment of the fill material
DUP3	1.7 – 1.9 m Brown Silty Sand (Fill Material)					X	Duplicate soil sample (TP3-21-GS3) for QA/QC purposes
DUP4	1.7 – 1.9 m Brown Silty Sand (Fill Material)	X					Duplicate soil sample (TP4-21-GS2) for QA/QC purposes

Notes:
- 1 – including As, Sb, Se, Hg and CrVI
- 2 – tested specifically for methyl mercury

TABLE 6 - Testing Parameters for Submitted Groundwater Samples						
Sample ID	**Screened Interval**	**Parameters Analyzed**				**Rationale**
		Metals[1]	**BTEX**	**PHCs F_1-F_4**	**PAHs**	
May 25, 2021						
MW1-21-GW1	7.44 - 10.49m Bedrock	X			X	Assess potential groundwater impacts resulting from the historical on-site spur line and off-site rail yard and rail tracks.
MW2-21-GW1	7.57 - 10.62m Bedrock	X			X	Assess potential groundwater impacts resulting from the historical on-site warehouse/workshop and coal storage.
MW3-21-GW1	3.96 - 7.01m Glacial Till	X	X	X		Assess potential groundwater impacts resulting from the historical on-site garage and coal storage yard and the off-site coal storage..
MW4-21-GW1	7.31 - 10.36m Bedrock				X	Assess potential groundwater impacts resulting from the historical on-site roadway.
DUP1	7.31 - 10.36m Bedrock				X	Duplicate groundwater sample (MW4-21-GW1) for QA/QC purposes.
DUP2	7.57 - 10.62m Bedrock	X				Duplicate groundwater sample (MW2-21-GW1) for QA/QC purposes.

Notes:
- 1 – including Hg and Cr_{VI}

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). Paracel is accredited and certified by SCC/CALA for specific tests registered with the association.

4.8 Residue Management

All soil cuttings, purge water and fluids from equipment cleaning were retained on-site.

4.9 Elevation Surveying

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

4.10 Quality Assurance and Quality Control Measures

A summary of quality assurance and quality control (QA/QC) measures, including sampling containers, preservation, labelling, handling, and custody, equipment cleaning procedures, and field quality control measurements is provided in the Sampling and Analysis Plan in Appendix 1.

5.0 REVIEW AND EVALUATION

5.1 Geology

Site soils consist of a layer of topsoil (0.1 to 0.2m thick) or engineered fill over (up to 0.5m thick) a thick layer of fill material extending to depths up to approximately 5.0m below grade. The fill material primarily consists of brown silty sand with some clay and gravel. Fragments of concrete, brick, wood and/or coal were identified at each test hole location. A thin layer of silty clay (from 4.27 to 5.18 mbgs) followed by a silty clay glacial till (from 5.18 to 7.01 mbgs) was encountered in BH3-21 below the fill material. A layer of asphalt was encountered in TP7-21 from 0.5 to 0.6 mbgs. Limestone bedrock was encountered beneath the fill material or glacial till at BH3-21, at depths ranging from approximately 2.6 to 7.0m below grade. Groundwater was encountered within the bedrock at depths ranging from approximately 5.64 to 9.00 m below ground surface and within the overburden in BH3-21 at a depth of approximately 5.60m below ground surface.

Site geology details are provided in the Soil Profile and Test Data Sheets provided in Appendix 1.

5.2 Groundwater Elevations, Flow Direction, and Hydraulic Gradient

Groundwater levels were measured during the groundwater sampling event on May 25, 2021 using an electronic water level meter. Groundwater levels are summarized in Table 7.

TABLE 7 - Groundwater Level Measurements

Borehole Location	Ground Surface Elevation (m)	Water Level Depth (m below grade)	Water Level Elevation (m ASL)	Date of Measurement
BH1-21	67.20	9.00	58.20	May 25, 2021
BH2-21	66.14	6.86	59.28	May 25, 2021
BH3-21	67.28	5.60	61.68	May 25, 2021
BH4-21	66.89	5.64	61.24	May 25, 2021

Based on the groundwater elevations measured during the sampling event, groundwater contour mapping was completed. Groundwater contours are shown on Drawing PE5267-3 – Test Hole Location Plan. Based on the contour mapping, groundwater flow at the Phase II Property is in a northwestern direction. A horizontal hydraulic gradient of approximately 0.06 m/m was calculated.

It should be noted that groundwater levels are expected to fluctuate throughout the year with seasonal variations.

5.3 Fine-Coarse Soil Texture

Grain-size analysis was not completed as part of this investigation. Coarse-grained soil standards were chosen based on the nature of the recovered soil samples.

5.4 Soil: Field Screening

The organic vapour readings were generally below 20ppm and not considered to be indicative of potential contamination. A slightly elevated reading of 77.2ppm was identified for Sample BH2-21-SS2. No olfactory indications of potential contamination were identified in the soil samples. Deleterious material identified in the fill material consists of construction debris, coal, brick, concrete and a layer of asphalt in TP7-21. The results of the vapour survey are presented on the Soil Profile and Test Data sheets.

The field screening results of each individual soil sample are provided on the Soil Profile and Test Data Sheets appended to this report.

5.5 Soil Quality

Based on the findings of the field screening in combination with sample depth and location, seven soil samples (including one duplicate) were submitted for analysis of metals (including As, Sb and Se), Hg, MeHg, CrVI, BTEX, PHC (F1-F4) and/or PAHs. The results of the analytical testing are presented in Tables 8 to 12. The laboratory certificate of analysis is provided in Appendix 1.

TABLE 8 - Analytical Test Results – Soil
Metals

Parameter	MDL (µg/g)	Soil Samples (µg/g)					MECP Table 3 Residential Standards (µg/g)
		May 14, 2021	May 17, 2021				
		BH1-21-SS5/6	BH2-21-SS4	BH3-21-SS4/5	BH4-21-SS2	DUP[1]	
Antimony	1.0	2.0	1.5	nd	nd	nd	7.5
Arsenic	1.0	4.5	7.4	6.2	2.7	5.2	18
Barium	1.0	**584**	159	150	106	132	390
Beryllium	0.5	nd	nd	0.5	nd	0.5	4
Boron	5.0	19.0	8.8	8.4	5.5	6.8	120
Cadmium	0.5	nd	0.8	nd	nd	nd	1.2
Chromium	5.0	22.6	24.1	25.7	16.0	24.2	160
Chromium (VI)	0.2	nd	nd	nd	nd	nd	8
Cobalt	1.0	5.2	6.0	5.7	5.4	5.2	22
Copper	5.0	17.3	43.2	16.3	20.9	15.9	140
Lead	1.0	61.9	**212**	72.4	21.8	78.1	120
Mercury	0.1	0.2	**1.3**	**0.5**	nd	**0.4**	0.27
Molybdenum	1.0	2.4	1.2	1.2	nd	1.0	6.9
Nickel	5.0	11.6	14.8	16.3	9.6	15.3	100
Selenium	1.0	nd	nd	nd	nd	nd	2.4
Silver	0.3	nd	0.3	nd	nd	nd	20
Thallium	1.0	nd	nd	nd	nd	nd	1
Uranium	1.0	nd	nd	nd	nd	nd	23
Vanadium	10.0	28.7	25.6	31.4	17.7	30.3	86
Zinc	20.0	261	271	67.4	103	69.3	340

Notes:
- MDL – Method Detection Limit
- nd – not detected above the MDL
- **Bold and underlined –** Results exceed selected MECP standard
- 1 – Duplicate of sample BH3-21-SS4/5

TABLE 8 Continued - Analytical Test Results – Soil
Metals

Parameter	MDL (µg/g)	Soil Samples (µg/g)					MECP Table 3 Residential Standards (µg/g)
		June 15, 2021					
		TP2-21-GS4	TP3-21-GS3	TP4-21-GS2	TP6-21-GS5	DUP4[2]	
Antimony	1.0	nd	2.1	nd	2.0	nd	7.5
Arsenic	1.0	3.2	**22.3**	3.9	5.0	3.2	18
Barium	1.0	190	181	149	90.9	121	390
Beryllium	0.5	nd	0.7	nd	nd	nd	4
Boron	5.0	8.7	6.9	7.1	9.3	5.5	120
Cadmium	0.5	nd	**3.1**	nd	nd	nd	1.2
Chromium	5.0	17.6	20.6	15.1	18.6	12.7	160
Chromium (VI)	0.2	nd	nd	nd	nd	nd	8
Cobalt	1.0	4.9	7.4	4.9	5.2	4.3	22
Copper	5.0	11.4	51.5	11.3	25.8	10.5	140
Lead	1.0	11.1	**270**	17.8	**136**	17.8	120
Mercury	0.1	nd	**1.0**	0.1	0.2	0.1	0.27
Molybdenum	1.0	nd	2.3	nd	2.3	nd	6.9
Nickel	5.0	12.4	17.8	10.9	12.8	9.7	100
Selenium	1.0	nd	**4.3**	nd	nd	nd	2.4
Silver	0.3	nd	nd	nd	nd	nd	20
Thallium	1.0	nd	nd	nd	nd	nd	1
Uranium	1.0	nd	nd	nd	nd	nd	23
Vanadium	10.0	20.1	26.4	22.5	24.3	18.0	86
Zinc	20.0	27.2	**1680**	48.6	161	47.7	340

Notes:
- MDL – Method Detection Limit
- nd – not detected above the MDL
- **Bold and underlined –** Results exceed selected MECP standard
- 2 – Duplicate of sample TP4-21-GS2

TABLE 9 - Analytical Test Results – Soil
Methyl Mercury

Parameter	MDL (µg/g)	Soil Samples (µg/g)			MECP Table 3 Residential Standards (µg/g)
		June 15, 2021			
		TP1-21-GS4	TP7-21-GS6	TP8-21-GS5	
Methyl Mercury	0.000050	nd	0.000176	0.000092	0.0084

Notes:
- MDL – Method Detection Limit
- nd – not detected above the MDL

Arsenic, barium, cadmium, lead, mercury, selenium and/or zinc concentrations in Samples BH1-21-SS5/6, BH2-21-SS4, BH3-21-SS4/5, TP3-21-GS3 and TP6-21-GS5 exceed the MECP Table 3 Standards. The remaining metal concentrations in the soil samples analysed are in compliance with the selected MECP Table 3 standards. The analytical results for metals tested in soil are shown on Drawing PE5267-4 – Analytical Testing Plan – Soil (Metals).

TABLE 10 - Analytical Test Results – Soil
VOCs

Parameter	MDL (µg/g)	Soil Sample (µg/g) June 15, 2021 TP1-21-GS3	MECP Table 3 Residential Standards (µg/g)
Acetone	0.50	nd	16
Benzene	0.02	nd	0.21
Bromodichloromethane	0.05	nd	13
Bromoform	0.05	nd	0.27
Bromomethane	0.05	nd	0.05
Carbon Tetrachloride	0.05	nd	0.05
Chlorobenzene	0.05	nd	2.4
Chloroform	0.05	nd	0.05
Dibromochloromethane	0.05	nd	9.4
Dichlorodifluoromethane	0.05	nd	16
1,2-Dichlorobenzene	0.05	nd	3.4
1,3-Dichlorobenzene	0.05	nd	4.8
1,4-Dichlorobenzene	0.05	nd	0.083
1,1-Dichloroethane	0.05	nd	3.5
1,2-Dichloroethane	0.05	nd	0.05
1,1-Dichloroethylene	0.05	nd	0.05
cis-1,2-Dichloroethylene	0.05	nd	3.4
trans-1,2-Dichloroethylene	0.05	nd	0.084
1,2-Dichloropropane	0.05	nd	0.05
1,3-Dichloropropene, total	0.05	nd	0.05
Ethylbenzene	0.05	nd	2
Ethylene dibromide (dibromoethane, 1,2-)	0.05	nd	0.05
Hexane	0.05	nd	2.8
Methyl Ethyl Ketone (2-Butanone)	0.50	nd	16
Methyl Isobutyl Ketone	0.50	nd	1.7
Methyl tert-butyl ether	0.05	nd	0.75
Methylene Chloride	0.05	nd	0.1
Styrene	0.05	nd	0.7
1,1,1,2-Tetrachloroethane	0.05	nd	0.058
1,1,2,2-Tetrachloroethane	0.05	nd	0.05
Tetrachloroethylene	0.05	nd	0.28
Toluene	0.05	nd	2.3
1,1,1-Trichloroethane	0.05	nd	0.38
1,1,2-Trichloroethane	0.05	nd	0.05
Trichloroethylene	0.05	nd	0.061
Trichlorofluoromethane	0.05	nd	4
Vinyl Chloride	0.02	nd	0.02
Xylenes, total	0.05	nd	3.1

Notes:
- MDL – Method Detection Limit
- nd – not detected above the MDL

No VOC parameters were detected in the soil sample analyzed. The results are in compliance with the selected MECP Table 3 standards. The analytical results for VOCs tested in soil are shown on Drawing PE5267-5 – Analytical Testing Plan – Soil (VOCs and BTEX).

TABLE 11 - Analytical Test Results – Soil
BTEX

Parameter	MDL (µg/g)	Soil Samples (µg/g)			MECP Table 3 Residential Standards (µg/g)
		May 14, 2021	May 17, 2021	June 15, 2021	
		BH1-21-SS3	BH3-21-SS2	TP2-21-GS4	
Benzene	0.02	nd	nd	nd	0.21
Toluene	0.05	nd	nd	nd	2
Ethylbenzene	0.05	nd	nd	nd	2.3
Xylenes	0.05	nd	nd	nd	3.1

Notes:
- MDL – Method Detection Limit
- nd – not detected above the MDL

No BTEX parameters were detected in the soil samples analyzed. The results are in compliance with the selected MECP Table 3 standards. The analytical results for BTEX tested in soil are shown on Drawing PE5267-5 – Analytical Testing Plan – Soil (VOCs and BTEX).

TABLE 12 - Analytical Test Results – Soil
PHCs F_1-F_4

Parameter	MDL (µg/g)	Soil Samples (µg/g)				MECP Table 3 Residential Standards (µg/g)
		May 14, 2021	May 17, 2021	June 15, 2021		
		BH1-21-SS3	BH3-21-SS2	TP1-21-GS3	TP2-21-GS4	
PHC F_1	7	nd	nd	nd	nd	55
PHC F_2	4	nd	7	5	5	98
PHC F_3	8	43	53	**386**	24	300
PHC F_4	6	29	37	134	15	2800

Notes:
- MDL – Method Detection Limit
- nd – not detected above the MDL
- **Bold and underlined –** Results exceed selected MECP standard

The PHC F_3 concentrations in sample TP1-21-GS3 exceeds the MECP Table 3 Standard. The remaining PHC concentrations in the soil samples analysed are in compliance with the selected MECP Table 3 standards. The analytical results for PHCs tested in soil are shown on Drawing PE5267-6 – Analytical Testing Plan – Soil (PHCs).

TABLE 13 - Analytical Test Results – Soil
PAHs

Parameter	MDL (µg/g)	Soil Sample (µg/g)					MECP Table 3 Residential Standards (µg/g)
		May 14, 2021	May 17, 2021				
		BH1-21-SS5/6	BH2-21-SS4	BH3-21-SS4/5	BH4-21-SS2	DUP[1]	
Acenaphthene	0.02	0.27	nd	nd	nd	0.03	7.9
Acenaphthylene	0.02	**0.23**	0.15	0.02	0.14	0.04	0.15
Anthracene	0.02	**0.75**	0.11	0.04	0.09	0.09	0.67
Benzo[a]anthracene	0.02	**1.50**	0.24	0.12	0.18	0.21	0.5
Benzo[a]pyrene	0.02	**1.38**	**0.35**	0.15	0.23	0.20	0.3
Benzo[b]fluoranthene	0.02	**1.29**	0.31	0.16	0.26	0.24	0.78
Benzo[g,h,i]perylene	0.02	0.70	0.25	0.09	0.19	0.12	6.6
Benzo[k]fluoranthene	0.02	0.75	0.16	0.09	0.11	0.12	0.78
Chrysene	0.02	1.44	0.22	0.16	0.18	0.19	7
Dibenzo[a,h]anthracene	0.02	**0.11**	0.06	nd	0.04	0.03	0.1
Fluoranthene	0.02	**2.89**	0.39	0.24	0.24	0.44	0.69
Fluorene	0.02	0.26	nd	nd	nd	0.03	62
Indeno[1,2,3-cd]pyrene	0.02	**0.66**	0.22	0.08	0.15	0.11	0.38
1-Methylnaphthalene	0.02	0.13	nd	nd	0.12	nd	0.99
2-Methylnaphthalene	0.02	0.13	0.03	nd	0.17	0.03	0.99
Methylnaphthalene (1&2)	0.04	0.29	nd	nd	0.29	0.05	0.99
Naphthalene	0.01	0.21	0.04	0.02	0.11	0.03	0.6
Phenanthrene	0.02	2.78	0.23	0.17	0.13	0.35	6.2
Pyrene	0.02	2.32	0.36	0.21	0.22	0.38	78

Notes:
- MDL – Method Detection Limit
- nd – not detected above the MDL
- **Bold and underlined –** Results exceed selected MECP standard
- 1 – Duplicate of sample BH3-21-SS4/5

TABLE 13 Continued - Analytical Test Results – Soil
PAHs

Parameter	MDL (µg/g)	Soil Sample (µg/g)					MECP Table 3 Residential Standards (µg/g)
		June 15, 2021					
		TP2-21-GS4	TP3-21-GS3	TP5-21-GS2	TP6-21-GS5	DUP3[1]	
Acenaphthene	0.02	nd	**15.5**	1.42	nd	**11.0**	7.9
Acenaphthylene	0.02	nd	**1.43**	**1.01**	**0.45**	**1.31**	0.15
Anthracene	0.02	nd	**34.0**	**2.40**	0.59	**32.9**	0.67
Benzo[a]anthracene	0.02	nd	**50.9**	**6.74**	**1.11**	**43.6**	0.5
Benzo[a]pyrene	0.02	nd	**48.5**	**7.22**	**1.25**	**38.9**	0.3
Benzo[b]fluoranthene	0.02	nd	**43.0**	**7.37**	**1.29**	**35.9**	0.78
Benzo[g,h,i]perylene	0.02	nd	**23.3**	3.95	0.81	**18.5**	6.6
Benzo[k]fluoranthene	0.02	nd	**23.6**	**4.47**	0.59	**19.2**	0.78
Chrysene	0.02	nd	**52.4**	**7.59**	1.41	**44.0**	7
Dibenzo[a,h]anthracene	0.02	nd	**6.01**	**1.07**	nd	**5.30**	0.1
Fluoranthene	0.02	nd	**123**	**18.7**	**2.49**	**105**	0.69
Fluorene	0.02	nd	12.8	1.23	nd	15.7	62
Indeno[1,2,3-cd]pyrene	0.02	nd	**21.1**	**3.61**	**0.67**	**17.0**	0.38

TABLE 13 Continued - Analytical Test Results – Soil PAHs							
1-Methylnaphthalene	0.02	nd	**3.91**	**1.96**	nd	**3.72**	0.99
2-Methylnaphthalene	0.02	nd	**5.39**	**2.43**	nd	**5.42**	0.99
Methylnaphthalene (1&2)	0.04	nd	**9.30**	**4.39**	nd	**9.15**	0.99
Naphthalene	0.01	nd	**9.72**	**3.10**	0.36	**10.1**	0.6
Phenanthrene	0.02	nd	**123**	**15.7**	2.18	**115**	6.2
Pyrene	0.02	nd	**97.6**	15.2	2.07	**78.9**	78

Notes:
- MDL – Method Detection Limit
- nd – not detected above the MDL
- **Bold and underlined –** Results exceed selected MECP standard
- 1 – Duplicate of sample TP3-21-GS3

Various PAH parameter concentrations in Samples BH1-21-SS5/6, BH2-21-SS4, TP23-21-GS3, TP5-21-GS2 and TP6-21-GS5 exceed the MECP Table 3 Standards. The remaining PAH concentrations in the soil samples analysed are in compliance with the selected MECP Table 3 standards. The analytical results for PAHs tested in soil are shown on Drawing PE5267-7 – Analytical Testing Plan – Soil (PAHs).

The maximum concentrations of analyzed parameters in the soil at the Phase II Property are summarized in Table 14.

TABLE 14 - Maximum Concentrations – Soil			
Parameter	**Maximum Concentration (µg/g)**	**Sample ID**	**Depth Interval (m BGS)**
Antimony	2.1	TP3-21-GS3	0.5-0.7; Fill Material
Arsenic	**22.3**	TP3-21-GS3	0.5-0.7; Fill Material
Barium	**584**	BH1-21-SS5/6	3.05 - 4.42; Fill Material
Beryllium	0.7	TP3-21-GS3	0.5-0.7; Fill Material
Boron	19.0	BH1-21-SS5/6	3.05 - 4.42; Fill Material
Cadmium	**3.1**	TP3-21-GS3	0.5-0.7; Fill Material
Chromium	25.7	BH3-21-SS4/5	2.29 - 3.66; Fill Material
Cobalt	7.4	TP3-21-GS3	0.5-0.7; Fill Material
Copper	51.5	TP3-21-GS3	0.5-0.7; Fill Material
Lead	**270**	TP3-21-GS3	0.5-0.7; Fill Material
Mercury	**1.3**	BH2-21-SS4	2.29 - 2.62; Fill Material
Molybdenum	2.4	BH1-21-SS5/6	3.05 - 4.42; Fill Material
Nickel	17.8	TP3-21-GS3	0.5-0.7; Fill Material
Selenium	**4.3**	TP3-21-GS3	0.5-0.7; Fill Material
Silver	0.3	BH2-21-SS4	2.29 - 2.62; Fill Material
Vanadium	31.4	BH3-21-SS4/5	2.29 - 3.66; Fill Material
Zinc	**1680**	TP3-21-GS3	0.5-0.7; Fill Material
PHC F_2	7	BH3-21-SS2	0.76 - 1.37; Fill Material
PHC F_3	**386**	TP1-21-GS3	1.7-1.9; Fill Material
PHC F_4	134	TP1-21-GS3	1.7-1.9; Fill Material
Acenaphthene	15.5	TP3-21-GS3	0.5-0.7; Fill Material
Acenaphthylene	1.43	TP3-21-GS3	0.5-0.7; Fill Material
Anthracene	34.0	TP3-21-GS3	0.5-0.7; Fill Material

TABLE 14 - Maximum Concentrations – Soil			
Benzo[a]anthracene	50.9	TP3-21-GS3	0.5-0.7; Fill Material
Benzo[a]pyrene	48.5	TP3-21-GS3	0.5-0.7; Fill Material
Benzo[b]fluoranthene	43.0	TP3-21-GS3	0.5-0.7; Fill Material
Benzo[g,h,i]perylene	23.3	TP3-21-GS3	0.5-0.7; Fill Material
Benzo[k]fluoranthene	23.6	TP3-21-GS3	0.5-0.7; Fill Material
Chrysene	52.4	TP3-21-GS3	0.5-0.7; Fill Material
Dibenzo[a,h]anthracene	6.01	TP3-21-GS3	0.5-0.7; Fill Material
Fluoranthene	123	TP3-21-GS3	0.5-0.7; Fill Material
Fluorene	15.7	DUP3 (TP3-21-GS3)	0.5-0.7; Fill Material
Indeno[1,2,3-cd]pyrene	21.1	TP3-21-GS3	0.5-0.7; Fill Material
1-Methylnaphthalene	3.91	TP3-21-GS3	0.5-0.7; Fill Material
2-Methylnaphthalene	5.42	DUP3 (TP3-21-GS3)	0.5-0.7; Fill Material
Methylnaphthalene (1&2)	9.30	TP3-21-GS3	0.5-0.7; Fill Material
Naphthalene	10.1	DUP3 (TP3-21-GS3)	0.5-0.7; Fill Material
Phenanthrene	123	TP3-21-GS3	0.5-0.7; Fill Material
Pyrene	97.6	TP3-21-GS3	0.5-0.7; Fill Material

All remaining parameter results were non-detect. The laboratory Certificates of Analysis are provided in Appendix 1.

5.6 Groundwater Quality

Groundwater samples (including two duplicates) from monitoring wells installed in BH1 through BH4 were submitted for laboratory analysis of metals (including Hg and CrVI), BTEX, PHC (F1-F4) and/or PAHs. The groundwater samples were obtained from the screened intervals noted in Table 3.

The results of the analytical testing are presented in Tables 15 to 18. The laboratory certificates of analysis are provided in Appendix 1.

TABLE 15 - Analytical Test Results – Groundwater
Metals

Parameter	MDL (µg/g)	Groundwater Samples (µg/g)				MECP Table 3 Residential Standards (µg/g)
		May 25, 2021				
		MW1-21-GW1	MW2-21-GW1	MW3-21-GW1	DUP2[1]	
Antimony	0.5	nd	nd	nd	nd	20,000
Arsenic	1	nd	nd	nd	nd	1,900
Barium	1	40	629	65	701	29,000
Beryllium	0.5	nd	nd	nd	nd	67
Boron	10	137	74	39	87	45,000
Cadmium	0.1	nd	nd	nd	nd	2.7
Chromium	1	nd	nd	nd	nd	810
Chromium (VI)	10	nd	nd	nd	nd	140
Cobalt	0.5	1.2	1.2	0.6	nd	66
Copper	0.5	3.3	4.9	3.5	4.8	87

TABLE 15 - Analytical Test Results – Groundwater
Metals

Parameter	MDL (µg/g)	Groundwater Samples (µg/g)				MECP Table 3 Residential Standards (µg/g)
		May 25, 2021				
		MW1-21-GW1	MW2-21-GW1	MW3-21-GW1	DUP2[1]	
Lead	0.1	nd	nd	nd	0.1	25
Mercury	0.1	nd	nd	nd	nd	0.29
Molybdenum	0.5	4.1	2.9	0.9	3.2	9,200
Nickel	1	8	4	7	4	490
Selenium	1	6	nd	2	nd	63
Silver	0.1	nd	nd	nd	nd	1.5
Sodium	200	455,000	228,000	289,000	237,000	2,300,000
Thallium	0.1	nd	0.1	nd	0.2	510
Uranium	0.1	2.8	3.8	4.7	4.1	420
Vanadium	0.5	nd	0.5	nd	0.6	250
Zinc	5	10	17	9	9	1,100

Notes:
- MDL – Method Detection Limit
- nd – not detected above the MDL
- 1 – Duplicate of sample MW2-21-GW1

All detected metal concentrations in the groundwater samples analysed are in compliance with the selected MECP Table 3 standards. The analytical results for groundwater tested are shown on Drawing PE5267-8 – Analytical Testing Plan – Groundwater.

TABLE 16 - Analytical Test Results – Groundwater
BTEX

Parameter	MDL (µg/L)	Groundwater Sample (µg/L)	MECP Table 3 Standards (µg/L)
		May 25, 2021	
		MW3-21-GW1	
Benzene	0.5	nd	44
Toluene	0.5	nd	18,000
Ethylbenzene	0.5	nd	2,300
Xylenes	0.5	nd	4,200

Notes:
- MDL – Method Detection Limit
- nd – not detected above the MDL

No detectable BTEX concentrations were identified in the groundwater sample analysed. As such, the results are in compliance with the selected MECP Table 3 standards. The analytical results for groundwater tested are shown on Drawing PE5267-8 – Analytical Testing Plan – Groundwater.

TABLE 17 - Analytical Test Results – Groundwater
PHCs

Parameter	MDL (µg/L)	Groundwater Sample (µg/L)	MECP Table 3 Standards (µg/L)
		May 25, 2021	
		MW3-21-GW1	
PHC F_1	25	nd	750
PHC F_2	100	nd	150
PHC F_3	100	nd	500
PHC F_4	100	nd	500

Notes:
- MDL – Method Detection Limit
- nd – not detected above the MDL

No detectable PHC concentrations were identified in the groundwater sample analysed; the results comply with the MECP Table 3 standards. The analytical results for groundwater tested are shown on Drawing PE5267-8 – Analytical Testing Plan – Groundwater.

TABLE 18 - Analytical Test Results – Groundwater
PAHs

Parameter	MDL (µg/g)	Groundwater Samples (µg/g)				MECP Table 3 Residential Standards (µg/g)
		May 25, 2021				
		MW1-21-GW1	MW2-21-GW1	MW4-21-GW1	DUP1[1]	
Acenaphthene	0.05	nd	nd	nd	nd	600
Acenaphthylene	0.05	nd	nd	nd	nd	1.8
Anthracene	0.01	nd	nd	nd	nd	2.4
Benzo[a]anthracene	0.01	nd	nd	nd	nd	4.7
Benzo[a]pyrene	0.01	nd	nd	nd	nd	0.81
TABLE 18 - Analytical Test Results – Groundwater PAHs						
Benzo[b]fluoranthene	0.05	nd	nd	nd	nd	0.75
Benzo[g,h,i]perylene	0.05	nd	nd	nd	nd	0.2
Benzo[k]fluoranthene	0.05	nd	nd	nd	nd	0.4
Chrysene	0.05	nd	nd	nd	nd	1
Dibenzo[a,h]anthracene	0.05	nd	nd	nd	nd	0.52
Fluoranthene	0.01	0.04	nd	nd	nd	130
Fluorene	0.05	nd	nd	nd	nd	400
Indeno[1,2,3-cd]pyrene	0.05	nd	nd	nd	nd	0.2
Methylnapthalene (1&2)	0.10	nd	nd	nd	nd	1,800
Naphthalene	0.05	0.34	nd	nd	nd	1,400
Phenanthrene	0.05	0.08	nd	nd	nd	580
Pyrene	0.01	0.04	nd	nd	nd	68

Notes:
- MDL – Method Detection Limit
- nd – not detected above the MDL
- 1 – Duplicate of sample MW4-21-GW1

Several PAH parameters were identified in Sample MW1-21-GW1 at concentrations below the MECP Table 3 standards. Otherwise, no PAH parameters were detected in the groundwater samples analysed. The analytical results for groundwater tested are shown on Drawing PE5267-8 – Analytical Testing Plan – Groundwater.

5.7 Quality Assurance and Quality Control Results

All samples submitted as part of the Phase II ESA were handled in accordance with the Analytical Protocol with respect to preservation method, storage requirement, and container type. As per Subsection 47(3) of O.Reg. 153/04, as amended under the Environmental Protection Act, a Certificate of Analysis has been received for each sample submitted for analysis and all Certificates of Analysis are appended to this report.

Duplicate soil and groundwater samples from BH1-21-SS5, MW2-21-GW1 and MW4-21-GW1 were submitted for laboratory analysis of metals (including Hg and CrVI), BTEX, PHCs (F1-F4) and/or PAHs.

The duplicates were collected with the intent of calculating the relative percent difference (RPD) between duplicate sample values, as a way of assessing the quality of the analytical test results. Several parameter concentrations were not detected in either or both the original sample and duplicate. The RPD values are therefore considered to be 0% and therefore meet the 20% target.

The RPD calculations for the original soil and duplicate sample are provided in Tables 19 to 20.

Table 19 - QA/QC Calculations – Soil

Parameter	MDL (µg/L)	BH3-21-SS4/5	DUP (BH3-21-SS4/5)	RPD (%)	QA/QC Result
Antimony	1.0	nd	nd	0	Meets Target
Arsenic	1.0	6.2	5.2	17.5	Meets Target
Barium	1.0	150	132	12.8	Meets Target
Beryllium	0.5	0.5	0.5	0	Meets Target
Boron	5.0	8.4	6.8	21.0	Does Not Meet Target
Cadmium	0.5	nd	nd	0	Meets Target
Chromium	5.0	25.7	24.2	6.0	Meets Target
Chromium (VI)	0.2	nd	nd	0	Meets Target
Cobalt	1.0	5.7	5.2	9.2	Meets Target
Copper	5.0	16.3	15.9	2.5	Meets Target
Lead	1.0	72.4	78.1	7.6	Meets Target
Mercury	0.1	**0.5**	**0.4**	22.2	Does Not Meet Target
Molybdenum	1.0	1.2	1.0	18.2	Meets Target
Nickel	5.0	16.3	15.3	6.3	Meets Target
Selenium	1.0	nd	nd	0	Meets Target
Silver	0.3	nd	nd	0	Meets Target
Thallium	1.0	nd	nd	0	Meets Target
Uranium	1.0	nd	nd	0	Meets Target
Vanadium	10.0	31.4	30.3	3.6	Meets Target
Zinc	20.0	67.4	69.3	2.8	Meets Target
Acenaphthene	0.02	nd	0.03	40	Does Not Meet Target
Acenaphthylene	0.02	0.02	0.04	66.7	Does Not Meet Target
Anthracene	0.02	0.04	0.09	76.9	Does Not Meet Target
Benzo[a]anthracene	0.02	0.12	0.21	54.5	Does Not Meet Target
Benzo[a]pyrene	0.02	0.15	0.20	28.6	Does Not Meet Target
Benzo[b]fluoranthene	0.02	0.16	0.24	40	Does Not Meet Target
Benzo[g,h,i]perylene	0.02	0.09	0.12	28.6	Does Not Meet Target
Benzo[k]fluoranthene	0.02	0.09	0.12	28.6	Does Not Meet Target
Chrysene	0.02	0.16	0.19	17.7	Meets Target
Dibenzo[a,h]anthracene	0.02	nd	0.03	40	Does Not Meet Target
Fluoranthene	0.02	0.24	0.44	58.8	Does Not Meet Target
Fluorene	0.02	nd	0.03	0	Meets Target
Indeno[1,2,3-cd]pyrene	0.02	0.08	0.11	31.6	Does Not Meet Target
1-Methylnaphthalene	0.02	nd	nd	0	Meets Target
2-Methylnaphthalene	0.02	nd	0.03	0	Meets Target
Methylnaphthalene(1&2)	0.04	nd	0.05	0	Meets Target
Naphthalene	0.01	0.02	0.03	40	Does Not Meet Target
Phenanthrene	0.02	0.17	0.35	69.2	Does Not Meet Target
Pyrene	0.02	0.21	0.38	57.6	Does Not Meet Target

Notes:

- MDL – Method Detection Limit
- nd – not detected above the MDL
- **Bold and underlined –** Results exceed selected MECP standard

Table 19 Continued - QA/QC Calculations – Soil					
Parameter	**MDL (µg/L)**	**TP3-21-GS3**	**DUP3 (TP3-21-GS3)**	**RPD (%)**	**QA/QC Result**
Acenaphthene	0.02	**15.5**	**11.0**	40.0	Does Not Meet Target
Acenaphthylene	0.02	**1.43**	**1.31**	8.8	Meets Target
Anthracene	0.02	**34.0**	**32.9**	3.3	Meets Target
Benzo[a]anthracene	0.02	**50.9**	**43.6**	15.4	Meets Target
Benzo[a]pyrene	0.02	**48.5**	**38.9**	22.0	Does Not Meet Target
Benzo[b]fluoranthene	0.02	**43.0**	**35.9**	18.0	Does Not Meet Target
Benzo[g,h,i]perylene	0.02	**23.3**	**18.5**	23.0	Meets Target
Benzo[k]fluoranthene	0.02	**23.6**	**19.2**	20.6	Meets Target
Chrysene	0.02	**52.4**	**44.0**	17.4	Meets Target
Dibenzo[a,h]anthracene	0.02	**6.01**	**5.30**	12.6	Meets Target
Fluoranthene	0.02	**123**	**105**	15.8	Meets Target
Fluorene	0.02	12.8	15.7	20.4	Meets Target
Indeno[1,2,3-cd]pyrene	0.02	**21.1**	**17.0**	21.5	Does Not Meet Target
1-Methylnaphthalene	0.02	**3.91**	**3.72**	5.0	Meets Target
2-Methylnaphthalene	0.02	**5.39**	**5.42**	0.6	Meets Target
Methylnaphthalene(1&2)	0.04	**9.30**	**9.15**	1.6	Meets Target
Naphthalene	0.01	**9.72**	**10.1**	3.8	Meets Target
Phenanthrene	0.02	**123**	**115**	6.7	Meets Target
Pyrene	0.02	**97.6**	**78.9**	21.2	Does Not Meet Target

Notes:
- MDL – Method Detection Limit
- nd – not detected above the MDL
- **Bold and underlined –** Results exceed selected MECP standard

Table 19 Continued - QA/QC Calculations – Soil					
Parameter	**MDL (µg/L)**	**TP4-21-GS2**	**DUP4 (TP4-21-GS2)**	**RPD (%)**	**QA/QC Result**
Antimony	1.0	nd	nd	0	Meets Target
Arsenic	1.0	3.9	3.2	19.7	Meets Target
Barium	1.0	149	121	20.7	Does Not Meet Target
Beryllium	0.5	nd	nd	0	Meets Target
Boron	5.0	7.1	5.5	25.4	Does Not Meet Target
Cadmium	0.5	nd	nd	0	Meets Target
Chromium	5.0	15.1	12.7	17.3	Meets Target
Chromium (VI)	0.2	nd	nd	0	Meets Target
Cobalt	1.0	4.9	4.3	13.0	Meets Target
Copper	5.0	11.3	10.5	7.3	Meets Target
Lead	1.0	17.8	17.8	0	Meets Target
Mercury	0.1	0.1	0.1	0	Meets Target
Molybdenum	1.0	nd	nd	0	Meets Target
Nickel	5.0	10.9	9.7	11.7	Meets Target
Selenium	1.0	nd	nd	0	Meets Target
Silver	0.3	nd	nd	0	Meets Target
Thallium	1.0	nd	nd	0	Meets Target
Uranium	1.0	nd	nd	0	Meets Target
Vanadium	10.0	22.5	18.0	22.2	Does Not Meet Target

Table 19 Continued - QA/QC Calculations – Soil					
Parameter	**MDL (µg/L)**	**TP4-21-GS2**	**DUP4 (TP4-21-GS2)**	**RPD (%)**	**QA/QC Result**
Zinc	20.0	48.6	47.7	1.9	Meets Target

Notes:
- MDL – Method Detection Limit
- nd – not detected above the MDL
- **Bold and underlined –** Results exceed selected MECP standard

Table 20 - QA/QC Calculations – Groundwater					
MW2-21-GW1					
Parameter	**MDL (µg/L)**	**MW2-21-GW1**	**DUP2 (MW2-21-GW1)**	**RPD (%)**	**QA/QC Result**
Antimony	0.5	nd	nd	0	Meets Target
Arsenic	1	nd	nd	0	Meets Target
Barium	1	629	701	10.8	Meets Target
Beryllium	0.5	nd	nd	0	Meets Target
Boron	10	74	87	16.1	Meets Target
Cadmium	0.1	nd	nd	0	Meets Target
Chromium	1	nd	nd	0	Meets Target
Chromium (VI)	10	nd	nd	0	Meets Target
Cobalt	0.5	1.2	nd	0	Meets Target
Copper	0.5	4.9	4.8	2.06	Meets Target
Lead	0.1	nd	0.1	0	Meets Target
Mercury	0.1	nd	nd	0	Meets Target
Molybdenum	0.5	2.9	3.2	9.8	Meets Target
Nickel	1	4	4	0	Meets Target
Selenium	1	nd	nd	0	Meets Target
Silver	0.1	nd	nd	0	Meets Target
Sodium	200	228,000	237,000	3.9	Meets Target
Thallium	0.1	0.1	0.2	66.7	Does Not Meet Target
Uranium	0.1	3.8	4.1	7.6	Meets Target
Vanadium	0.5	0.5	0.6	18.2	Meets Target
Zinc	5	17	9	61.5	Does Not Meet Target

Notes:
- MDL – Method Detection Limit
- nd – not detected above the MDL

Table 20 Continued - QA/QC Calculations – Groundwater					
Parameter	**MDL (µg/L)**	**MW4-21-GW1**	**DUP1 (MW4-21-GW1)**	**RPD (%)**	**QA/QC Result**
Acenaphthene	0.05	nd	nd	0	Meets Target
Acenaphthylene	0.05	nd	nd	0	Meets Target
Anthracene	0.01	nd	nd	0	Meets Target
Benzo[a]anthracene	0.01	nd	nd	0	Meets Target
Benzo[a]pyrene	0.01	nd	nd	0	Meets Target
Benzo[b]fluoranthene	0.05	nd	nd	0	Meets Target
Benzo[g,h,i]perylene	0.05	nd	nd	0	Meets Target

Table 20 Continued - QA/QC Calculations – Groundwater					
Parameter	**MDL (µg/L)**	**MW4-21-GW1**	**DUP1 (MW4-21-GW1)**	**RPD (%)**	**QA/QC Result**
Benzo[k]fluoranthene	0.05	nd	nd	0	Meets Target
Chrysene	0.05	nd	nd	0	Meets Target
Dibenzo[a,h]anthracene	0.05	nd	nd	0	Meets Target
Fluoranthene	0.01	nd	nd	0	Meets Target
Fluorene	0.05	nd	nd	0	Meets Target
Indeno[1,2,3-cd]pyrene	0.05	nd	nd	0	Meets Target
Methylnaphthalene(1&2)	0.10	nd	nd	0	Meets Target
Naphthalene	0.05	nd	nd	0	Meets Target
Phenanthrene	0.05	nd	nd	0	Meets Target
Pyrene	0.01	nd	nd	0	Meets Target

Notes:
- MDL – Method Detection Limit
- nd – not detected above the MDL

Typically, RPD values below 20% are considered to be of satisfactory quality. The relative percent difference (RPD) results calculated for several soil parameters fell outside of the acceptable range of 20%. It is not uncommon that very small concentrations or values will yield higher RPD values, and as such, the RPD value is not an accurate measure in these cases.

Despite the exceeded RPD values calculated for samples BH3-21-SS4/5, TP3-21-GS3, TP4-21-GS2 and MW2-21-GW1 between the original and duplicate samples, it should be noted that the individual metal and PAH parameters detected appear to be consistent between the two samples. Furthermore, the concentration of the majority of the detected metal and PAH parameters were well within the selected MECP Table 3 standards in both samples by a large margin (except for Mercury which was in excess of the standard). As a result, it is our opinion that the decision-making usefulness of the samples is not considered to be impaired, and thus the quality of the field data collected during this remediation is considered to be sufficient to meet the overall objectives of this assessment.

5.8 Phase II Conceptual Site Model

The following section has been prepared in accordance with the requirements of O.Reg. 153/04, as amended by the Environmental Protection Act. Conclusions and recommendations are discussed in a subsequent section.

Potentially Contaminating Activity and Areas of Potential Environmental Concern

Based on the results of the Phase I ESA completed for the subject property, 51 PCAs were identified, nine of which represent APECs on the Phase II Property. The APECs on the Phase II Property are as follows:

- APEC 1: Resulting from the historical presence of an on-site warehouse/workshop (PCA #N/A);
- APEC 2: Resulting from the historical presence of on-site coal storage (PCA #N/A).
- APEC 3: Resulting from the historical presence of on-site coal storage (PCA #N/A).
- APEC 4: Resulting from the historical presence of an on-site garage (PCA #52).
- APEC 5: Resulting from the use of de-icing salt associated with on-site and adjacent roadways (PCA #N/A).
- APEC 6: Resulting from the historical presence of an on-site railway spur line (PCA #46).
- APEC 7: Resulting from the presence of fill material of unknown quality (PCA #30).
- APEC 8: Resulting from the historical presence of an off-site rail yard and rail lines (PCA #46).
- APEC 9: Resulting from the historical presence of off-site coal storage (PCA #N/A).

Contaminants of Potential Concern

The following CPCs are identified with respect to the Phase II Property:

- ❒ Metals (including Arsenic (As,), Antimony (Sb) and Selenium);
- ❒ Mercury (Hg);
- ❒ Hexavalent Chromium;
- ❒ Volatile Organic Compounds (VOCs);
- ❒ Benzene, Toluene, Ethylbenzene, and Xylenes (BTEX);
- ❒ Petroleum Hydrocarbons, fractions 1 - 4 (PHCs F_1-F_4); and
- ❒ Polycyclic Aromatic Hydrocarbons (PAHs).

Subsurface Structures and Utilities

A small basement crawl space is present beneath the northwestern portion of the on-site vacant building. Multiple underground utilities were identified on the Phase I Property including electrical, gas, water, sewer and telecommunication lines.

Based on standard practice for subsurface utility installation, service trenches are expected to be present approximately 1 to 2 m below existing grade. In general, trench backfill may provide a preferential pathway for contaminant transport if the water table is at or above the base of the trenches. Based on the findings of the Phase II ESA, groundwater on the Phase II Property complies with the MECP Table 3 standards and is located within the bedrock, 5.6 to 9.0 m below ground surface. Therefore subsurface structures and utilities are not expected to have had the potential to impact contaminant distribution.

Physical Setting

Site Stratigraphy

The stratigraphy of the Phase II Property generally consists of:

- ❒ Topsoil, encountered at depths ranging from approximately 0.00 to 5.00 m below ground surface
- ❒ Fill material, consisting of brown silty sand with crushed stone, trace concrete, brick and clay; encountered at depths ranging from approximately 0.00 to 5.00 m below ground surface

- Very stiff to stiff, brown silty clay; encountered in BH3-21 from approximately 4.27 to 5.18 m below ground surface;
- Glacial till, consisting of brown to grey silty clay with sand, gravel, cobbles and boulders; encountered in BH3-21 from approximately 5.18 to 7.01 m below ground surface;
- Limestone bedrock, encountered at depths ranging from approximately 2.62 to 7.01 m below ground surface.

The site stratigraphy, from ground surface to the deepest aquifer or aquitard investigated, is provided in the Soil Profile and Test Data Sheets in Appendix 1.

Hydrogeological Characteristics

Groundwater at the Phase II Property was encountered within the bedrock or the overburden in BH3-21. During the most recent groundwater monitoring event, groundwater flow was measured in a northwestern direction, with a hydraulic gradient of 0.06 m/m. Groundwater contours are shown on Drawing PE5267-3 – Groundwater Contour Plan.

Approximate Depth to Bedrock

Bedrock was confirmed within all four boreholes at depths ranging from approximately 2.62 to 7.01 m below ground surface, as determined by rock coring activities conducted in three of the boreholes at the time of the drilling program.

Approximate Depth to Water Table

The depth to the water table at the subject site varies between approximately 5.60 to 9.00 m below existing grade.

Sections 41 and 43.1 of the Regulation

Section 41 of the Regulation does not apply to the Phase II Property, in that the subject property is not within 30m of an environmentally sensitive area, and the pH of surface soil is between 5 and 9.

Section 43.1 of the Regulation does not apply to the subject site as bedrock is not located less than 2 m below ground surface.

Fill Placement

Fill material, consisting of brown silty sand with crushed stone, trace concrete, brick and clay was identified throughout the entire Phase II Property.

Existing Buildings and Structures

The Phase II Property is currently occupied by a vacant building located on the southeastern portion of the subject site. The subject building was constructed as early as 1878.

Proposed Buildings and Other Structures

The proposed site development for the Phase II Property will consist of a residential high rise building with two underground parking levels. Associated access lanes, walkways and hardscaped areas are also anticipated as part of the development. It is expected that the proposed buildings will be municipally serviced.

Areas of Natural Scientific Interest and Water Bodies

There are no areas of natural and scientific interest or waterbodies on the Phase II Property or within the 250 m study area.

Environmental Condition

Areas Where Contaminants are Present

Based on the findings of this Phase II ESA, soil (fill material) impacted with metal parameters, arsenic and selenium, mercury, PAH parameters and/or PHC (F_3) concentrations exceeding the MECP Table 3 standards, was present on the northern, central and southwestern portions of the Phase II Property. Based on the non-homogenous nature of the fill material, it is expected that impacted soil is present in pockets across the entire Phase II Property.

Groundwater beneath the Phase II Property was determined to comply with the MECP Table 3 standards.

Types of Contaminants

Based on the findings of this Phase II ESA, soil contaminants at the Phase II Property include the following:

- Metals (barium, cadmium, lead and zinc);

- ❒ Arsenic and selenium;
- ❒ Mercury;
- ❒ PHCs (F_3); and
- ❒ PAHs (acenapthene, acenapthylene, anthracene, benzo[a]anthracene, benzo[a]pyrene, benzo[b]fluoranthene, benzo[g,h,i]perylene, benzo[k]fluoranthene, chrysene, dibenzo[a,h]anthracene, fluoranthene, indeno[1,2,3-cd]pyrene, methylnapthalene (1&2), naphthalene, phenanthrene, pyrene)

The groundwater at the Phase II Property complies with the MECP Table 3 standards.

Contaminated Media

The soil (fill material) across the Phase II Property is impacted with parameter concentrations exceeding the MECP Table 3 standards.

Groundwater beneath the Phase II Property complies with the MECP Table 3 standards.

What Is Known About Areas Where Contaminants Are Present

Based on the findings of this Phase II ESA, impacted soil was identified at test holes BH1-21, BH2-21, BH3-21, TP1-21-GS3, TP3-21-GS3, TP5-21-GS2 and TP6-21-GS5. Based on the nature of the fill material, pockets of metal (including As, Sb, Se), mercury, PHC and/or PAH impacts are anticipated to be present across the Phase II Property.

The impacted soil identified on the Phase II Property is interpreted to be associated with historical uses in combination with the historical importation of poor-quality fill material.

Distribution and Migration of Contaminants

A layer of impacted fill material was identified throughout the subject site. This layer was observed to range from approximately 2.62 to 5.00 m thick. Based on the observations made during the field program, in conjunction with analytical test results, it is expected that the majority of the fill material is impacted with metals and/or PAHs.

Based on the findings of the Phase II ESA, groundwater beneath the site was in compliance with the MECP Table 3 standards. Given the clean groundwater

results in combination with the low solubility of metal, mercury and PAH parameters, no significant distribution or migration of contaminants is considered to have occurred on the Phase II Property.

Discharge of Contaminants

The metals and PAH impacted fill material identified on the Phase II Property is considered to be the result of the historical uses of the property as a coal storage yard/area, on site railway spur line and road way or from the importation of fill material of a poor quality.

Climatic and Meteorological Conditions

In general, climatic and meteorological conditions have the potential to affect contaminant distribution. Two ways by which climatic and meteorological conditions may affect contaminant distribution include the downward leaching of contaminants by means of the infiltration of precipitation, and the migration of contaminants via groundwater levels and/or flow, which may fluctuate seasonally.

Based on the results of the Phase II ESA, downward leaching may have affected contaminant distribution at the Phase II Property. However, given the low solubility of metal and PAH parameters, no significant distribution or migration of contaminants is considered to have occurred.

Site groundwater was in compliance with the MECP Table 3 standards; as such, migration of contaminants via groundwater levels and/or flow is not considered to have occurred on the Phase II Property.

Potential for Vapour Intrusion

Given the non-volatile nature of the impacts identified in the soil, the potential for vapour intrusion into the current site building is considered to be low.

As part of the site redevelopment for the proposed building, all impacted soil on the RSC Property will be excavated and disposed off-site. Given the groundwater beneath the site is clean, once the impacted soil is removed, there will be no anticipated potential for vapour intrusion into future subsurface structures and utilities at the Phase II Property.

6.0 CONCLUSIONS

Assessment

A Phase II ESA was conducted for the northeast portion of the property addressed 70 Nicholas Street, in the City of Ottawa, Ontario. The purpose of the Phase II ESA was to address potentially contaminating activities (PCAs) that were identified during the Phase I ESA and considered to result in areas of potential environmental concern (APECs) on the Phase II Property.

The Phase II ESA was carried out in conjunction with a geotechnical investigation and consisted of the placement of four boreholes and nine test pits. All boreholes were constructed with groundwater monitoring wells. The general soil profile encountered during the field program consisted of a silty sand fill layer, over a layer of clay followed by glacial till (on the southwest corner of the site only), followed by limestone bedrock. No unusual staining or odour was noted at the time of the field program. Deleterious material identified in the fill material consists of construction debris, coal, brick, concrete and a layer of asphalt in TP7-21.

A total of 17 soil samples were submitted for laboratory analysis of Metals (including methyl mercury), Volatile Organic Compounds (VOCs), Benzene, Toluene, Ethylbenzene and Xylenes (BTEX), Petroleum Hydrocarbons (PHCs, Fractions F_1-F_4) and/or Polycyclic Aromatic Hydrocarbons (PAHs). No VOC or BTEX concentrations identified in the samples analysed. Concentrations of metals (including As, Sb, Se), Hg, PAH and/or PHC (F_3) parameters exceeding the MECP Table 3 standards were identified in soil Samples BH1-21-SS5/6, BH2-21-SS4, BH3-21-SS4/5 TP1-21-GS3, TP3-21-GS3, TP5-21-GS2 and TP6-21-GS5. Based on Hg results, MeHg was analyzed and determined to comply with the MECP Table 3 standards.

Groundwater samples from monitoring wells BH1-21, BH2-21, BH3-21 and BH4-21 were collected during the May 25, 2021 sampling event. No sheen, free product or odour was noted during the groundwater sampling event.

Groundwater samples were analyzed for Metals, BTEX, PHCs and/or PAHs. All groundwater results comply with the selected MECP Table 3 Residential Standards.

Recommendations

Soil

Based on the findings of the Phase II ESA, it is anticipated that fill material impacted with metals, mercury, PAHs and/or PHC (F_3) exceeding the MECP Table 3 standards is present across the Phase II Property at depths extending up to approximately 5.0m below grade. It is our understanding that the Phase II Property will be redeveloped with a residential multi-story building with 2 levels of underground parking.

It is recommended that an environmental site remediation program, involving the removal of all impacted fill material be completed prior to site redevelopment. Prior to off-site disposal of the impacted soil at a licenced landfill site, a leachate analysis of a representative sample of contaminated soil must be conducted in accordance with Ontario Regulation 347/558.

It is also recommended that Paterson personnel be onsite during construction activities to direct the excavation and segregation of impacted soil and to conduct additional delineation or confirmatory sampling as required.

Any clean soil that requires removal from the Phase II Property for construction purposes must be handled in accordance with Ontario Regulation 406/19: On-Site and Excess Soil Management.

Groundwater

It is recommended that the monitoring wells installed on the Phase II Property remain viable for future monitoring, if required. It is expected that groundwater monitoring wells will be abandoned in accordance with O.Reg.903 at the time of the construction excavation.

7.0 STATEMENT OF LIMITATIONS

This Phase II - Environmental Site Assessment report has been prepared under the supervision of a Qualified Person, in general accordance with O.Reg. 153/04, as amended, and meets the requirements of CSA Z769-00. The conclusions presented herein are based on information gathered from a limited sampling and testing program. The test results represent conditions at specific test locations at the time of the field program.

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 of the test holes themselves.

Should any conditions be encountered at the subject site and/or historical information that differ from our findings, we request that we be notified immediately in order to allow for a reassessment.

This report was prepared for the sole use of The Cadillac Fairview Corporation Limited. Notification from The Cadillac Fairview Corporation Limited and Paterson Group will be required to release this report to any other party.

Paterson Group Inc.

Jeremy Camposarcone, B. Eng.

Karyn Munch, P.Eng., Q.P.ESA

Report Distribution:

- ❒ The Cadillac Fairview Corporation Limited
- ❒ Paterson Group

FIGURES

FIGURE 1 – KEY PLAN

DRAWING PE5267-1 – SITE PLAN

DRAWING PE5267-2 – SURROUNDING LAND USE PLAN

DRAWING PE5267-3 – TEST HOLE LOCATION PLAN

DRAWING PE5267-4 – ANALYTICAL TESTING PLAN – SOIL (METALS)

DRAWING PE5267-4A – CROSS SECTION A-A' – SOIL (METALS)

DRAWING PE5267-4B – CROSS SECTION B-B' – SOIL (METALS)

DRAWING PE5267-5– ANALYTICAL TESTING PLAN – SOIL (VOCS AND BTEX)

DRAWING PE5267-5A – CROSS SECTION A-A' – SOIL (VOCS AND BTEX)

DRAWING PE5267-5B – CROSS SECTION B-B' – SOIL (VOCS AND BTEX)

DRAWING PE5267-6 – ANALYTICAL TESTING PLAN – SOIL (PHCS)

DRAWING PE5267-6A – CROSS SECTION A-A' – SOIL (PHCS)

DRAWING PE5267-6B – CROSS SECTION B-B' – SOIL (PHCS)

DRAWING PE5267-7 – ANALYTICAL TESTING PLAN – SOIL (PAHS)

DRAWING PE5267-7A – CROSS SECTION A-A' – SOIL (PAHS)

DRAWING PE5267-7B – CROSS SECTION B-B' – SOIL (PAHS)

DRAWING PE5267-8 – ANALYTICAL TESTING PLAN – GROUNDWATER

DRAWING PE5267-8A – CROSS-SECTION A – A' – GROUNDWATER

DRAWING PE5267-8B – CROSS-SECTION B – B' – GROUNDWATER

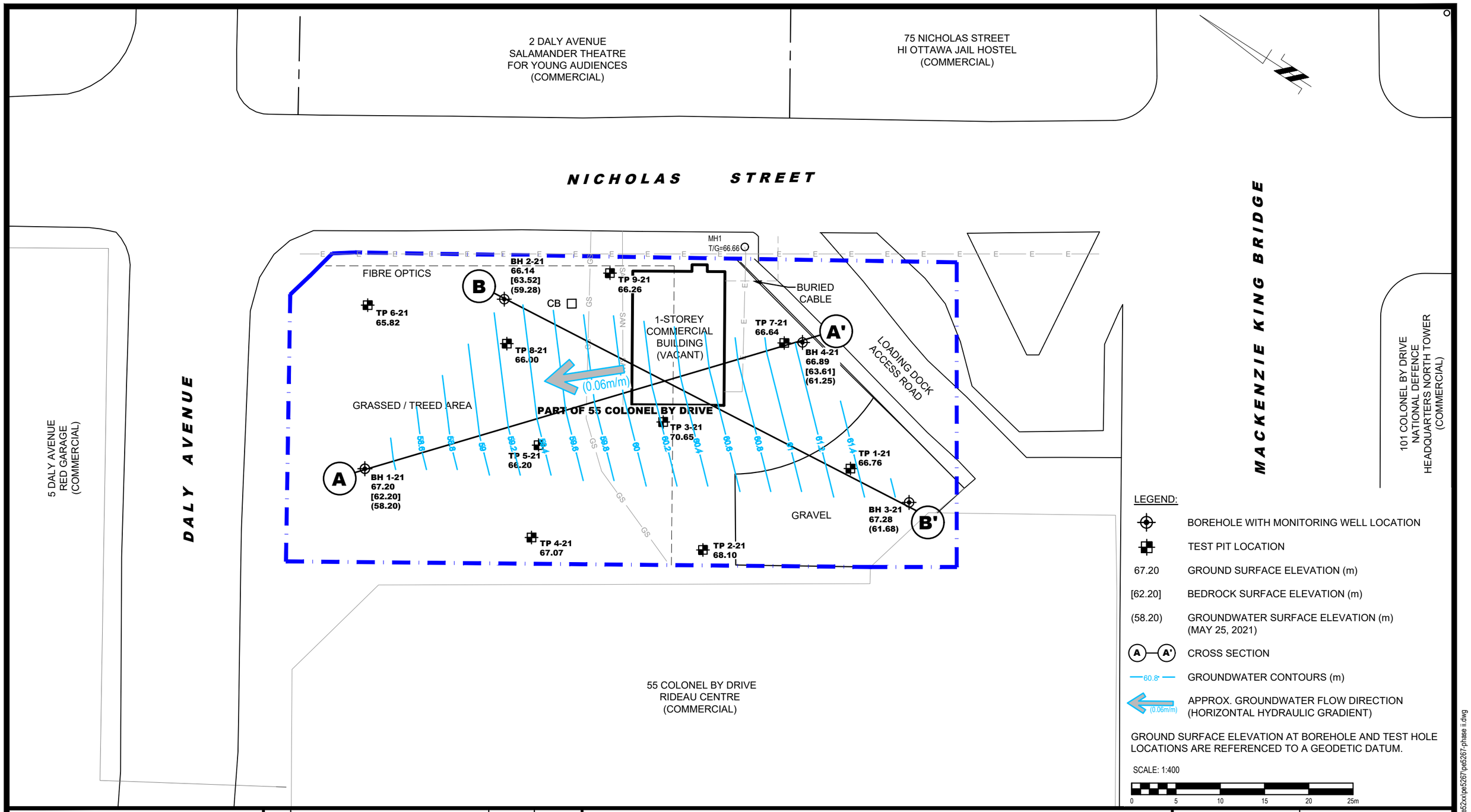
APPENDIX 1

SAMPLING AND ANALYSIS PLAN

SOIL PROFILE AND TEST DATA SHEETS

SYMBOLS AND TERMS

LABORATORY CERTIFICATES OF ANALYSIS



LEGEND:

- BOREHOLE WITH MONITORING WELL LOCATION
- TEST PIT LOCATION
- 67.20 — GROUND SURFACE ELEVATION (m)
- [62.20] — BEDROCK SURFACE ELEVATION (m)
- (58.20) — GROUNDWATER SURFACE ELEVATION (m) (MAY 25, 2021)
- A — A' — CROSS SECTION
- 60.8 — GROUNDWATER CONTOURS (m)
- (0.06m/m) — APPROX. GROUNDWATER FLOW DIRECTION (HORIZONTAL HYDRAULIC GRADIENT)

GROUND SURFACE ELEVATION AT BOREHOLE AND TEST HOLE LOCATIONS ARE REFERENCED TO A GEODETIC DATUM.

SCALE: 1:400

0 5 10 15 20 25m

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NO.	REVISIONS	DATE	INITIAL

THE CADILLAC FAIRVIEW CORPORATION LIMITED

PHASE II - ENVIRONMENTAL SITE ASSESSMENT
70 NICHOLAS STREET

OTTAWA, ONTARIO

Title:

TEST HOLE LOCATION PLAN

Scale: 1:400	Date: 08/2021
Drawn by: YA	Report No.: PE5267-2
Checked by: JC	Dwg. No.: PE5267-3
Approved by: MSD	Revision No.:

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2 DALY AVENUE
SALAMANDER THEATRE
FOR YOUNG AUDIENCES
(COMMERCIAL)

75 NICHOLAS STREET
HI OTTAWA JAIL HOSTEL
(COMMERCIAL)

NICHOLAS STREET

DALY AVENUE

KI BRIDGE

5 DALY AVENUE
RED GARAGE
(COMMERCIAL)

101 COLONEL BY DRIVE
NATIONAL DEFENCE
HEADQUARTERS NORTH TOWER
(COMMERCIAL)

55 COLONEL BY DRIVE
RIDEAU CENTRE
(COMMERCIAL)

PART OF 55 COLONEL BY DRIVE

1-STOREY
COMMERCIAL
BUILDING
(VACANT)

GRASSED / TREED AREA

GRAVEL

LOADING DOCK
ACCESS ROAD

FIBRE OPTICS

BURIED
CABLE

CB

MH1
T/G=66.66

BH2-21-SS4	2.29-2.62m	May 17, 2021
Parameter	Result (µg/g)	Standard(µg/g)
Lead	212	120
Mercury	1.3	0.27

Remaining Metals comply with MECP Table 3 Standards

TP8-21-GS5 2.5-2.7m June 15, 2021
Methyl Mercury complies with MECP Table 3 Standards

TP7-21-GS6 2.7-3.0m June 15, 2021
Methyl Mercury complies with MECP Table 3 Standards

TP6-21-GS5	2.8-3.0m	June 15, 2021
Parameter	Result (µg/g)	Standard(µg/g)
Lead	136	120

Remaining Metals comply with MECP Table 3 Standards

BH4-21-SS2 0.76-1.37m May 17, 2021
Metals comply with MECP Table 3 Standards

TP1-21-GS4 2.3-2.5m June 15, 2021
Methyl Mercury complies with MECP Table 3 Standards

BH3-21-SS4/5	2.29-3.66m	May 17, 2021
Parameter	Result (µg/g)	Standard(µg/g)
Mercury	0.5	0.27

Remaining Metals comply with MECP Table 3 Standards

DUP(BH3-21-SS4/5)	2.29-3.66m	May 17, 2021
Parameter	Result (µg/g)	Standard(µg/g)
Mercury	0.4	0.27

Remaining Metals comply with MECP Table 3 Standards

BH1-21-SS5/6	3.05-4.42m	May 14, 2021
Parameter	Result (µg/g)	Standard(µg/g)
Barium	584	390

Remaining Metals comply with MECP Table 3 Standards

TP4-21-GS2 0.7-0.8m June 15, 2021
Metals comply with MECP Table 3 Standards

DUP4(TP4-21-GS2) 0.7-0.8m June 15, 2021
Metals comply with MECP Table 3 Standards

TP2-21-GS4 1.7-1.9m June 15, 2021
Metals comply with MECP Table 3 Standards

TP3-21-GS3	0.5-0.7m	June 15, 2021
Parameter	Result (µg/g)	Standard(µg/g)
Arsenic	22.3	18
Cadmium	3.1	1.2
Lead	270	120
Mercury	1.0	0.27
Selenium	4.3	2.4
Zinc	1680	340

Remaining Metals comply with MECP Table 3 Standards

SOIL RESULT COMPLIES WITH MECP TABLE 3 STANDARDS

SOIL RESULT EXCEEDS MECP TABLE 3 STANDARDS

BH 1-21
67.20
[62.20]
(58.20)

BH 2-21
66.14
[63.52]
(59.28)

BH 3-21
67.28
(61.68)

BH 4-21
66.89
[63.61]
(61.25)

TP 1-21
66.76

TP 2-21
68.10

TP 3-21
70.65

TP 4-21
67.07

TP 5-21
66.20

TP 6-21
65.82

TP 7-21
66.64

TP 8-21
66.00

TP 9-21
66.26

LEGEND:

- BOREHOLE WITH MONITORING WELL LOCATION
- TEST PIT LOCATION
- 67.20 GROUND SURFACE ELEVATION (m)
- [62.20] BEDROCK SURFACE ELEVATION (m)
- (58.20) GROUNDWATER SURFACE ELEVATION (m) (MAY 25, 2021)
- A — A' CROSS SECTION

GROUND SURFACE ELEVATION AT BOREHOLE AND TEST HOLE LOCATIONS ARE REFERENCED TO A GEODETIC DATUM.

SCALE: 1:400

0 5 10 15 20 25m

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NO.	REVISIONS	DATE	INITIAL

THE CADILLAC FAIRVIEW CORPORATION LIMITED

PHASE II - ENVIRONMENTAL SITE ASSESSMENT
70 NICHOLAS STREET

OTTAWA, ONTARIO

Title:

ANALYTICAL TESTING PLAN - SOIL (METALS)

Scale: 1:400	Date: 08/2021
Drawn by: YA	Report No.: PE5267-2
Checked by: JC	Dwg. No.: PE5267-4
Approved by: MSD	Revision No.:

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BH1-21-SS5/6	3.05-4.42m	May 14, 2021
Parameter	Result (µg/g)	Standard(µg/g)
Barium	584	390

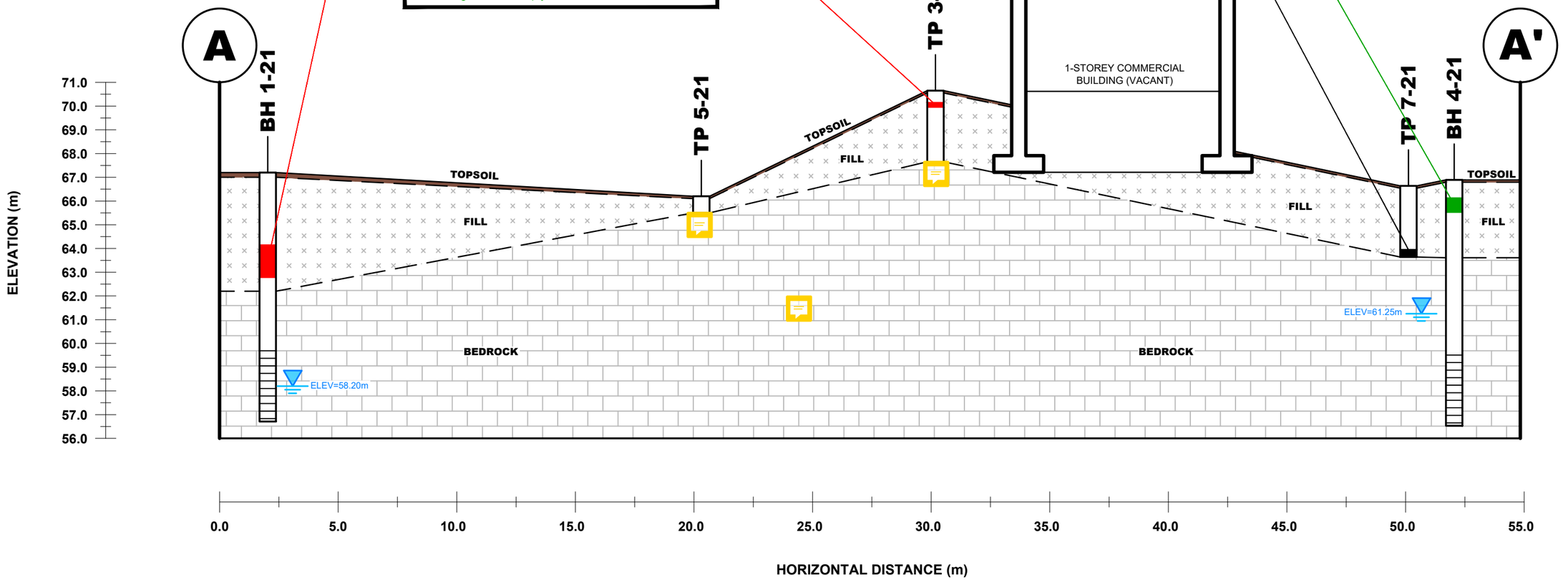
Remaining Metals comply with MECP Table 3 Standards

TP3-21-GS3	0.5-0.7m	June 15, 2021
Parameter	Result (µg/g)	Standard(µg/g)
Arsenic	22.3	18
Cadmium	3.1	1.2
Lead	270	120
Mercury	1.0	0.27
Selenium	4.3	2.4
Zinc	1680	340

Remaining Metals comply with MECP Table 3 Standards

BH4-21-SS2 0.76-1.37m May 17, 2021
Metals comply with MECP Table 3 Standards

TP7-21-GS6 2.7-3.0m June 15, 2020
WAITING FOR METHYL MERCURY RESULTS



SOIL RESULT COMPLIES WITH MECP TABLE 3 STANDARDS

SOIL RESULT EXCEEDS MECP TABLE 3 STANDARDS

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NO.	REVISIONS	DATE	INITIAL

THE CADILLAC FAIRVIEW CORPORATION LIMITED

PHASE II - ENVIRONMENTAL SITE ASSESSMENT
PART OF 55 COLONEL BY DRIVE

OTTAWA, ONTARIO

Title:

CROSS SECTION A-A' - SOIL (METALS)

Scale: AS SHOWN	Date: 07/2021
Drawn by: YA	Report No.: PE5267-2
Checked by: JC	Dwg. No.: PE5267-4A
Approved by: MSD	Revision No.:

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BH1-21-SS5/6	3.05-4.42m	May 14, 2021
Parameter	Result (µg/g)	Standard(µg/g)
Barium	584	390

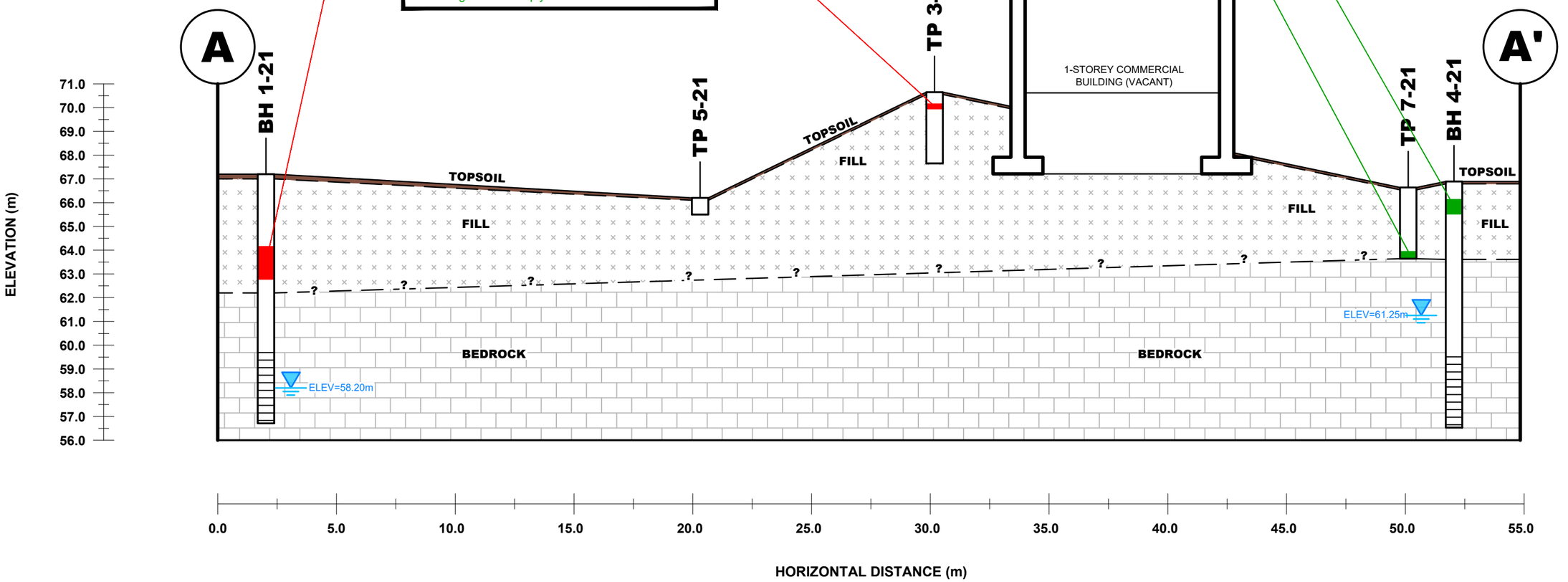
Remaining Metals comply with MECP Table 3 Standards

TP3-21-GS3	0.5-0.7m	June 15, 2021
Parameter	Result (µg/g)	Standard(µg/g)
Arsenic	22.3	18
Cadmium	3.1	1.2
Lead	270	120
Mercury	1.0	0.27
Selenium	4.3	2.4
Zinc	1680	340

Remaining Metals comply with MECP Table 3 Standards

BH4-21-SS2 0.76-1.37m May 17, 2021
Metals comply with MECP Table 3 Standards

TP7-21-GS6 2.7-3.0m June 15, 2021
Methyl Mercury complies with MECP Table 3 Standards



SOIL RESULT COMPLIES WITH MECP TABLE 3 STANDARDS

SOIL RESULT EXCEEDS MECP TABLE 3 STANDARDS

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NO.	REVISIONS	DATE	INITIAL

THE CADILLAC FAIRVIEW CORPORATION LIMITED

PHASE II - ENVIRONMENTAL SITE ASSESSMENT
70 NICHOLAS STREET

OTTAWA, ONTARIO

Title:

CROSS SECTION A-A' - SOIL (METALS)

Scale: AS SHOWN	Date: 08/2021
Drawn by: YA	Report No.: PE5267-2
Checked by: JC	Dwg. No.: PE5267-4A
Approved by: MSD	Revision No.:

p:\autocad drawings\environmental\pe52xx\pe5267\pe5267-phase ii.dwg

BH2-21-SS4	2.29-2.62m	May 17, 2021
Parameter	Result (µg/g)	Standard(µg/g)
Lead	212	120
Mercury	1.3	0.27

Remaining Metals comply with MECP Table 3 Standards

TP8-21-GS5	2.5-2.7m	June 15, 2021

Methyl Mercury complies with MECP Table 3 Standards

TP3-21-GS3	0.5-0.7m	June 15, 2021
Parameter	Result (µg/g)	Standard(µg/g)
Arsenic	22.3	18
Cadmium	3.1	1.2
Lead	270	120
Mercury	1.0	0.27
Selenium	4.3	2.4
Zinc	1680	340

Remaining Metals comply with MECP Table 3 Standards

BH3-21-SS4/5	2.29-3.66m	May 17, 2021
Parameter	Result (µg/g)	Standard(µg/g)
Mercury	0.5	0.27

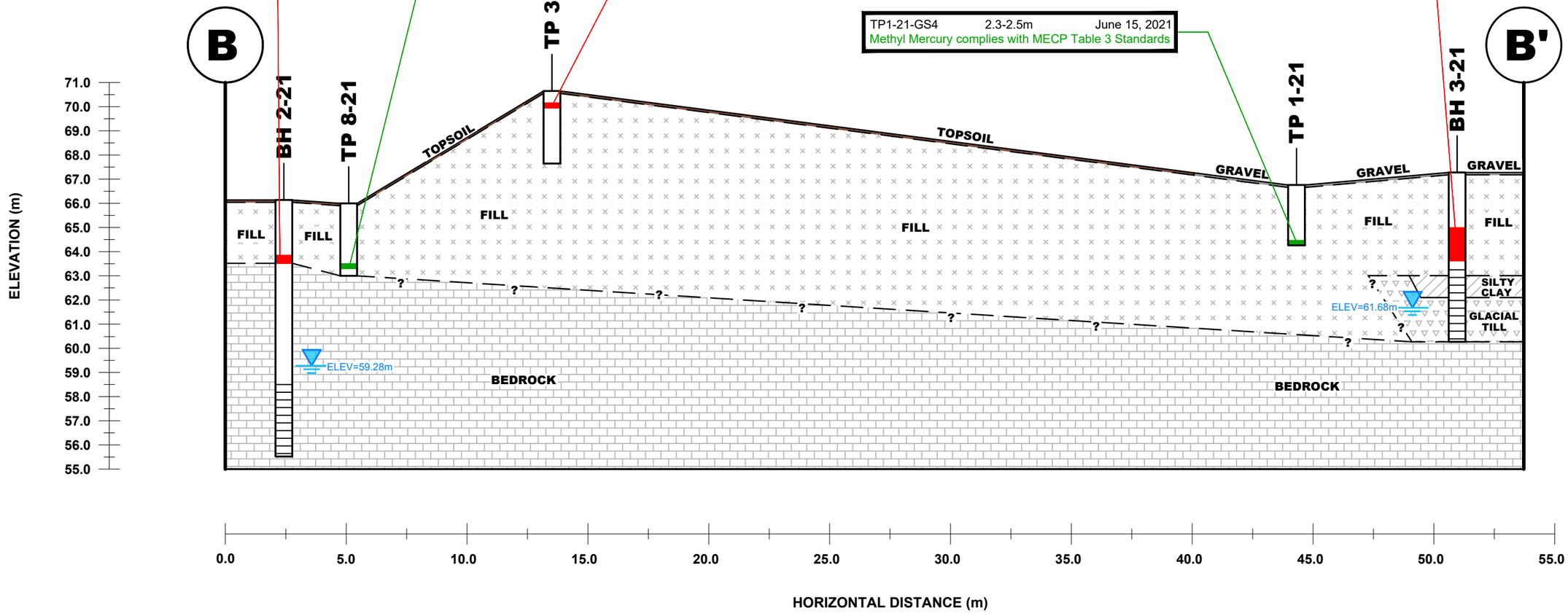
Remaining Metals comply with MECP Table 3 Standards

DUP(BH3-21-SS4/5)	2.29-3.66m	May 17, 2021
Parameter	Result (µg/g)	Standard(µg/g)
Mercury	0.4	0.27

Remaining Metals comply with MECP Table 3 Standards

TP1-21-GS4	2.3-2.5m	June 15, 2021

Methyl Mercury complies with MECP Table 3 Standards



SOIL RESULT COMPLIES WITH MECP TABLE 3 STANDARDS

SOIL RESULT EXCEEDS MECP TABLE 3 STANDARDS

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NO.	REVISIONS	DATE	INITIAL

THE CADILLAC FAIRVIEW CORPORATION LIMITED

PHASE II - ENVIRONMENTAL SITE ASSESSMENT
70 NICHOLAS STREET

OTTAWA, ONTARIO

Title:

CROSS SECTION B-B' - SOIL (METALS)

Scale: AS SHOWN	Date: 08/2021
Drawn by: YA	Report No.: PE5267-2
Checked by: JC	Dwg. No.: PE5267-4B
Approved by: MSD	Revision No.:

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BH2-21-SS4	2.29-2.62m	May 17, 2021
Parameter	Result (µg/g)	Standard(µg/g)
Lead	212	120
Mercury	1.3	0.27

Remaining Metals comply with MECP Table 3 Standards

TP3-21-GS3	0.5-0.7m	June 15, 2021
Parameter	Result (µg/g)	Standard(µg/g)
Arsenic	22.3	18
Cadmium	3.1	1.2
Lead	270	120
Mercury	1.0	0.27
Selenium	4.3	2.4
Zinc	1680	340

Remaining Metals comply with MECP Table 3 Standards

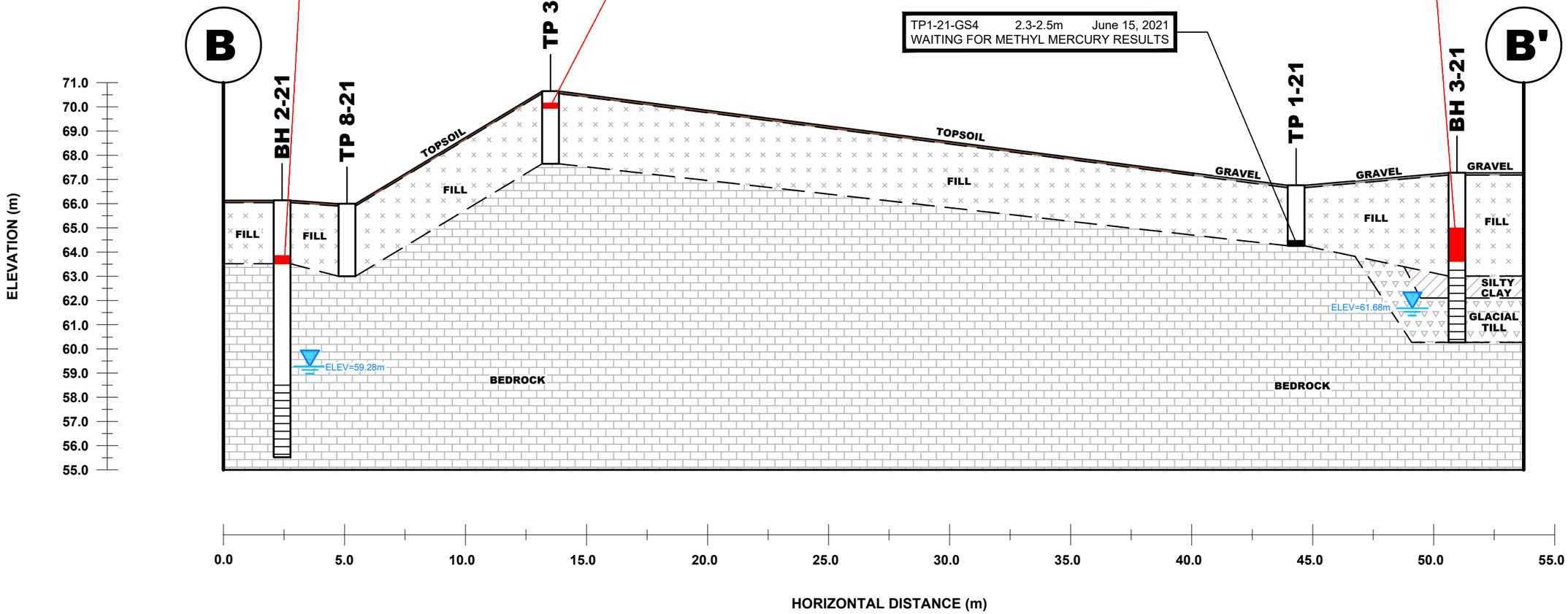
BH3-21-SS4/5	2.29-3.66m	May 17, 2021
Parameter	Result (µg/g)	Standard(µg/g)
Mercury	0.5	0.27

Remaining Metals comply with MECP Table 3 Standards

DUP(BH3-21-SS4/5)	2.29-3.66m	May 17, 2021
Parameter	Result (µg/g)	Standard(µg/g)
Mercury	0.4	0.27

Remaining Metals comply with MECP Table 3 Standards

TP1-21-GS4 2.3-2.5m June 15, 2021
WAITING FOR METHYL MERCURY RESULTS



SOIL RESULT COMPLIES WITH MECP TABLE 3 STANDARDS

SOIL RESULT EXCEEDS MECP TABLE 3 STANDARDS

patersongroup
consulting engineers

154 Colonnade Road South
Ottawa, Ontario K2E 7J5
Tel: (613) 226-7381 Fax: (613) 226-6344

NO.	REVISIONS	DATE	INITIAL

THE CADILLAC FAIRVIEW CORPORATION LIMITED

PHASE II - ENVIRONMENTAL SITE ASSESSMENT
PART OF 55 COLONEL BY DRIVE

OTTAWA, ONTARIO

Title:

CROSS SECTION B-B' - SOIL (METALS)

Scale: AS SHOWN	Date: 07/2021
Drawn by: YA	Report No.: PE5267-2
Checked by: JC	Dwg. No.: PE5267-4B
Approved by: MSD	Revision No.:

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2 DALY AVENUE
SALAMANDER THEATRE
FOR YOUNG AUDIENCES
(COMMERCIAL)

75 NICHOLAS STREET
HI OTTAWA JAIL HOSTEL
(COMMERCIAL)

NICHOLAS STREET

DALY AVENUE

MACKENZIE KING BRIDGE

5 DALY AVENUE
RED GARAGE
(COMMERCIAL)

101 COLONEL BY DRIVE
NATIONAL DEFENCE
HEADQUARTERS NORTH TOWER
(COMMERCIAL)

MH1
T/G=66.66

FIBRE OPTICS

BURIED CABLE

CB

1-STOREY COMMERCIAL BUILDING (VACANT)

LOADING DOCK ACCESS ROAD

GRASSED / TREED AREA

PART OF 55 COLONEL BY DRIVE

GRAVEL

B

BH 2-21
66.14
[63.52]
(59.28)

TP 6-21
65.82

TP 8-21
66.00

TP 9-21
66.26

TP 7-21
66.64

A'

BH 4-21
66.89
[63.61]
(61.25)

TP 3-21
70.65

TP 5-21
66.20

TP 1-21
66.76

A

BH 1-21
67.20
[62.20]
(58.20)

BH 3-21
67.28
(61.68)

B'

TP 4-21
67.07

TP 2-21
68.10

TP1-21-GS3 1.7-1.9m June 15, 2021
VOCs comply with MECP Table 3 Standards

BH3-21-SS2 0.76-1.37m May 17, 2021
BTEX comply with MECP Table 3 Standards

BH1-21-SS3 1.52-2.13m May 14, 2021
BTEX comply with MECP Table 3 Standards

TP2-21-GS4 1.70-1.90m June 15, 2021
BTEX comply with MECP Table 3 Standards

55 COLONEL BY DRIVE
RIDEAU CENTRE
(COMMERCIAL)

LEGEND:

- BOREHOLE WITH MONITORING WELL LOCATION
- TEST PIT LOCATION
- 67.20 GROUND SURFACE ELEVATION (m)
- [62.20] BEDROCK SURFACE ELEVATION (m)
- (58.20) GROUNDWATER SURFACE ELEVATION (m) (MAY 25, 2021)
- A — A' CROSS SECTION

GROUND SURFACE ELEVATION AT BOREHOLE AND TEST HOLE LOCATIONS ARE REFERENCED TO A GEODETIC DATUM.

SCALE: 1:400

0 5 10 15 20 25m

SOIL RESULT COMPLIES WITH MECP TABLE 3 STANDARDS

SOIL RESULT EXCEEDS MECP TABLE 3 STANDARDS

patersongroup
consulting engineers

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Ottawa, Ontario K2E 7J5
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NO.	REVISIONS	DATE	INITIAL

THE CADILLAC FAIRVIEW CORPORATION LIMITED

PHASE II - ENVIRONMENTAL SITE ASSESSMENT
70 NICHOLAS STREET

OTTAWA, ONTARIO

Title:

ANALYTICAL TESTING PLAN - SOIL (BTEX, VOCs)

Scale: 1:400	Date: 08/2021
Drawn by: YA	Report No.: PE5267-2
Checked by: JC	Dwg. No.: PE5267-5
Approved by: MSD	Revision No.:

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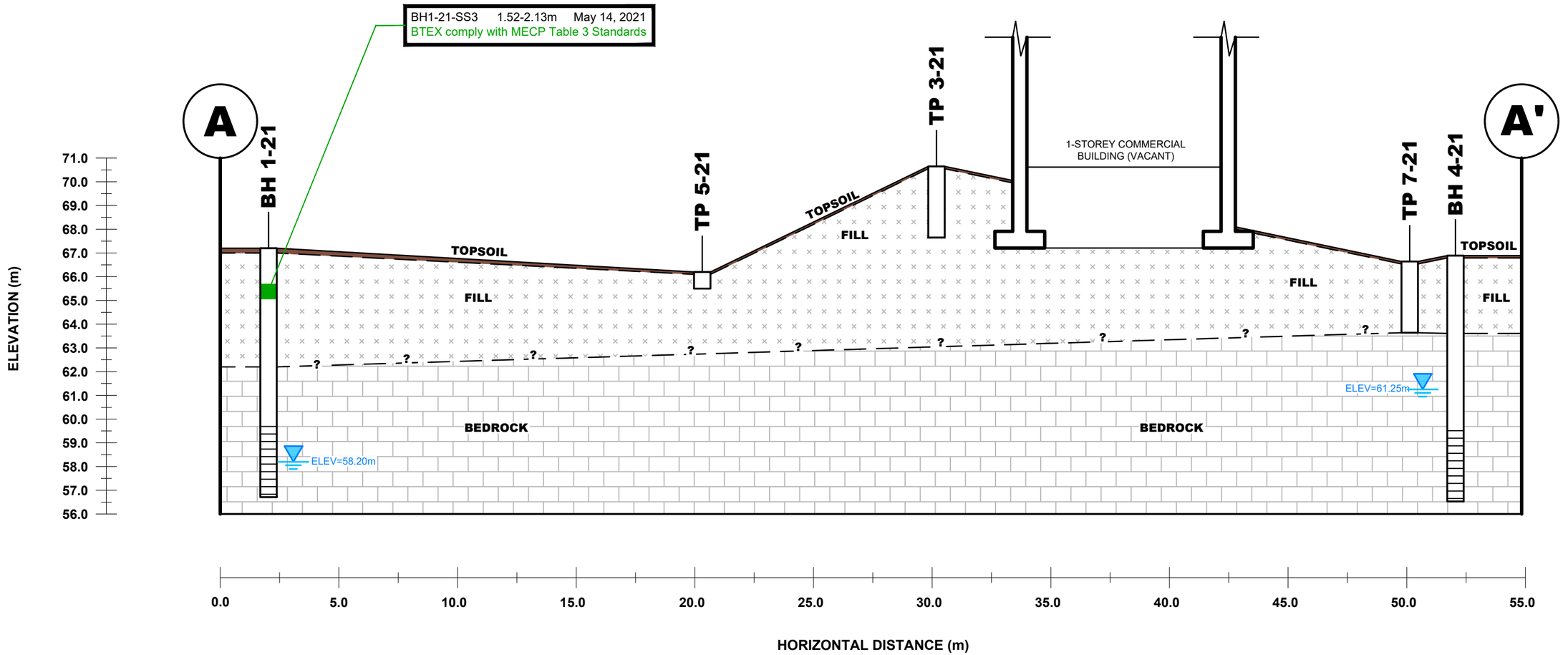

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THE CADILLAC FAIRVIEW CORPORATION LIMITED

PHASE II - ENVIRONMENTAL SITE ASSESSMENT
70 NICHOLAS STREET

OTTAWA, ONTARIO

Title:

CROSS SECTION A-A' - SOIL (BTEX, VOCs)

Scale: AS SHOWN	Date: 08/2021
Drawn by: YA	Report No.: PE5267-2
Checked by: JC	Dwg. No.: PE5267-5A
Approved by: MSD	Revision No.:

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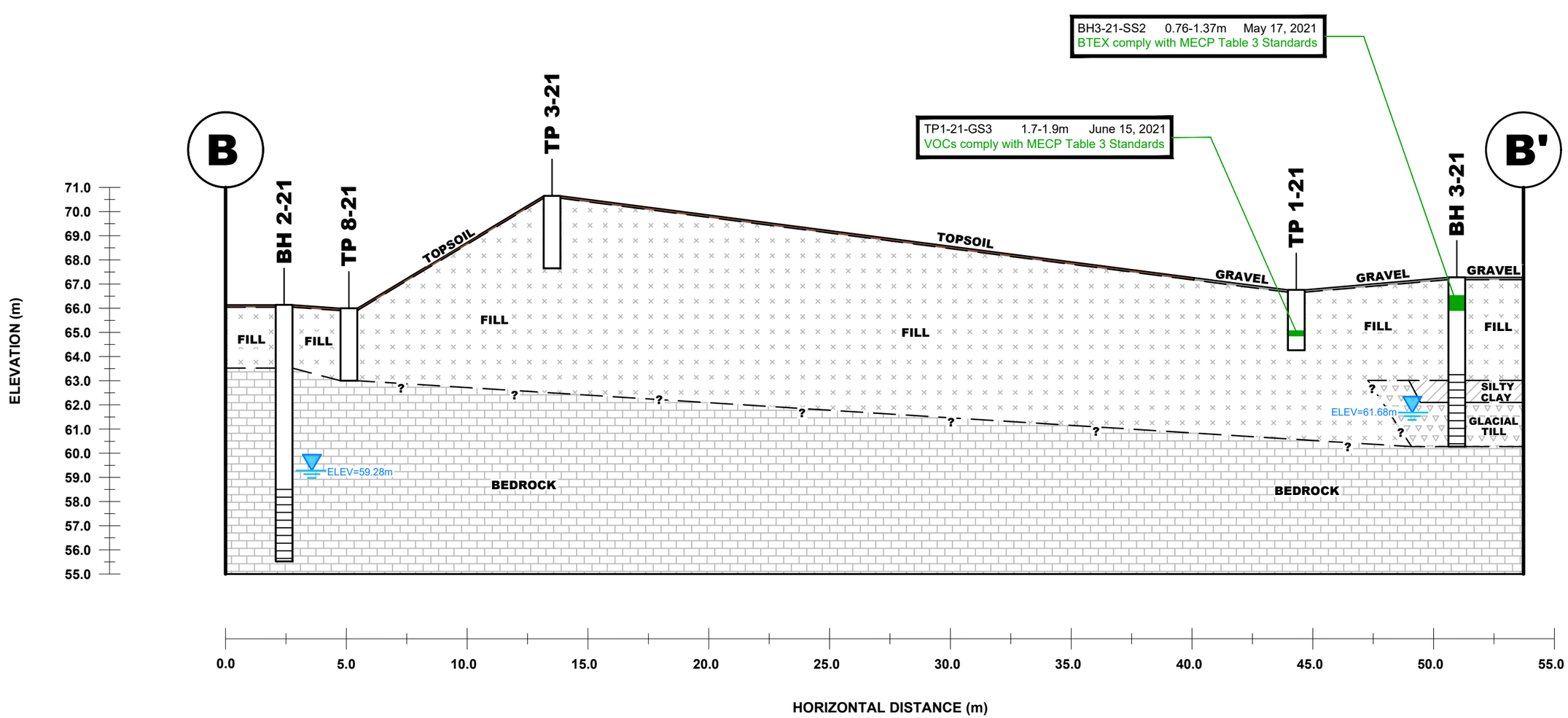

SOIL RESULT COMPLIES WITH MECP TABLE 3 STANDARDS

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PHASE II - ENVIRONMENTAL SITE ASSESSMENT
70 NICHOLAS STREET

OTTAWA, ONTARIO

Title:

CROSS SECTION B-B' - SOIL (BTEX, VOCs)

Scale: AS SHOWN	Date: 08/2021
Drawn by: YA	Report No.: PE5267-2
Checked by: JC	Dwg. No.: PE5267-5B
Approved by: MSD	Revision No.:

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2 DALY AVENUE
SALAMANDER THEATRE
FOR YOUNG AUDIENCES
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75 NICHOLAS STREET
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NATIONAL DEFENCE
HEADQUARTERS NORTH TOWER
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BURIED CABLE

CB

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T/G=66.66

1-STOREY COMMERCIAL BUILDING (VACANT)

LOADING DOCK ACCESS ROAD

GRASSED / TREED AREA

PART OF 55 COLONEL BY DRIVE

GRAVEL

B
BH 2-21
66.14
[63.52]
(59.28)

TP 6-21
65.82

TP 8-21
66.00

TP 9-21
66.26

TP 7-21
66.64

A'
BH 4-21
66.89
[63.61]
(61.25)

TP 3-21
70.65

TP 5-21
66.20

TP 1-21
66.76

A
BH 1-21
67.20
[62.20]
(58.20)

BH 3-21
67.28
(61.68)
B'

TP 4-21
67.07

TP 2-21
68.10

TP1-21-GS3	1.70-1.90m	June 15, 2021
Parameter	Result (µg/g)	Standard(µg/g)
F3 PHCs	386	300
Remaining PHCs comply with MECP Table 3 Standards		

BH3-21-SS2	0.76-1.37m	May 17, 2021
PHCs comply with MECP Table 3 Standards		

BH1-21-SS3	1.52-2.13m	May 14, 2021
PHCs comply with MECP Table 3 Standards		

TP2-21-GS4	1.70-1.90m	June 15, 2021
PHCs comply with MECP Table 3 Standards		

55 COLONEL BY DRIVE
RIDEAU CENTRE
(COMMERCIAL)

LEGEND:

- BOREHOLE WITH MONITORING WELL LOCATION
- TEST PIT LOCATION
- 67.20 GROUND SURFACE ELEVATION (m)
- [62.20] BEDROCK SURFACE ELEVATION (m)
- (58.20) GROUNDWATER SURFACE ELEVATION (m) (MAY 25, 2021)
- A — A' CROSS SECTION

GROUND SURFACE ELEVATION AT BOREHOLE AND TEST HOLE LOCATIONS ARE REFERENCED TO A GEODETIC DATUM.

SCALE: 1:400

0 5 10 15 20 25m

SOIL RESULT COMPLIES WITH MECP TABLE 3 STANDARDS

SOIL RESULT EXCEEDS MECP TABLE 3 STANDARDS

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consulting engineers

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NO.	REVISIONS	DATE	INITIAL

THE CADILLAC FAIRVIEW CORPORATION LIMITED

PHASE II - ENVIRONMENTAL SITE ASSESSMENT
70 NICHOLAS STREET

OTTAWA, ONTARIO

Title:

ANALYTICAL TESTING PLAN - SOIL (PHCs)

Scale: 1:400	Date: 08/2021
Drawn by: YA	Report No.: PE5267-2
Checked by: JC	Dwg. No.: PE5267-6
Approved by: MSD	Revision No.:

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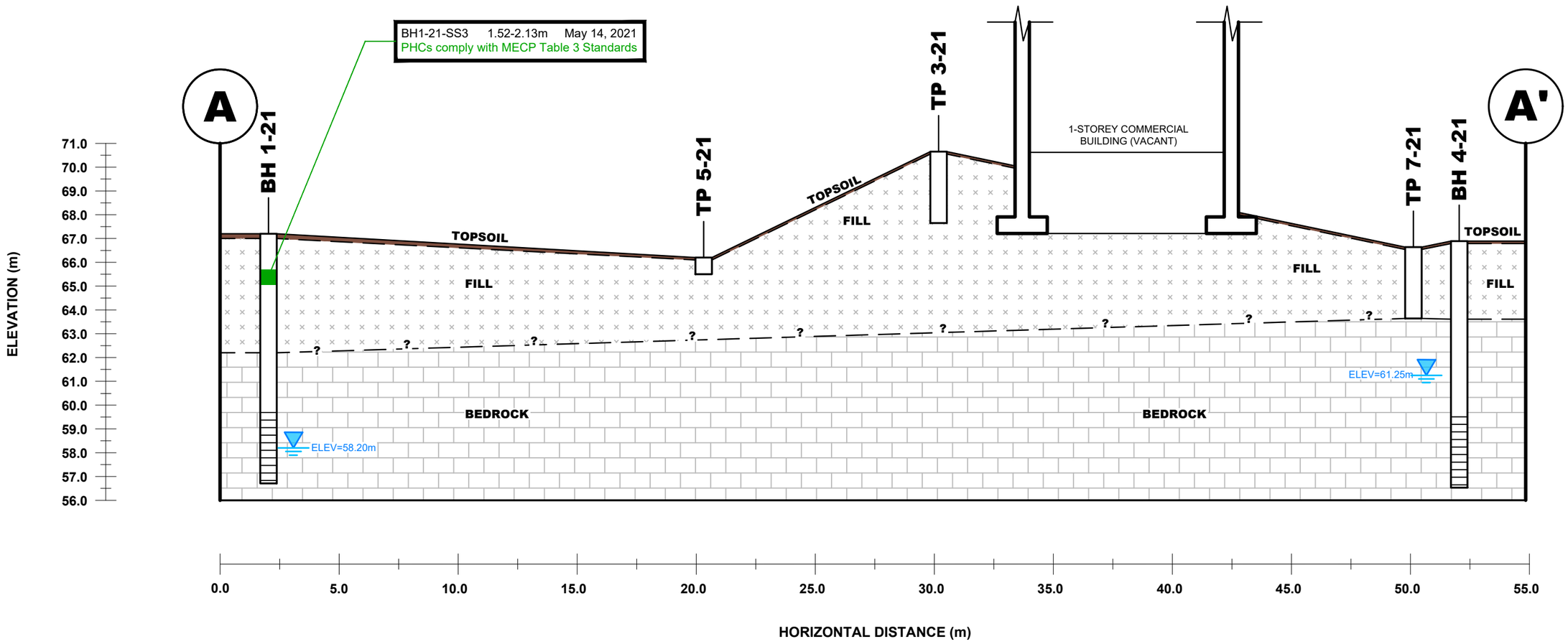

SOIL RESULT COMPLIES WITH MECP TABLE 3 STANDARDS

SOIL RESULT EXCEEDS MECP TABLE 3 STANDARDS

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NO.	REVISIONS	DATE	INITIAL

THE CADILLAC FAIRVIEW CORPORATION LIMITED

PHASE II - ENVIRONMENTAL SITE ASSESSMENT
70 NICHOLAS STREET

OTTAWA, ONTARIO

Title:

CROSS SECTION A-A' - SOIL (PHCs)

Scale: AS SHOWN	Date: 08/2021
Drawn by: YA	Report No.: PE5267-2
Checked by: JC	Dwg. No.: PE5267-6A
Approved by: MSD	Revision No.:

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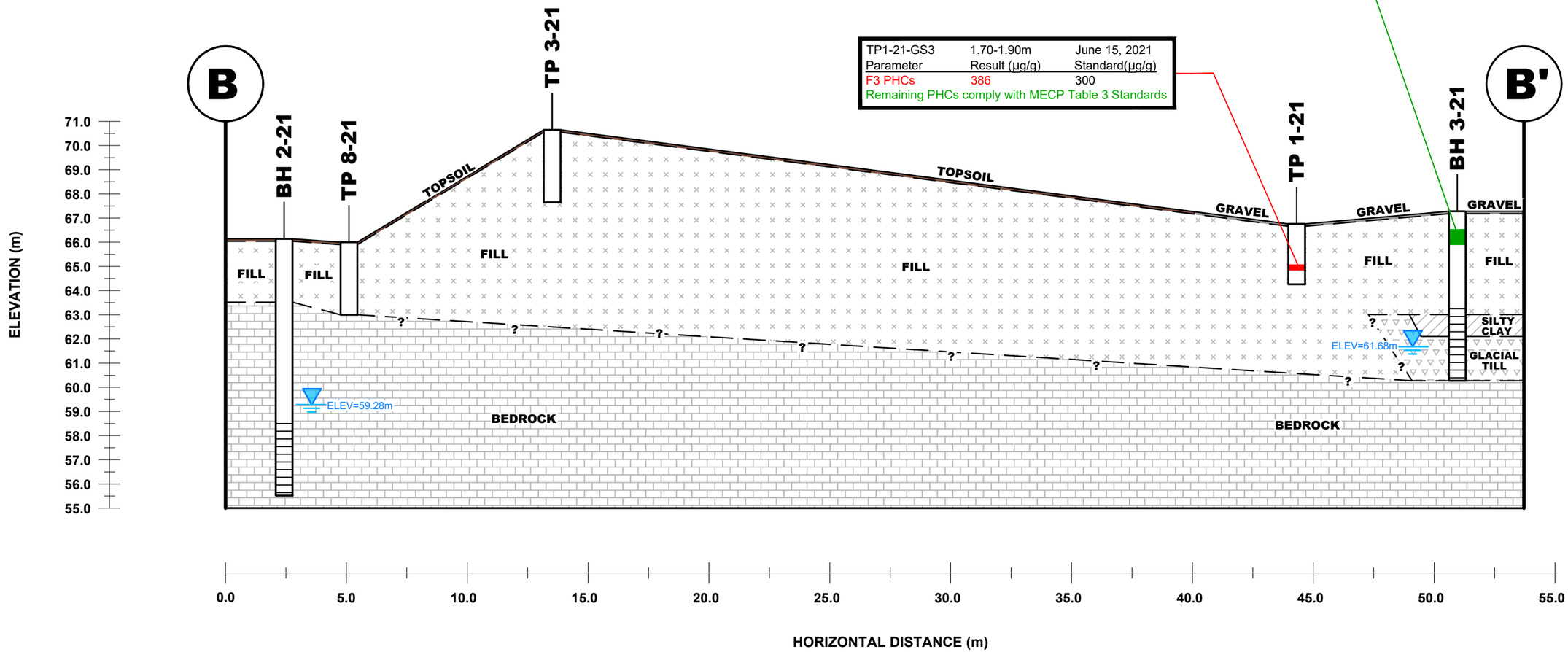

SOIL RESULT COMPLIES WITH MECP TABLE 3 STANDARDS

SOIL RESULT EXCEEDS MECP TABLE 3 STANDARDS

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PHASE II - ENVIRONMENTAL SITE ASSESSMENT
70 NICHOLAS STREET

OTTAWA, ONTARIO

Title:

CROSS SECTION B-B' - SOIL (PHCs)

Scale: AS SHOWN	Date: 08/2021
Drawn by: YA	Report No.: PE5267-2
Checked by: JC	Dwg. No.: PE5267-6B
Approved by: MSD	Revision No.:

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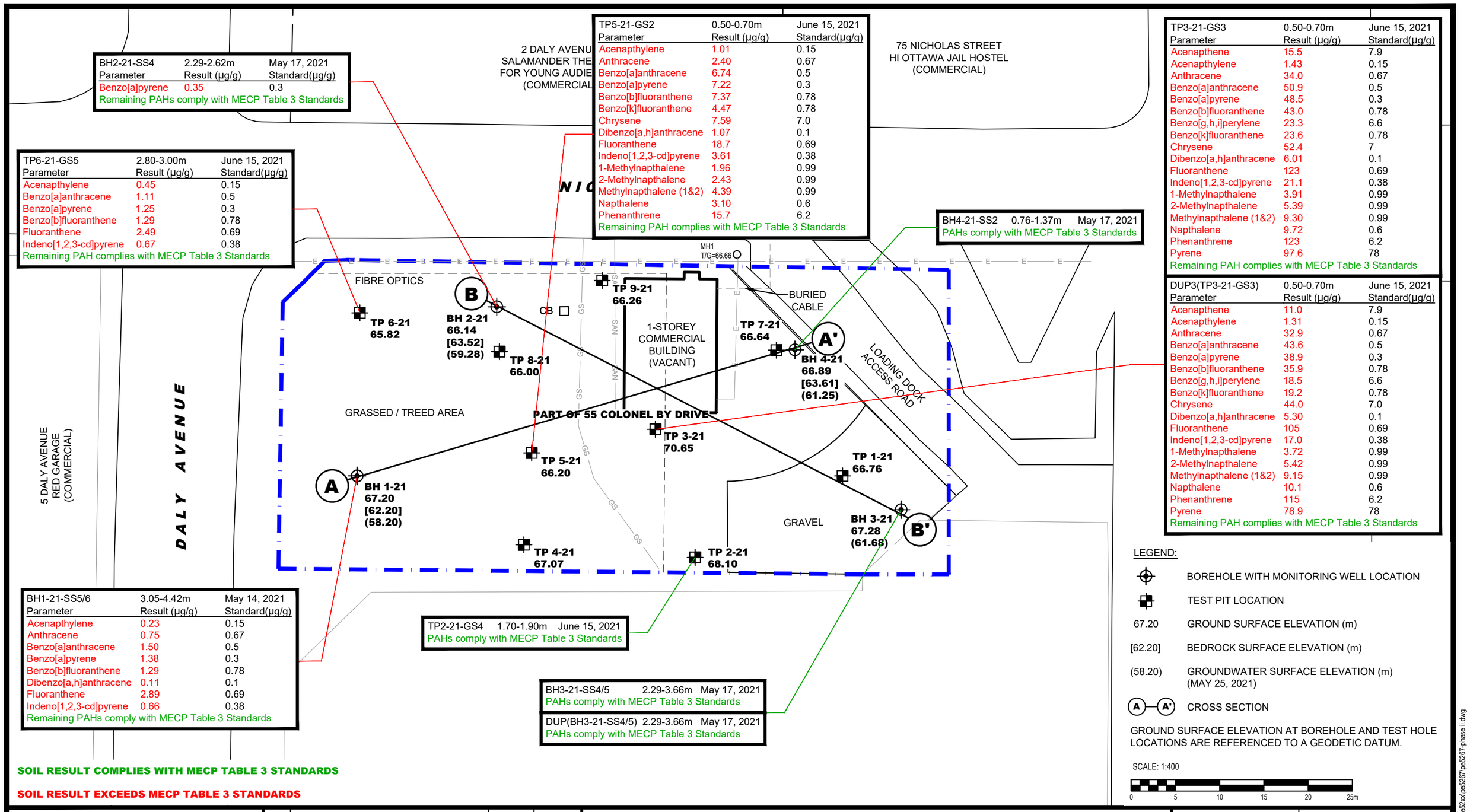

TP5-21-GS2	0.50-0.70m	June 15, 2021
Parameter	Result (µg/g)	Standard(µg/g)
Acenapthylene	1.01	0.15
Anthracene	2.40	0.67
Benzo[a]anthracene	6.74	0.5
Benzo[a]pyrene	7.22	0.3
Benzo[b]fluoranthene	7.37	0.78
Benzo[k]fluoranthene	4.47	0.78
Chrysene	7.59	7.0
Dibenzo[a,h]anthracene	1.07	0.1
Fluoranthene	18.7	0.69
Indeno[1,2,3-cd]pyrene	3.61	0.38
1-Methylnapthalene	1.96	0.99
2-Methylnapthalene	2.43	0.99
Methylnapthalene (1&2)	4.39	0.99
Napthalene	3.10	0.6
Phenanthrene	15.7	6.2

Remaining PAH complies with MECP Table 3 Standards

BH2-21-SS4	2.29-2.62m	May 17, 2021
Parameter	Result (µg/g)	Standard(µg/g)
Benzo[a]pyrene	0.35	0.3

Remaining PAHs comply with MECP Table 3 Standards

TP6-21-GS5	2.80-3.00m	June 15, 2021
Parameter	Result (µg/g)	Standard(µg/g)
Acenapthylene	0.45	0.15
Benzo[a]anthracene	1.11	0.5
Benzo[a]pyrene	1.25	0.3
Benzo[b]fluoranthene	1.29	0.78
Fluoranthene	2.49	0.69
Indeno[1,2,3-cd]pyrene	0.67	0.38

Remaining PAH complies with MECP Table 3 Standards

BH4-21-SS2 0.76-1.37m May 17, 2021
PAHs comply with MECP Table 3 Standards

TP3-21-GS3	0.50-0.70m	June 15, 2021
Parameter	Result (µg/g)	Standard(µg/g)
Acenapthene	15.5	7.9
Acenapthylene	1.43	0.15
Anthracene	34.0	0.67
Benzo[a]anthracene	50.9	0.5
Benzo[a]pyrene	48.5	0.3
Benzo[b]fluoranthene	43.0	0.78
Benzo[g,h,i]perylene	23.3	6.6
Benzo[k]fluoranthene	23.6	0.78
Chrysene	52.4	7
Dibenzo[a,h]anthracene	6.01	0.1
Fluoranthene	123	0.69
Indeno[1,2,3-cd]pyrene	21.1	0.38
1-Methylnapthalene	3.91	0.99
2-Methylnapthalene	5.39	0.99
Methylnapthalene (1&2)	9.30	0.99
Napthalene	9.72	0.6
Phenanthrene	123	6.2
Pyrene	97.6	78

Remaining PAH complies with MECP Table 3 Standards

DUP3(TP3-21-GS3)	0.50-0.70m	June 15, 2021
Parameter	Result (µg/g)	Standard(µg/g)
Acenapthene	11.0	7.9
Acenapthylene	1.31	0.15
Anthracene	32.9	0.67
Benzo[a]anthracene	43.6	0.5
Benzo[a]pyrene	38.9	0.3
Benzo[b]fluoranthene	35.9	0.78
Benzo[g,h,i]perylene	18.5	6.6
Benzo[k]fluoranthene	19.2	0.78
Chrysene	44.0	7.0
Dibenzo[a,h]anthracene	5.30	0.1
Fluoranthene	105	0.69
Indeno[1,2,3-cd]pyrene	17.0	0.38
1-Methylnapthalene	3.72	0.99
2-Methylnapthalene	5.42	0.99
Methylnapthalene (1&2)	9.15	0.99
Napthalene	10.1	0.6
Phenanthrene	115	6.2
Pyrene	78.9	78

Remaining PAH complies with MECP Table 3 Standards

BH1-21-SS5/6	3.05-4.42m	May 14, 2021
Parameter	Result (µg/g)	Standard(µg/g)
Acenapthylene	0.23	0.15
Anthracene	0.75	0.67
Benzo[a]anthracene	1.50	0.5
Benzo[a]pyrene	1.38	0.3
Benzo[b]fluoranthene	1.29	0.78
Dibenzo[a,h]anthracene	0.11	0.1
Fluoranthene	2.89	0.69
Indeno[1,2,3-cd]pyrene	0.66	0.38

Remaining PAHs comply with MECP Table 3 Standards

TP2-21-GS4 1.70-1.90m June 15, 2021
PAHs comply with MECP Table 3 Standards

BH3-21-SS4/5 2.29-3.66m May 17, 2021
PAHs comply with MECP Table 3 Standards

DUP(BH3-21-SS4/5) 2.29-3.66m May 17, 2021
PAHs comply with MECP Table 3 Standards

LEGEND:

- BOREHOLE WITH MONITORING WELL LOCATION
- TEST PIT LOCATION
- 67.20 GROUND SURFACE ELEVATION (m)
- [62.20] BEDROCK SURFACE ELEVATION (m)
- (58.20) GROUNDWATER SURFACE ELEVATION (m) (MAY 25, 2021)
- A—A' CROSS SECTION

GROUND SURFACE ELEVATION AT BOREHOLE AND TEST HOLE LOCATIONS ARE REFERENCED TO A GEODETIC DATUM.

SCALE: 1:400

0 5 10 15 20 25m

SOIL RESULT COMPLIES WITH MECP TABLE 3 STANDARDS

SOIL RESULT EXCEEDS MECP TABLE 3 STANDARDS

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NO.	REVISIONS	DATE	INITIAL

THE CADILLAC FAIRVIEW CORPORATION LIMITED

PHASE II - ENVIRONMENTAL SITE ASSESSMENT
70 NICHOLAS STREET

OTTAWA, ONTARIO

Title:

ANALYTICAL TESTING PLAN - SOIL (PAHs)

Scale: 1:400	Date: 08/2021
Drawn by: YA	Report No.: PE5267-2
Checked by: JC	Dwg. No.: PE5267-7
Approved by: MSD	Revision No.:

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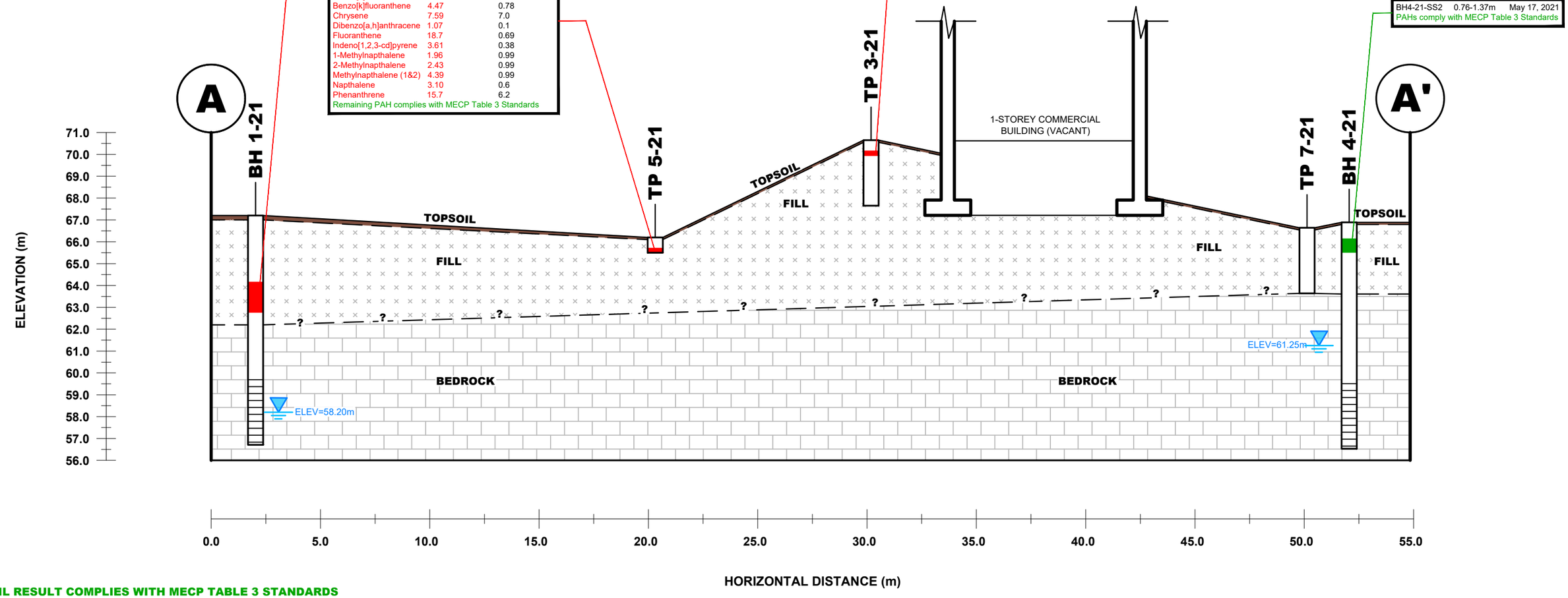
BH1-21-SS5/6	3.05-4.42m	May 14, 2021
Parameter	Result (µg/g)	Standard(µg/g)
Acenapthylene	0.23	0.15
Anthracene	0.75	0.67
Benzo[a]anthracene	1.50	0.5
Benzo[a]pyrene	1.38	0.3
Benzo[b]fluoranthene	1.29	0.78
Dibenzo[a,h]anthracene	0.11	0.1
Fluoranthene	2.89	0.69
Indeno[1,2,3-cd]pyrene	0.66	0.38
Remaining PAHs comply with MECP Table 3 Standards		

TP5-21-GS2	0.50-0.70m	June 15, 2021
Parameter	Result (µg/g)	Standard(µg/g)
Acenapthylene	1.01	0.15
Anthracene	2.40	0.67
Benzo[a]anthracene	6.74	0.5
Benzo[a]pyrene	7.22	0.3
Benzo[b]fluoranthene	7.37	0.78
Benzo[k]fluoranthene	4.47	0.78
Chrysene	7.59	7.0
Dibenzo[a,h]anthracene	1.07	0.1
Fluoranthene	18.7	0.69
Indeno[1,2,3-cd]pyrene	3.61	0.38
1-Methylnapthalene	1.96	0.99
2-Methylnapthalene	2.43	0.99
Methylnapthalene (1&2)	4.39	0.99
Napthalene	3.10	0.6
Phenanthrene	15.7	6.2
Remaining PAH complies with MECP Table 3 Standards		

TP3-21-GS3	0.50-0.70m	June 15, 2021
Parameter	Result (µg/g)	Standard(µg/g)
Acenapthene	15.5	7.9
Acenapthylene	1.43	0.15
Anthracene	34.0	0.67
Benzo[a]anthracene	50.9	0.5
Benzo[a]pyrene	48.5	0.3
Benzo[b]fluoranthene	43.0	0.78
Benzo[g,h,i]perylene	23.3	6.6
Benzo[k]fluoranthene	23.6	0.78
Chrysene	52.4	7
Dibenzo[a,h]anthracene	6.01	0.1
Fluoranthene	123	0.69
Indeno[1,2,3-cd]pyrene	21.1	0.38
1-Methylnapthalene	3.91	0.99
2-Methylnapthalene	5.39	0.99
Methylnapthalene (1&2)	9.30	0.99
Napthalene	9.72	0.6
Phenanthrene	123	6.2
Pyrene	97.6	78
Remaining PAH complies with MECP Table 3 Standards		

DUP3(TP3-21-GS3)	0.50-0.70m	June 15, 2021
Parameter	Result (µg/g)	Standard(µg/g)
Acenapthene	11.0	7.9
Acenapthylene	1.31	0.15
Anthracene	32.9	0.67
Benzo[a]anthracene	43.6	0.5
Benzo[a]pyrene	38.9	0.3
Benzo[b]fluoranthene	35.9	0.78
Benzo[g,h,i]perylene	18.5	6.6
Benzo[k]fluoranthene	19.2	0.78
Chrysene	44.0	7.0
Dibenzo[a,h]anthracene	5.30	0.1
Fluoranthene	105	0.69
Indeno[1,2,3-cd]pyrene	17.0	0.38
1-Methylnapthalene	3.72	0.99
2-Methylnapthalene	5.42	0.99
Methylnapthalene (1&2)	9.15	0.99
Napthalene	10.1	0.6
Phenanthrene	115	6.2
Pyrene	78.9	78
Remaining PAH complies with MECP Table 3 Standards		

BH4-21-SS2 0.76-1.37m May 17, 2021
PAHs comply with MECP Table 3 Standards



SOIL RESULT COMPLIES WITH MECP TABLE 3 STANDARDS

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154 Colonnade Road South
Ottawa, Ontario K2E 7J5
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NO.	REVISIONS	DATE	INITIAL

THE CADILLAC FAIRVIEW CORPORATION LIMITED

PHASE II - ENVIRONMENTAL SITE ASSESSMENT
70 NICHOLAS STREET

OTTAWA, ONTARIO

Title:

CROSS SECTION A-A' - SOIL (PAHs)

Scale: AS SHOWN	Date: 08/2021
Drawn by: YA	Report No.: PE5267-2
Checked by: JC	Dwg. No.: PE5267-7A
Approved by: MSD	Revision No.:

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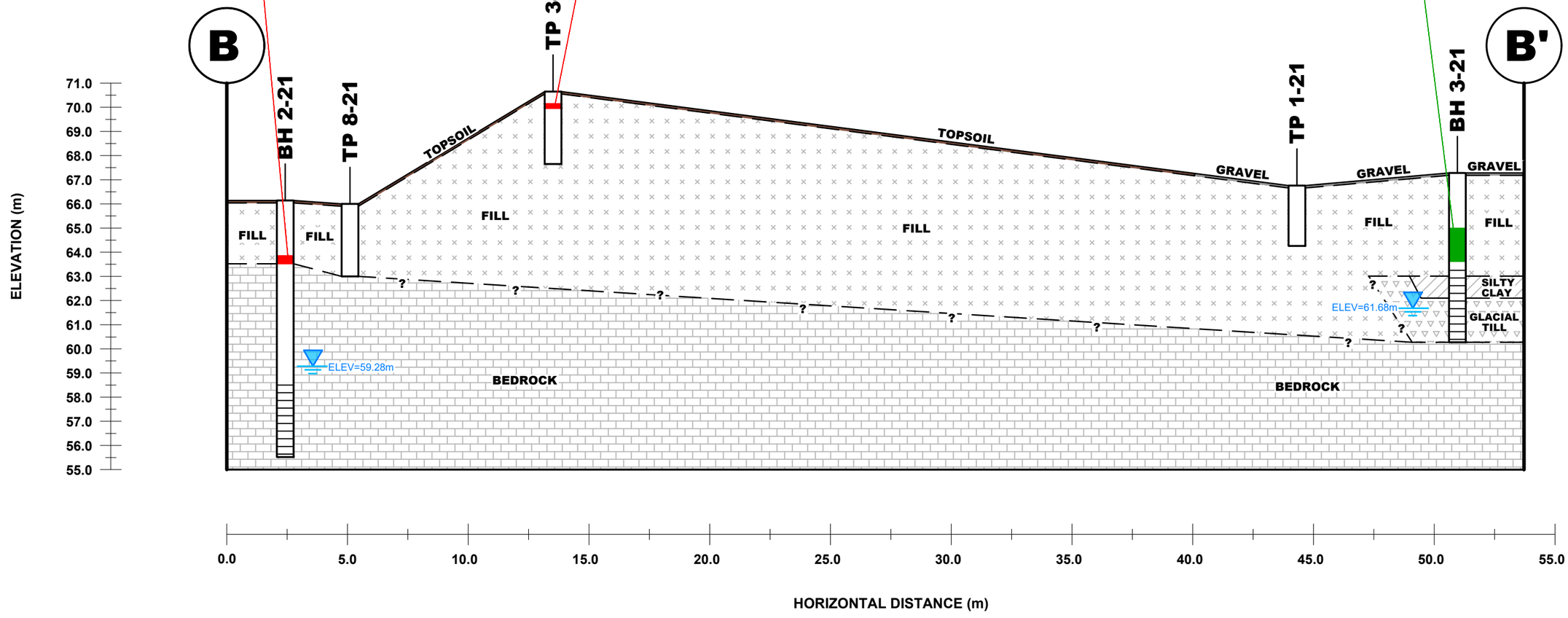
BH2-21-SS4	2.29-2.62m	May 17, 2021
Parameter	Result (µg/g)	Standard(µg/g)
Benzo[a]pyrene	0.35	0.3
Remaining PAHs comply with MECP Table 3 Standards		

TP3-21-GS3	0.50-0.70m	June 15, 2021
Parameter	Result (µg/g)	Standard(µg/g)
Acenapthene	15.5	7.9
Acenapthylene	1.43	0.15
Anthracene	34.0	0.67
Benzo[a]anthracene	50.9	0.5
Benzo[a]pyrene	48.5	0.3
Benzo[b]fluoranthene	43.0	0.78
Benzo[g,h,i]perylene	23.3	6.6
Benzo[k]fluoranthene	23.6	0.78
Chrysene	52.4	7
Dibenzo[a,h]anthracene	6.01	0.1
Fluoranthene	123	0.69
Indeno[1,2,3-cd]pyrene	21.1	0.38
1-Methylnapthalene	3.91	0.99
2-Methylnapthalene	5.39	0.99
Methylnapthalene (1&2)	9.30	0.99
Napthalene	9.72	0.6
Phenanthrene	123	6.2
Pyrene	97.6	78
Remaining PAH complies with MECP Table 3 Standards		

DUP3(TP3-21-GS3)	0.50-0.70m	June 15, 2021
Parameter	Result (µg/g)	Standard(µg/g)
Acenapthene	11.0	7.9
Acenapthylene	1.31	0.15
Anthracene	32.9	0.67
Benzo[a]anthracene	43.6	0.5
Benzo[a]pyrene	38.9	0.3
Benzo[b]fluoranthene	35.9	0.78
Benzo[g,h,i]perylene	18.5	6.6
Benzo[k]fluoranthene	19.2	0.78
Chrysene	44.0	7.0
Dibenzo[a,h]anthracene	5.30	0.1
Fluoranthene	105	0.69
Indeno[1,2,3-cd]pyrene	17.0	0.38
1-Methylnapthalene	3.72	0.99
2-Methylnapthalene	5.42	0.99
Methylnapthalene (1&2)	9.15	0.99
Napthalene	10.1	0.6
Phenanthrene	115	6.2
Pyrene	78.9	78
Remaining PAH complies with MECP Table 3 Standards		

BH3-21-SS4/5	2.29-3.66m	May 17, 2021
PAHs comply with MECP Table 3 Standards		
DUP(BH3-21-SS4/5)	2.29-3.66m	May 17, 2021
PAHs comply with MECP Table 3 Standards		



SOIL RESULT COMPLIES WITH MECP TABLE 3 STANDARDS

SOIL RESULT EXCEEDS MECP TABLE 3 STANDARDS

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THE CADILLAC FAIRVIEW CORPORATION LIMITED

PHASE II - ENVIRONMENTAL SITE ASSESSMENT
70 NICHOLAS STREET

OTTAWA, ONTARIO

Title:

CROSS SECTION B-B' - SOIL (PAHs)

Scale: AS SHOWN	Date: 08/2021
Drawn by: YA	Report No.: PE5267-2
Checked by: JC	Dwg. No.: PE5267-7B
Approved by: MSD	Revision No.:

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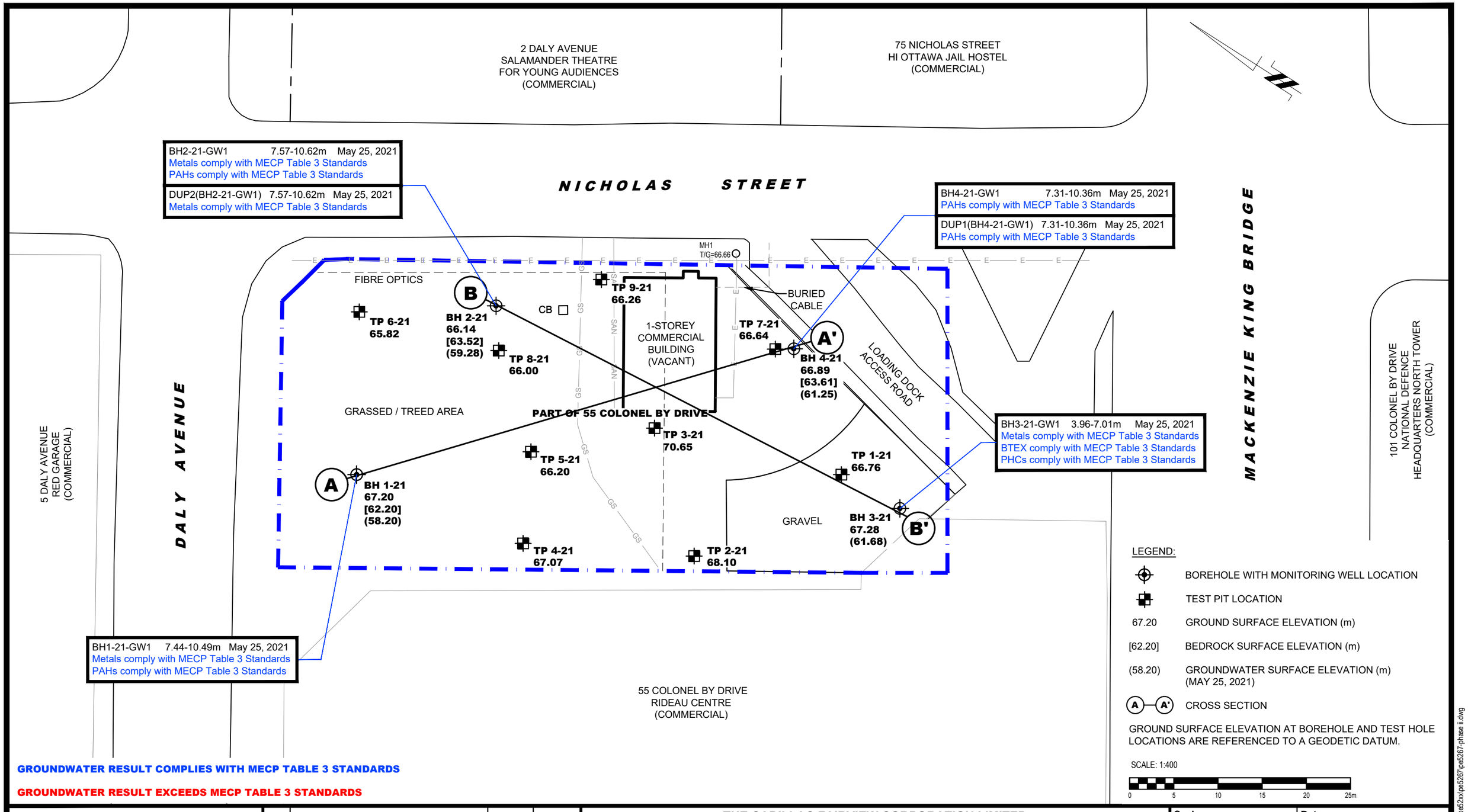

GROUNDWATER RESULT COMPLIES WITH MECP TABLE 3 STANDARDS

GROUNDWATER RESULT EXCEEDS MECP TABLE 3 STANDARDS

LEGEND:

- BOREHOLE WITH MONITORING WELL LOCATION
- TEST PIT LOCATION
- 67.20 GROUND SURFACE ELEVATION (m)
- [62.20] BEDROCK SURFACE ELEVATION (m)
- (58.20) GROUNDWATER SURFACE ELEVATION (m) (MAY 25, 2021)
- A — A' CROSS SECTION

GROUND SURFACE ELEVATION AT BOREHOLE AND TEST HOLE LOCATIONS ARE REFERENCED TO A GEODETIC DATUM.

SCALE: 1:400

0 5 10 15 20 25m

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NO.	REVISIONS	DATE	INITIAL

THE CADILLAC FAIRVIEW CORPORATION LIMITED

PHASE II - ENVIRONMENTAL SITE ASSESSMENT
70 NICHOLAS STREET

OTTAWA, ONTARIO

Title:

ANALYTICAL TESTING PLAN - GROUNDWATER (METALS, VOCs, BTEX, PHCs, PAHs)

Scale: 1:400	Date: 08/2021
Drawn by: YA	Report No.: PE5267-2
Checked by: JC	Dwg. No.: PE5267-8
Approved by: MSD	Revision No.:

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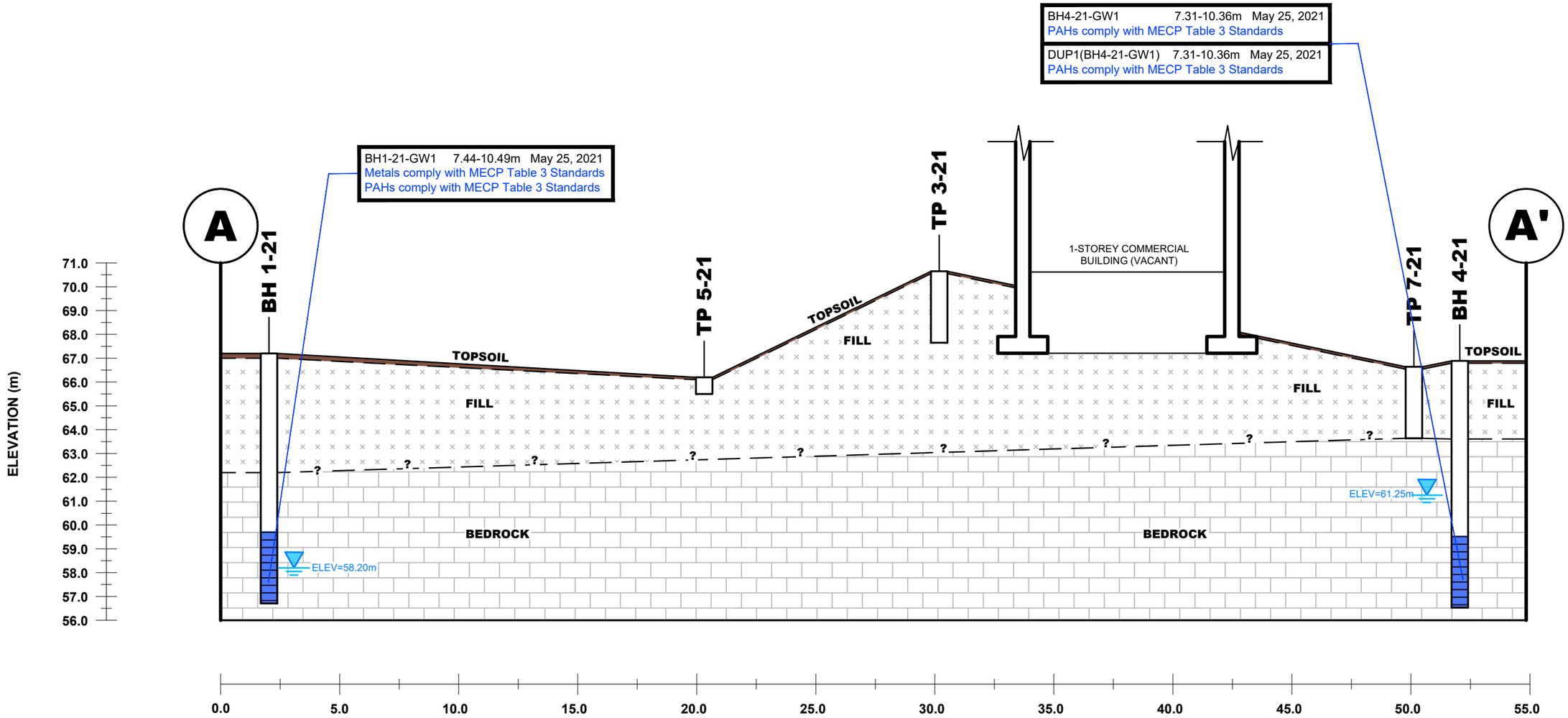

GROUNDWATER RESULT COMPLIES WITH MECP TABLE 3 STANDARDS

GROUNDWATER RESULT EXCEEDS MECP TABLE 3 STANDARDS

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THE CADILLAC FAIRVIEW CORPORATION LIMITED

PHASE II - ENVIRONMENTAL SITE ASSESSMENT
70 NICHOLAS STREET

OTTAWA, ONTARIO

Title:

CROSS SECTION A-A' - GROUNDWATER (METALS, VOCs, BTEX, PHCs, PAHs)

Scale: AS SHOWN	Date: 08/2021
Drawn by: YA	Report No.: PE5267-2
Checked by: JC	Dwg. No.: PE5267-8A
Approved by: MSD	Revision No.:

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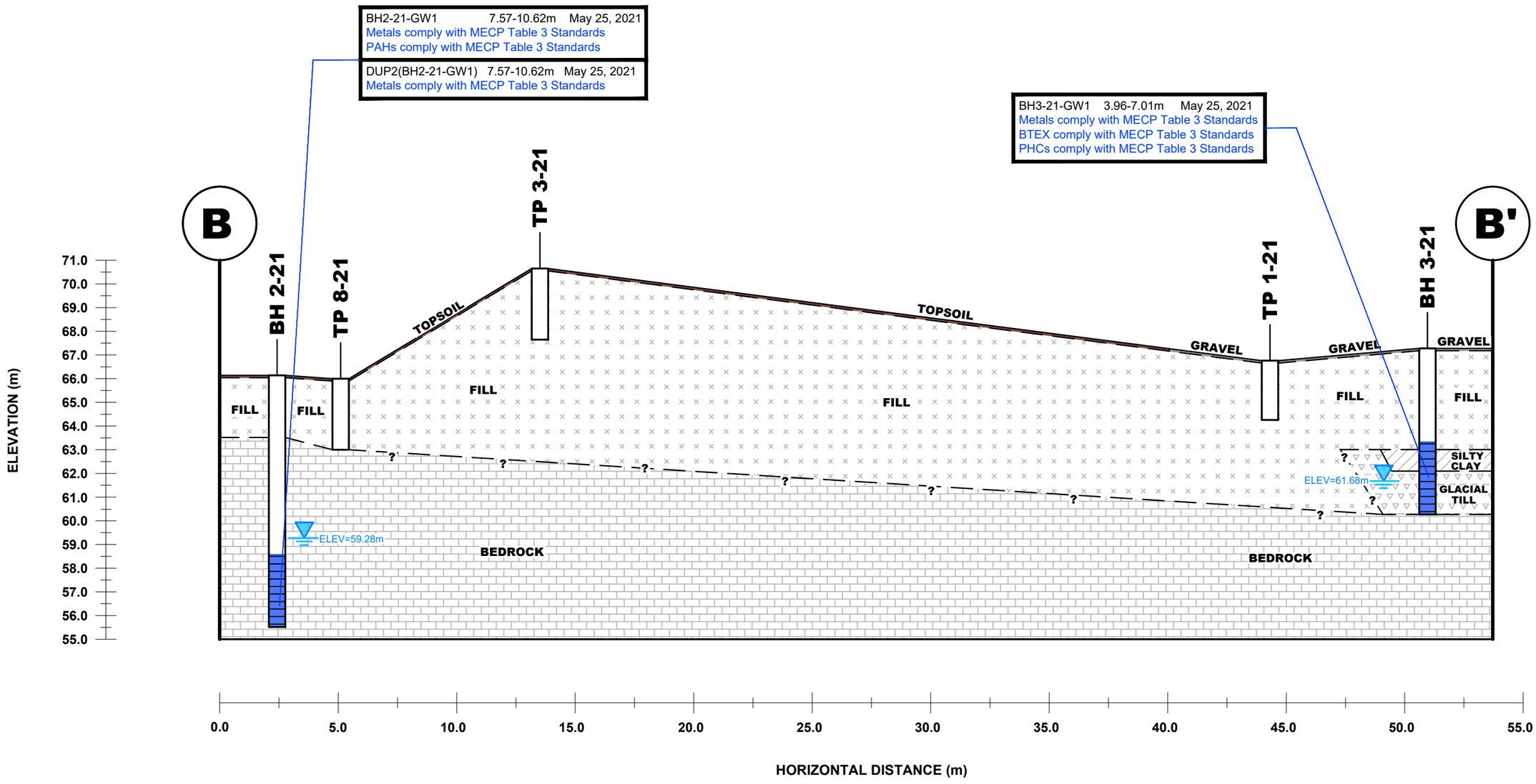

GROUNDWATER RESULT COMPLIES WITH MECP TABLE 3 STANDARDS

GROUNDWATER RESULT EXCEEDS MECP TABLE 3 STANDARDS

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THE CADILLAC FAIRVIEW CORPORATION LIMITED

PHASE II - ENVIRONMENTAL SITE ASSESSMENT
70 NICHOLAS STREET

OTTAWA, ONTARIO

Title:
CROSS SECTION B-B' - GROUNDWATER (METALS, VOCs, BTEX, PHCs, PAHs)

Scale: AS SHOWN	Date: 08/2021
Drawn by: YA	Report No.: PE5267-2
Checked by: JC	Dwg. No.: PE5267-8B
Approved by: MSD	Revision No.:

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APPENDIX 1

SAMPLING AND ANALYSIS PLAN

SOIL PROFILE AND TEST DATA SHEETS

SYMBOLS AND TERMS

LABORATORY CERTIFICATES OF ANALYSIS

Geotechnical Engineering

Environmental Engineering

Hydrogeology

Geological Engineering

Materials Testing

Building Science

patersongroup

Sampling & Analysis Plan

Phase II Environmental Site Assessment
70 Nicholas Street
Ottawa, Ontario

Prepared For

The Cadillac Fairview Corporation Limited

May 12, 2021

Report: PE5267-SAP

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TABLE OF CONTENTS

1.0 SAMPLING PROGRAM

Paterson was retained by Mr. Peter Nikolakakos of The Cadillac Fairview Corporation Limited, to conduct a Phase II Environmental Site Assessment (ESA) for the property addressed 70 Nicholas Street, in the City of Ottawa, Ontario.

The Phase II ESA was carried out to address the areas of potential environmental concern on the Phase II Property. The following subsurface investigation program was developed. A Geotechnical Investigation was conducted concurrently with the environmental subsurface investigation.

Borehole	Location & Rationale	Proposed Depth & Rationale
BH1	Place on the northwest portion of the Phase II Property to assess the potential impact due to APECs 1, 5, 6, 7 and 8.	Borehole to be advanced to approximately 10 mbgs to install monitoring well.
BH2	Place on the northeast portion of the Phase II Property to assess the potential impact due to APECs 1, 2, 5 and 7.	Borehole to be advanced to approximately 10 mbgs to install monitoring well.
BH3	Place on the southeast portion of the Phase II Property to assess the potential impact due to APECs 5 and 7.	Borehole to be advanced to approximately 7 mbgs to install monitoring well.
BH4	Place on the southwest portion of the Phase II Property to assess the potential impact due to APECs 3, 4, 7 and 9.	Borehole to be advanced to approximately 10 mbgs to install monitoring well.
TP1-21 to TP9-21	Place to provide general coverage of the Phase II Property ; to laterally delineate soil exceedances identified in the boreholes and to further assess the quality of the fill material.	Test Pit to be advanced to native soil or bedrock to assess the full depth of the fill material.

Borehole and test pit locations are shown on Drawing PE5267-3-Test Hole Location Plan, appended to the main report.

At each borehole, split-spoon samples of overburden soils will be obtained at 0.76 m (2'6") intervals until practical refusal to augering. All soil samples will be retained, and samples will be selected for submission following a preliminary screening analysis.

Following borehole drilling, monitoring wells will be installed in selected boreholes (as above) for the measurement of water levels and the collection of groundwater samples. Borehole locations are shown on the Test Hole Location Plan appended to the main report.

Nine test pits will be placed across the entire Phase II Property for delineation purposes and to obtain broader coverage to assess the quality of the fill material (APEC 7). At each test pit location, samples will be collected at approximate 0.5 to 1.0m intervals. Samples will also be collected from potentially contaminated layers and different soil strata. Test pits should be placed through the full depth of the fill material to the native layer and/or bedrock, whichever is encountered first.

2.0 ANALYTICAL TESTING PROGRAM

The analytical testing program for soil at the subject site is based on the following general considerations:

- ❒ At least one sample from each borehole or test pit should be submitted, in order to delineate the horizontal extent of contamination across the site.
- ❒ At least one sample from each stratigraphic unit should be submitted, in order to delineate the vertical extent of contamination at the site.
- ❒ In boreholes and test pits where there is visual or olfactory evidence of contamination, or where organic vapour meter or photoionization detector readings indicate the presence of contamination, the 'worst-case' sample from each borehole should be submitted for comparison with MECP site condition standards.
- ❒ In boreholes and test pits with evidence of contamination as described above, a sample should be submitted from the stratigraphic unit below the 'worst-case' sample to determine whether the contaminant(s) have migrated downward.
- ❒ Parameters analyzed should be consistent with the Contaminants of Potential Concern identified in the Phase I ESA.

The analytical testing program for groundwater at the subject site is based on the following general considerations:

- ❒ Groundwater monitoring wells should be installed in all boreholes with visual or olfactory evidence of soil contamination, in stratigraphic units where soil

contamination was encountered, where those stratigraphic units are at or below the water table (i.e. a water sample can be obtained).

- ❒ Groundwater monitoring well screens should straddle the water table at sites where the contaminants of concern are suspected to be LNAPLs.
- ❒ At least one groundwater monitoring well should be installed in a stratigraphic unit below the suspected contamination, where said stratigraphic unit is water-bearing.
- ❒ Parameters analyzed should be consistent with the Contaminants of Concern identified in the Phase I ESA and with the contaminants identified in the soil samples.

3.0 STANDARD OPERATING PROCEDURES

3.1 Environmental Drilling Procedure

Purpose

The purpose of environmental boreholes and test pits is to identify and/or delineate contamination within the soil and/or to install groundwater monitoring wells in order to identify contamination within the groundwater.

Equipment

The following is a list of equipment that is in addition to regular drilling equipment stated in the geotechnical drilling SOP:

- ❒ glass soil sample jars
- ❒ two buckets
- ❒ cleaning brush (toilet brush works well)
- ❒ dish detergent
- ❒ methyl hydrate
- ❒ water (if not available on site - water jugs available in trailer)
- ❒ latex or nitrile gloves (depending on suspected contaminant)
- ❒ RKI Eagle organic vapour meter or MiniRae photoionization detector (depending on contamination suspected)

Determining Borehole and Test Pit Locations

If conditions on site are not as suspected, and planned borehole locations cannot be drilled, **call the office to discuss**. Alternative borehole locations will be determined in conversation with the field technician and supervising engineer.

After drilling and/or excavation of test pits is completed, a plan with the test hole locations must be provided. Distances should be measured using a measuring tape or wheel or located with a GPS unit.

Drilling Procedure

The actual drilling procedure for environmental boreholes is the same as geotechnical boreholes (see SOP for drilling and sampling) with a few exceptions as follows:

- ❒ Continuous split spoon samples (every 0.6 m or 2') or semi-continuous (every 0.76 m or 2'6") are required.
- ❒ Make sure samples are well sealed in plastic bags with no holes prior to screening and are kept cool but unfrozen.
- ❒ If sampling for VOCs, BTEX, or PHCs F1, a soil core from each soil sample which may be analyzed must be taken and placed in the laboratory-provided methanol vial.
- ❒ Note all and any odours or discolouration of samples.
- ❒ Split spoon samplers must be washed between samples.
- ❒ If obvious contamination is encountered, continue sampling until vertical extent of contamination is delineated.
- ❒ As a general rule, environmental boreholes should be deep enough to intercept the groundwater table (unless this is impossible/impractical - call project manager to discuss).
- ❒ If at all possible, soil samples should be submitted to a preliminary screening procedure on site, either using a RKI Eagle, PID, etc. depending on type of suspected contamination.

Test Pit Excavation

Nine test pits will be placed across the entire Phase II Property for delineation purposes and to obtain broader coverage to assess the quality of the fill material (APEC 7). At each test pit location, samples will be collected at approximate 0.5 to 1.0m intervals. Samples will also be collected from potentially contaminated layers

and different soil strata. Test pits should be placed through the full depth of the fill material to the native layer and/or bedrock, whichever is encountered first.

Spoon Washing Procedure

All sampling equipment (spilt spoons, etc.) must be washed between samples in order to prevent cross contamination of soil samples.

- ❒ Obtain two buckets of water (preferably hot if available)
- ❒ Add a small amount of dish soap to one bucket
- ❒ Scrub spoons with brush in soapy water, inside and out, including tip
- ❒ Rinse in clean water
- ❒ Apply a small amount of methyl hydrate to the inside of the spoon. (A spray bottle or water bottle with a small hole in the cap works well)
- ❒ Allow to dry (takes seconds)
- ❒ Rinse with distilled water, a spray bottle works well.

The methyl hydrate eliminates any soap residue that may be on the spoon, and is especially important when dealing with suspected VOCs.

Screening Procedure

The RKI Eagle is used to screen most soil samples, particularly where petroleum hydrocarbon contamination is suspected. The MiniRae is used when VOCs are suspected, however it also can be useful for detecting petroleum. These tools are for screening purposes only and cannot be used in place of laboratory testing. Vapour results obtained from the RKI Eagle and the PID are relative and must be interpreted.

Screening equipment should be calibrated on an approximately monthly basis, more frequently if heavily used.

- ❒ Samples should be brought to room temperature; this is specifically important in colder weather. Soil must not be frozen.
- ❒ Turn instrument on and allow to come to zero - calibrate if necessary
- ❒ If using RKI Eagle, ensure instrument is in methane elimination mode unless otherwise directed.
- ❒ Ensure measurement units are ppm (parts per million) initially. RKI Eagle will automatically switch to %LEL (lower explosive limit) if higher concentrations are encountered.
- ❒ Break up large lumps of soil in the sample bag, taking care not to puncture bag.

- ❒ Insert probe into soil bag, creating a seal with your hand around the opening.
- ❒ Gently manipulate soil in bag while observing instrument readings.
- ❒ Record the highest value obtained in the first 15 to 25 seconds
- ❒ Make sure to indicate scale (ppm or LEL); also note which instrument was used (RKI Eagle 1 or 2, or MiniRae).
- ❒ Jar samples and refrigerate as per Sampling and Analysis Plan.

3.2 Monitoring Well Installation Procedure

Equipment

- ❒ 5' x 2" [1.52 m x 50 mm] threaded sections of Schedule 40 PVC slotted well screen (5' x 1 ¼" [1.52 m x 32 mm] if installing in cored hole in bedrock)
- ❒ 5' x 2" [1.52 m x 50 mm] threaded sections of Schedule 40 PVC riser pipe (5' x 1 ¼" [1.52 m x 32 mm] if installing in cored hole in bedrock)
- ❒ Threaded end-cap
- ❒ Slip-cap or J-plug
- ❒ Asphalt cold patch or concrete
- ❒ Silica Sand
- ❒ Bentonite chips (Holeplug)
- ❒ Steel flushmount casing

Procedure

- ❒ Drill borehole to required depth, using drilling and sampling procedures described above.
- ❒ If borehole is deeper than required monitoring well, backfill with bentonite chips to required depth. This should only be done on wells where contamination is not suspected, in order to prevent downward migration of contamination.
- ❒ Only one monitoring well should be installed per borehole.
- ❒ Monitoring wells should not be screened across more than one stratigraphic unit to prevent potential migration of contaminants between units.
- ❒ Where LNAPLs are the suspected contaminants of concern, monitoring wells should be screened straddling the water table in order to capture any free product floating on top of the water table.
- ❒ Thread the end cap onto a section of screen. Thread second section of screen if required. Thread risers onto screen. Lower into borehole to required depth. Ensure slip-cap or J-plug is inserted to prevent backfill materials entering well.

- ❒ As drillers remove augers, backfill borehole annulus with silica sand until the level of sand is approximately 0.3 m above the top of the screen.
- ❒ Backfill with holeplug until at least 0.3 m of holeplug is present above the top of the silica sand.
- ❒ Backfill remainder of borehole with holeplug or with auger cuttings (if contamination is not suspected).
- ❒ Install flushmount casing. Seal space between flushmount and borehole annulus with concrete, cold patch, or holeplug to match surrounding ground surface.

3.3 Monitoring Well Sampling Procedure

Equipment

- ❒ Water level metre or interface probe on hydrocarbon/LNAPL sites
- ❒ Spray bottles containing water and methanol to clean water level tape or interface probe
- ❒ Peristaltic pump
- ❒ Polyethylene tubing for peristaltic pump
- ❒ Flexible tubing for peristaltic pump
- ❒ Latex or nitrile gloves (depending on suspected contaminant)
- ❒ Allen keys and/or 9/16” socket wrench to remove well caps
- ❒ Graduated bucket with volume measurements
- ❒ pH/Temperature/Conductivity combo pen
- ❒ Laboratory-supplied sample bottles

Sampling Procedure

- ❒ Locate well and use socket wrench or Allan key to open metal flush mount protector cap. Remove plastic well cap.
- ❒ Measure water level, with respect to existing ground surface, using water level meter or interface probe. If using interface probe on suspected NAPL site, measure the thickness of free product.
- ❒ Measure total depth of well.
- ❒ Clean water level tape or interface probe using methanol and water. Change gloves between wells.
- ❒ Calculate volume of standing water within well and record.
- ❒ Insert polyethylene tubing into well and attach to peristaltic pump. Turn on peristaltic pump and purge into graduated bucket. Purge at least three well volumes of water from the well. Measure and record field chemistry. Continue

to purge, measuring field chemistry after every well volume purged, until appearance or field chemistry stabilizes.

- ❒ Note appearance of purge water, including colour, opacity (clear, cloudy, silty), sheen, presence of LNAPL, and odour. Note any other unusual features (particulate matter, effervescence (bubbling) of dissolved gas, etc.).
- ❒ Fill required sample bottles. If sampling for metals, attach 75-micron filter to discharge tube and filter metals sample. If sampling for VOCs, use low flow rate to ensure continuous stream of non-turbulent flow into sample bottles. Ensure no headspace is present in VOC vials.
- ❒ Replace well cap and flushmount casing cap.

4.0 QUALITY ASSURANCE/QUALITY CONTROL (QA/QC)

The QA/QC program for this Phase II ESA is as follows:

- ❒ All non-dedicated sampling equipment (split spoons) will be decontaminated according to the SOPs listed above.
- ❒ All groundwater sampling equipment is dedicated (polyethylene and flexible peristaltic tubing is replaced for each well).
- ❒ Where groundwater samples are to be analyzed for VOCs, one laboratory-provided trip blank will be submitted for analysis with every laboratory submission.
- ❒ Approximately one (1) field duplicate will be submitted for every ten (10) samples submitted for laboratory analysis. A minimum of one (1) field duplicate per project will be submitted. Field duplicates will be submitted for soil and groundwater samples
- ❒ Where combo pens are used to measure field chemistry, they will be calibrated on an approximately monthly basis, according to frequency of use.

5.0 DATA QUALITY OBJECTIVES

The purpose of setting data quality objectives (DQOs) is to ensure that the level of uncertainty in data collected during the Phase II ESA is low enough that decision-making is not affected, and that the overall objectives of the investigation are met.

The quality of data is assessed by comparing field duplicates with original samples. If the relative percent difference (RPD) between the duplicate and the sample is within 20%, the data are considered to be of sufficient quality so as not to affect decision-making. The RPD is calculated as follows:

$$RPD = \left| \frac{x_1 - x_2}{(x_1 + x_2)/2} \right| \times 100\%$$

Where x_1 is the concentration of a given parameter in an original sample and x_2 is the concentration of that same parameter in the field duplicate sample.

For the purpose of calculating the RPD, it is desirable to select field duplicates from samples for which parameters are present in concentrations above laboratory detection limits, i.e. samples which are expected to be contaminated. If parameters are below laboratory detection limits for selected samples or duplicates, the RPD may be calculated using a concentration equal to one half (0.5 x) the laboratory detection limit.

It is also important to consider data quality in the overall context of the project. For example, if the DQOs are not met for a given sample, yet the concentrations of contaminants in both the sample and the duplicate exceed the MECP site remediation standards by a large margin, the decision-making usefulness of the sample may not be considered to be impaired. The proximity of other samples which meet the DQOs must also be considered in developing the Phase II Conceptual Site Model; often there are enough data available to produce a reliable Phase II Conceptual Site Model even if DQOs are not met for certain individual samples.

These considerations are discussed in the body of the report.

6.0 PHYSICAL IMPEDIMENTS TO SAMPLING & ANALYSIS PLAN

Physical impediments to the Sampling and Analysis plan may include:

- ❒ The location of underground utilities
- ❒ Poor recovery of split-spoon soil samples
- ❒ Insufficient groundwater volume for groundwater samples
- ❒ Breakage of sampling containers following sampling or while in transit to the laboratory
- ❒ Elevated detection limits due to matrix interference (generally related to soil colour or presence of organic material)
- ❒ Elevated detection limits due to high concentrations of certain parameters, necessitating dilution of samples in laboratory
- ❒ Drill rig breakdowns
- ❒ Winter conditions
- ❒ Other site-specific impediments

Site-specific impediments to the Sampling and Analysis plan are discussed in the body of the Phase II ESA report.

patersongroup Consulting Engineers

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SOIL PROFILE AND TEST DATA

Phase II - Environmental Site Assessment
55 Colonel By Drive
Ottawa, Ontario

DATUM Geodetic

FILE NO. PE5267

REMARKS

HOLE NO. BH 1-21

BORINGS BY CME-55 Low Clearance Drill **DATE** May 14, 2021

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)
GROUND SURFACE						0	67.20
FILL: Topsoil with brown silty sand 0.20		AU	1				
		SS	2	25	18	1	66.20
		SS	3	38	50+		
FILL: Brown silty sand with crushed stone, brick and concrete, trace clay		SS	4	42	33	2	65.20
		SS	5	33	5	3	64.20
		SS	6	29	50+	4	63.20
5.00		SS	7	67	77	5	62.20
		RC	1	100	72	6	61.20
		RC	2	100	69	7	60.20
BEDROCK: Fair to good quality, grey limestone		RC	3	100	67	8	59.20
						9	58.20
		RC	4	100	77	10	57.20
10.49							
End of Borehole							
(GWL @ 9.00m - May 25, 2021)							

Photo Ionization Detector
● Volatile Organic Rdg. (ppm)

○ **Lower Explosive Limit %**

20 40 60 80

100 200 300 400 500

RKI Eagle Rdg. (ppm)

▲ Full Gas Resp. △ Methane Elim.

Monitoring Well Construction

patersongroup Consulting Engineers

154 Colonnade Road South, Ottawa, Ontario K2E 7J5

SOIL PROFILE AND TEST DATA

Phase II - Environmental Site Assessment
55 Colonel By Drive
Ottawa, Ontario

DATUM Geodetic

FILE NO. PE5267

REMARKS

HOLE NO. BH 2-21

BORINGS BY CME-55 Low Clearance Drill **DATE** May 17, 2021

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)
GROUND SURFACE						0	66.14
		AU	1				
FILL: Brown silty sand with crushed stone and organics, trace topsoil and brick		SS	2		23	1	65.14
		SS	3		37	2	64.14
2.62		SS	4		50+		
		RC	1	100	64	3	63.14
						4	62.14
		RC	2	100	55	5	61.14
						6	60.14
BEDROCK: Fair to good quality, grey limestone		RC	3	100	66	7	59.14
		RC	4	100	70	8	58.14
						9	57.14
		RC	5	100	85	10	56.14
10.62							
End of Borehole							
(GWL @ 6.86m - May 25, 2021)							

Photo Ionization Detector

● Volatile Organic Rdg. (ppm)

○ **Lower Explosive Limit %**

20 40 60 80

100 200 300 400 500

RKI Eagle Rdg. (ppm)

▲ Full Gas Resp. △ Methane Elim.

Monitoring Well Construction

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SOIL PROFILE AND TEST DATA

Phase II - Environmental Site Assessment
55 Colonel By Drive
Ottawa, Ontario

DATUM Geodetic

FILE NO. PE5267

REMARKS

HOLE NO. BH 3-21

BORINGS BY CME-55 Low Clearance Drill **DATE** May 17, 2021

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)
GROUND SURFACE						0	67.28
FILL: Brown silty sand with organics		AU	1				
0.76							
		SS	2	42	33	1	66.28
		SS	3	42	20	2	65.28
FILL: Brown silty sand with organics and crushed stone, trace concrete and brick		SS	4	33	35		
		SS	5	33	25	3	64.28
4.27						4	63.28
Very stiff to stiff, brown **SILTY CLAY**		SS	6	83	7		
5.18						5	62.28
		SS	7	0	50+		
GLACIAL TILL: Brown to grey silty clay with sand, gravel, cobbles and boulders		SS	8	83	6	6	61.28
7.01		SS	9	17	50+	7	60.28
End of Borehole							
Practical refusal to augering at 7.01m depth.							
(GWL @ 5.60m - May 25, 2021)							

Photo Ionization Detector
● Volatile Organic Rdg. (ppm)

○ **Lower Explosive Limit %**

20 40 60 80

100 200 300 400 500

RKI Eagle Rdg. (ppm)

▲ Full Gas Resp. △ Methane Elim.

Monitoring Well Construction

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SOIL PROFILE AND TEST DATA

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DATUM Geodetic

FILE NO. PE5267

REMARKS

HOLE NO. BH 4-21

BORINGS BY CME-55 Low Clearance Drill **DATE** May 17, 2021

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)
GROUND SURFACE						0	66.89
		AU	1				
		SS	2	33	42	1	65.89
FILL: Brown silty sand with crushed stone, gravel, trace concrete and topsoil		SS	3	33	11	2	64.89
		SS	4	0	50+		
3.28						3	63.89
		RC	1	100	28	4	62.89
		RC	2	100	69	5	61.89
BEDROCK: Poor to good quality, grey limestone		RC	3	100	85	6	60.89
		RC	4	100	68	7	59.89
		RC	5	100	75	8	58.89
10.36						9	57.89
End of Borehole						10	56.89
(GWL @ 5.64m - May 25, 2021)							

Photo Ionization Detector
● Volatile Organic Rdg. (ppm)

○ **Lower Explosive Limit %**

20 40 60 80

100 200 300 400 500

RKI Eagle Rdg. (ppm)

▲ Full Gas Resp. △ Methane Elim.

Monitoring Well Construction

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SOIL PROFILE AND TEST DATA

Phase II - Environmental Site Assessment
55 Colonel By Drive
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DATUM Geodetic

FILE NO. PE5267

REMARKS

HOLE NO. TP 1-21

BORINGS BY Backhoe **DATE** June 15, 2021

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)	Photo Ionization Detector: Volatile Organic Rdg. (ppm) / Lower Explosive Limit %	Monitoring Well Construction
GROUND SURFACE						0	66.76		
FILL: Crushed stone with brown silty sand									
0.50									
		G	1						
		G	2			1	65.76		
FILL: Brown silty sand wiht crushed stone, some concrete, trace brick and clay									
		G	3			2	64.76		
		G	4						
2.50									
End of Test Pit									
Practical refusal to excavation on concrete at 2.50m depth.									

Photo Ionization Detector: ○ Lower Explosive Limit % — 20 40 60 80

100 200 300 400 500

RKI Eagle Rdg. (ppm)

▲ Full Gas Resp. △ Methane Elim.

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SOIL PROFILE AND TEST DATA

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FILE NO. PE5267

REMARKS

HOLE NO. TP 2-21

BORINGS BY Backhoe **DATE** June 15, 2021

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)	Photo Ionization Detector: Volatile Organic Rdg. (ppm) / Lower Explosive Limit %	Monitoring Well Construction
GROUND SURFACE									
TOPSOIL 0.10		G	1			0	68.10		
FILL: Brown silty sand with crushed stone, cobbles and boulders, some concrete, trace brick		G	2			1	67.10		
		G	3						
1.90		G	4						
End of Test Pit Practical refusal to excavation on concrete at 1.90m depth.									

Photo Ionization Detector: ● Volatile Organic Rdg. (ppm); ○ Lower Explosive Limit %

20 40 60 80

100 200 300 400 500

RKI Eagle Rdg. (ppm)

▲ Full Gas Resp. △ Methane Elim.

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SOIL PROFILE AND TEST DATA

Phase II - Environmental Site Assessment
55 Colonel By Drive
Ottawa, Ontario

DATUM Geodetic

FILE NO. PE5267

REMARKS

HOLE NO. TP 3-21

BORINGS BY Backhoe **DATE** June 15, 2021

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)
GROUND SURFACE						0	70.65
TOPSOIL 0.10		G	1				
FILL: Brown silty sand with crushed stone, trace brick							
- trace coal and wood by 0.5m depth		G	2				
		G	3				
0.90						1	69.65
FILL: Brown silty sand, some coal, trace clay		G	4				
1.50							
FILL: Brown silty sand, some clay, trace brick and coal							
2.00						2	68.65
		G	5				
FILL: Brown silty sand with clay, gravel, cobbles and boulders							
		G	6				
3.00						3	67.65
End of Test Pit							

Photo Ionization Detector
● Volatile Organic Rdg. (ppm)
○ **Lower Explosive Limit %**

20 40 60 80

100 200 300 400 500

RKI Eagle Rdg. (ppm)
▲ Full Gas Resp. △ Methane Elim.

Monitoring Well Construction

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SOIL PROFILE AND TEST DATA

Phase II - Environmental Site Assessment
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Ottawa, Ontario

DATUM Geodetic

FILE NO. PE5267

REMARKS

HOLE NO. TP 4-21

BORINGS BY Backhoe **DATE** June 15, 2021

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)	Photo Ionization Detector: Volatile Organic Rdg. (ppm) / Lower Explosive Limit %	Monitoring Well Construction
GROUND SURFACE									
TOPSOIL 0.10		G	1			0	67.07		
FILL: Brown silty sand with crushed stone, trace concrete and brick									
0.80		G	2						
End of Test Pit Practical refusal to excavation on concrete at 0.80m depth.									

Photo Ionization Detector
● Volatile Organic Rdg. (ppm)
○ Lower Explosive Limit %
20 40 60 80
100 200 300 400 500
RKI Eagle Rdg. (ppm)
▲ Full Gas Resp. △ Methane Elim.

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SOIL PROFILE AND TEST DATA

Phase II - Environmental Site Assessment
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DATUM Geodetic

FILE NO. PE5267

REMARKS

HOLE NO. TP 5-21

BORINGS BY Backhoe **DATE** June 15, 2021

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)	Photo Ionization Detector: ● Volatile Organic Rdg. (ppm) / ○ Lower Explosive Limit %	Monitoring Well Construction
GROUND SURFACE						0	66.20		
TOPSOIL 0.10		G	1						
FILL: Brown silty sand with crushed stone, trace brick and coal									
0.70		G	2						
End of Test Pit									
Practical refusal to excavation on concrete at 0.70m depth.									

Photo Ionization Detector scale: 20 40 60 80

RKI Eagle Rdg. (ppm): 100 200 300 400 500

▲ Full Gas Resp. △ Methane Elim.

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SOIL PROFILE AND TEST DATA

Phase II - Environmental Site Assessment
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FILE NO. PE5267

REMARKS

HOLE NO. TP 6-21

BORINGS BY Backhoe **DATE** June 15, 2021

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)	Photo Ionization Detector: Volatile Organic Rdg. (ppm) / Lower Explosive Limit %	Monitoring Well Construction
GROUND SURFACE									
TOPSOIL 0.10		G	1			0	65.82		
FILL: Brown silty sand with crushed stone, gravel, concrete, trace brick		G	2			1	64.82		
		G	3			2	63.82		
		G	4						
3.00		G	5			3	62.82		
End of Test Pit									

Photo Ionization Detector: ● Volatile Organic Rdg. (ppm); ○ Lower Explosive Limit %

20 40 60 80

100 200 300 400 500

RKI Eagle Rdg. (ppm)

▲ Full Gas Resp. △ Methane Elim.

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SOIL PROFILE AND TEST DATA

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FILE NO. PE5267

REMARKS

HOLE NO. TP 7-21

BORINGS BY Backhoe **DATE** June 15, 2021

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)
GROUND SURFACE						0	66.64
TOPSOIL 0.10		G	1				
FILL: Brown silty sand with crushed stone, trace brick and concrete							
0.50		G	2				
Asphalt 0.60							
		G	3			1	65.64
FILL: Brown silty sand with blast rock, crushed stone, trace brick, clay and coal		G	4			2	64.64
		G	5				
		G	6				
3.00						3	63.64
End of Test Pit							

Photo Ionization Detector
● Volatile Organic Rdg. (ppm)
○ Lower Explosive Limit %
20 40 60 80
100 200 300 400 500
RKI Eagle Rdg. (ppm)
▲ Full Gas Resp. △ Methane Elim.

Monitoring Well Construction

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SOIL PROFILE AND TEST DATA

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FILE NO. PE5267

REMARKS

HOLE NO. TP 8-21

BORINGS BY Backhoe **DATE** June 15, 2021

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)
GROUND SURFACE							
TOPSOIL 0.10		G	1			0	66.00
FILL: Brown silty sand with crushed stone, gravel, boulders, cobbles and concrete, trace brick and wood		G	2			1	65.00
		G	3				
1.80						2	64.00
FILL: Brown silty sand with clay, some brick and crushed stone		G	4				
		G	5				
		G	6				
3.00						3	63.00
End of Test Pit							

Photo Ionization Detector
● Volatile Organic Rdg. (ppm)
○ **Lower Explosive Limit %**

20 40 60 80

100 200 300 400 500

RKI Eagle Rdg. (ppm)
▲ Full Gas Resp. △ Methane Elim.

Monitoring Well Construction

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FILE NO. PE5267

REMARKS

HOLE NO. TP 9-21

BORINGS BY Backhoe **DATE** June 15, 2021

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)	Photo Ionization Detector: ● Volatile Organic Rdg. (ppm) / ○ Lower Explosive Limit %	Monitoring Well Construction
GROUND SURFACE									
TOPSOIL 0.10						0	66.26		
FILL: Brown silty sand with crushed stone, gravel, concrete, cobbles and boulders		G	1						
		G	2			1	65.26		
1.50		G	3						
End of Test Pit Practical refusal to excavation on concrete at 1.50m depth.									

Photo Ionization Detector: ○ Lower Explosive Limit % — 20 40 60 80

100 200 300 400 500

RKI Eagle Rdg. (ppm)

▲ Full Gas Resp. △ Methane Elim.

SYMBOLS AND TERMS

SOIL DESCRIPTION

Behavioural properties, such as structure and strength, take precedence over particle gradation in describing soils. Terminology describing soil structure are as follows:

Desiccated	-	having visible signs of weathering by oxidation of clay minerals, shrinkage cracks, etc.
Fissured	-	having cracks, and hence a blocky structure.
Varved	-	composed of regular alternating layers of silt and clay.
Stratified	-	composed of alternating layers of different soil types, e.g. silt and sand or silt and clay.
Well-Graded	-	Having wide range in grain sizes and substantial amounts of all intermediate particle sizes (see Grain Size Distribution).
Uniformly-Graded	-	Predominantly of one grain size (see Grain Size Distribution).

The standard terminology to describe the relative strength of cohesionless soils is the compactness condition, usually inferred from the results of the Standard Penetration Test (SPT) 'N' value. The SPT N value is the number of blows of a 63.5 kg hammer, falling 760 mm, required to drive a 51 mm O.D. split spoon sampler 300 mm into the soil after an initial penetration of 150 mm. An SPT N value of "P" denotes that the split-spoon sampler was pushed 300 mm into the soil without the use of a falling hammer.

Compactness Condition	'N' Value	Relative Density %
Very Loose	<4	<15
Loose	4-10	15-35
Compact	10-30	35-65
Dense	30-50	65-85
Very Dense	>50	>85

The standard terminology to describe the strength of cohesive soils is the consistency, which is based on the undisturbed undrained shear strength as measured by the in situ or laboratory shear vane tests, unconfined compression tests, or occasionally by the Standard Penetration Test (SPT). Note that the typical correlations of undrained shear strength to SPT N value (tabulated below) tend to underestimate the consistency for sensitive silty clays, so Paterson reviews the applicable split spoon samples in the laboratory to provide a more representative consistency value based on tactile examination.

Consistency	Undrained Shear Strength (kPa)	'N' Value
Very Soft	<12	<2
Soft	12-25	2-4
Firm	25-50	4-8
Stiff	50-100	8-15
Very Stiff	100-200	15-30
Hard	>200	>30

SYMBOLS AND TERMS (continued)

SOIL DESCRIPTION (continued)

Cohesive soils can also be classified according to their "sensitivity". The sensitivity, S_t, is the ratio between the undisturbed undrained shear strength and the remoulded undrained shear strength of the soil. The classes of sensitivity may be defined as follows:

Low Sensitivity:	$S_t < 2$
Medium Sensitivity:	$2 < S_t < 4$
Sensitive:	$4 < S_t < 8$
Extra Sensitive:	$8 < S_t < 16$
Quick Clay:	$S_t > 16$

ROCK DESCRIPTION

The structural description of the bedrock mass is based on the Rock Quality Designation (RQD).

The RQD classification is based on a modified core recovery percentage in which all pieces of sound core over 100 mm long are counted as recovery. The smaller pieces are considered to be a result of closely-spaced discontinuities (resulting from shearing, jointing, faulting, or weathering) in the rock mass and are not counted. RQD is ideally determined from NQ or larger size core. However, it can be used on smaller core sizes, such as BQ, if the bulk of the fractures caused by drilling stresses (called "mechanical breaks") are easily distinguishable from the normal in situ fractures.

RQD %	**ROCK QUALITY**
90-100	Excellent, intact, very sound
75-90	Good, massive, moderately jointed or sound
50-75	Fair, blocky and seamy, fractured
25-50	Poor, shattered and very seamy or blocky, severely fractured
0-25	Very poor, crushed, very severely fractured

SAMPLE TYPES

SS	-	Split spoon sample (obtained in conjunction with the performing of the Standard Penetration Test (SPT))
TW	-	Thin wall tube or Shelby tube, generally recovered using a piston sampler
G	-	"Grab" sample from test pit or surface materials
AU	-	Auger sample or bulk sample
WS	-	Wash sample
RC	-	Rock core sample (Core bit size BQ, NQ, HQ, etc.). Rock core samples are obtained with the use of standard diamond drilling bits.

SYMBOLS AND TERMS (continued)

PLASTICITY LIMITS AND GRAIN SIZE DISTRIBUTION

WC%	-	Natural water content or water content of sample, %
LL	-	Liquid Limit, % (water content above which soil behaves as a liquid)
PL	-	Plastic Limit, % (water content above which soil behaves plastically)
PI	-	Plasticity Index, % (difference between LL and PL)
Dxx	-	Grain size at which xx% of the soil, by weight, is of finer grain sizes These grain size descriptions are not used below 0.075 mm grain size
D10	-	Grain size at which 10% of the soil is finer (effective grain size)
D60	-	Grain size at which 60% of the soil is finer
Cc	-	Concavity coefficient = $(D30)^2 / (D10 \times D60)$
Cu	-	Uniformity coefficient = D60 / D10

Cc and Cu are used to assess the grading of sands and gravels:
Well-graded gravels have: $1 < Cc < 3$ and $Cu > 4$
Well-graded sands have: $1 < Cc < 3$ and $Cu > 6$
Sands and gravels not meeting the above requirements are poorly-graded or uniformly-graded.
Cc and Cu are not applicable for the description of soils with more than 10% silt and clay (more than 10% finer than 0.075 mm or the #200 sieve)

CONSOLIDATION TEST

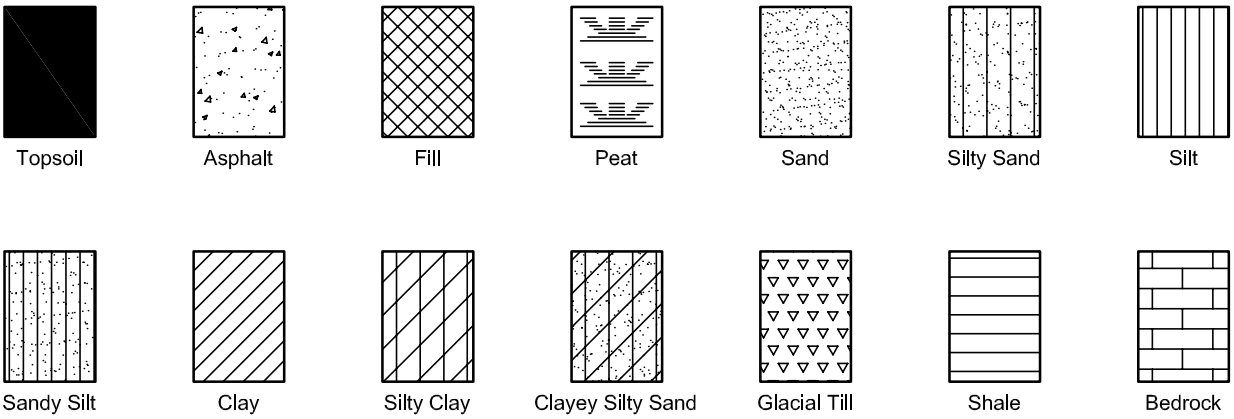
p'_o	-	Present effective overburden pressure at sample depth
p'_c	-	Preconsolidation pressure of (maximum past pressure on) sample
Ccr	-	Recompression index (in effect at pressures below p'_c)
Cc	-	Compression index (in effect at pressures above p'_c)
OC Ratio		Overconsolidaton ratio = p'_c / p'_o
Void Ratio		Initial sample void ratio = volume of voids / volume of solids
Wo	-	Initial water content (at start of consolidation test)

PERMEABILITY TEST

k	-	Coefficient of permeability or hydraulic conductivity is a measure of the ability of water to flow through the sample. The value of k is measured at a specified unit weight for (remoulded) cohesionless soil samples, because its value will vary with the unit weight or density of the sample during the test.

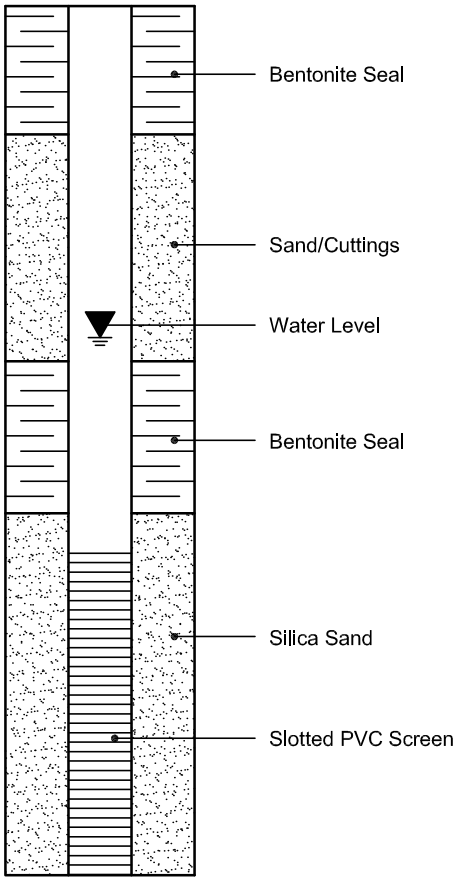
SYMBOLS AND TERMS (continued)

STRATA PLOT

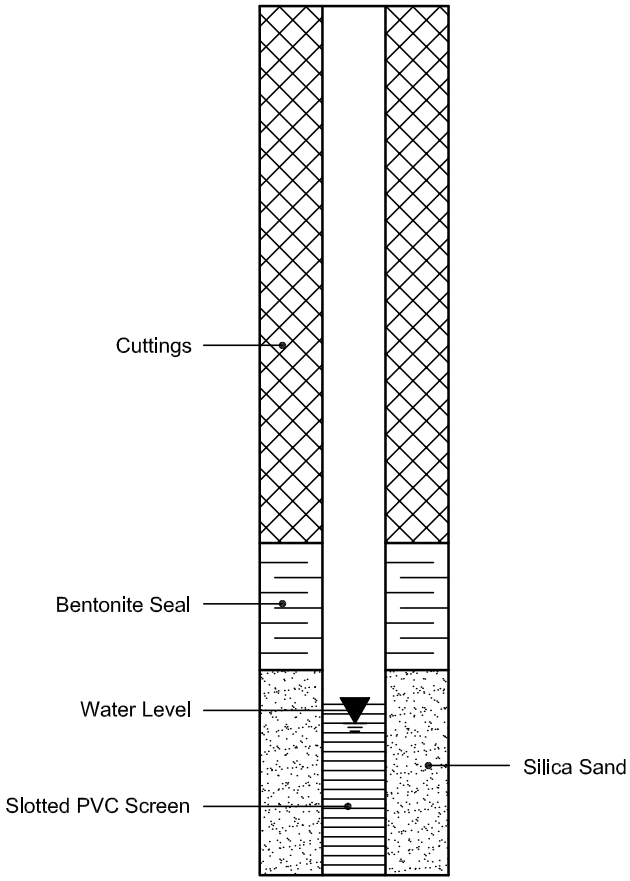


MONITORING WELL AND PIEZOMETER CONSTRUCTION

MONITORING WELL CONSTRUCTION



PIEZOMETER CONSTRUCTION



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Certificate of Analysis

Paterson Group Consulting Engineers

154 Colonnade Road South
Nepean, ON K2E 7J5
Attn: Karyn Munch

Client PO: 33033
Project: PE5267
Custody: 126670

Report Date: 4-Jun-2021
Order Date: 28-May-2021

Order #: 2122570

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

Paracel ID	Client ID
2122570-01	MW1-21-GW1
2122570-02	MW2-21-GW1
2122570-03	MW3-21-GW1
2122570-04	MW4-21-GW1
2122570-05	DUP1

Approved By:

Mark Foto

Mark Foto, M.Sc.
Lab Supervisor

Certificate of Analysis

Report Date: 04-Jun-2021

Client: Paterson Group Consulting Engineers

Order Date: 28-May-2021

Client PO: 33033

Project Description: PE5267

Analysis Summary Table

Analysis	Method Reference/Description	Extraction Date	Analysis Date
BTEX by P&T GC-MS	EPA 624 - P&T GC-MS	1-Jun-21	1-Jun-21
Chromium, hexavalent - water	MOE E3056 - colourimetric	31-May-21	31-May-21
Mercury by CVAA	EPA 245.2 - Cold Vapour AA	31-May-21	3-Jun-21
Metals, ICP-MS	EPA 200.8 - ICP-MS	31-May-21	31-May-21
PHC F1	CWS Tier 1 - P&T GC-FID	31-May-21	1-Jun-21
PHCs F2 to F4	CWS Tier 1 - GC-FID, extraction	2-Jun-21	4-Jun-21
REG 153: PAHs by GC-MS	EPA 625 - GC-MS, extraction	2-Jun-21	3-Jun-21

Certificate of Analysis

Report Date: 04-Jun-2021

Client: Paterson Group Consulting Engineers

Order Date: 28-May-2021

Client PO: 33033

Project Description: PE5267

	Client ID:	MW1-21-GW1	MW2-21-GW1	MW3-21-GW1	MW4-21-GW1
	Sample Date:	25-May-21 09:00	25-May-21 09:00	25-May-21 09:00	25-May-21 09:00
	Sample ID:	2122570-01	2122570-02	2122570-03	2122570-04
	MDL/Units	Water	Water	Water	Water
Metals					
Mercury	0.1 ug/L	<0.1	<0.1	<0.1	-
Antimony	0.5 ug/L	<0.5	<0.5	<0.5	-
Arsenic	1 ug/L	<1	<1	<1	-
Barium	1 ug/L	40	629	65	-
Beryllium	0.5 ug/L	<0.5	<0.5	<0.5	-
Boron	10 ug/L	137	74	39	-
Cadmium	0.1 ug/L	<0.1	<0.1	<0.1	-
Chromium	1 ug/L	<1	<1	<1	-
Chromium (VI)	10 ug/L	<10	<10	<10	-
Cobalt	0.5 ug/L	1.2	1.2	0.6	-
Copper	0.5 ug/L	3.3	4.9	3.5	-
Lead	0.1 ug/L	<0.1	<0.1	<0.1	-
Molybdenum	0.5 ug/L	4.1	2.9	0.9	-
Nickel	1 ug/L	8	4	7	-
Selenium	1 ug/L	6	<1	2	-
Silver	0.1 ug/L	<0.1	<0.1	<0.1	-
Sodium	200 ug/L	455000	228000	289000	-
Thallium	0.1 ug/L	<0.1	0.1	<0.1	-
Uranium	0.1 ug/L	2.8	3.8	4.7	-
Vanadium	0.5 ug/L	<0.5	0.5	<0.5	-
Zinc	5 ug/L	10	17	9	-
Volatiles					
Benzene	0.5 ug/L	-	-	<0.5	-
Ethylbenzene	0.5 ug/L	-	-	<0.5	-
Toluene	0.5 ug/L	-	-	<0.5	-
m,p-Xylenes	0.5 ug/L	-	-	<0.5	-
o-Xylene	0.5 ug/L	-	-	<0.5	-
Xylenes, total	0.5 ug/L	-	-	<0.5	-
Toluene-d8	Surrogate	-	-	120%	-
Hydrocarbons					
F1 PHCs (C6-C10)	25 ug/L	-	-	<25	-
F2 PHCs (C10-C16)	100 ug/L	-	-	<100	-
F3 PHCs (C16-C34)	100 ug/L	-	-	<100	-
F4 PHCs (C34-C50)	100 ug/L	-	-	<100	-
Semi-Volatiles					

Certificate of Analysis

Report Date: 04-Jun-2021

Client: Paterson Group Consulting Engineers

Order Date: 28-May-2021

Client PO: 33033

Project Description: PE5267

	Client ID:	MW1-21-GW1	MW2-21-GW1	MW3-21-GW1	MW4-21-GW1
	Sample Date:	25-May-21 09:00	25-May-21 09:00	25-May-21 09:00	25-May-21 09:00
	Sample ID:	2122570-01	2122570-02	2122570-03	2122570-04
	MDL/Units	Water	Water	Water	Water
Acenaphthene	0.05 ug/L	<0.05	<0.05	-	<0.05
Acenaphthylene	0.05 ug/L	<0.05	<0.05	-	<0.05
Anthracene	0.01 ug/L	<0.01	<0.01	-	<0.01
Benzo [a] anthracene	0.01 ug/L	<0.01	<0.01	-	<0.01
Benzo [a] pyrene	0.01 ug/L	<0.01	<0.01	-	<0.01
Benzo [b] fluoranthene	0.05 ug/L	<0.05	<0.05	-	<0.05
Benzo [g,h,i] perylene	0.05 ug/L	<0.05	<0.05	-	<0.05
Benzo [k] fluoranthene	0.05 ug/L	<0.05	<0.05	-	<0.05
Chrysene	0.05 ug/L	<0.05	<0.05	-	<0.05
Dibenzo [a,h] anthracene	0.05 ug/L	<0.05	<0.05	-	<0.05
Fluoranthene	0.01 ug/L	0.04	<0.01	-	<0.01
Fluorene	0.05 ug/L	<0.05	<0.05	-	<0.05
Indeno [1,2,3-cd] pyrene	0.05 ug/L	<0.05	<0.05	-	<0.05
1-Methylnaphthalene	0.05 ug/L	<0.05	<0.05	-	<0.05
2-Methylnaphthalene	0.05 ug/L	<0.05	<0.05	-	<0.05
Methylnaphthalene (1&2)	0.10 ug/L	<0.10	<0.10	-	<0.10
Naphthalene	0.05 ug/L	0.34	<0.05	-	<0.05
Phenanthrene	0.05 ug/L	0.08	<0.05	-	<0.05
Pyrene	0.01 ug/L	0.04	<0.01	-	<0.01
2-Fluorobiphenyl	Surrogate	80.4%	93.9%	-	92.9%
Terphenyl-d14	Surrogate	90.4%	117%	-	119%

Certificate of Analysis

Report Date: 04-Jun-2021

Client: Paterson Group Consulting Engineers

Order Date: 28-May-2021

Client PO: 33033

Project Description: PE5267

	Client ID:	DUP1	-	-	-
	Sample Date:	25-May-21 09:00	-	-	-
	Sample ID:	2122570-05	-	-	-
	MDL/Units	Water	-	-	-
Metals					
Antimony	0.5 ug/L	<0.5	-	-	-
Arsenic	1 ug/L	<1	-	-	-
Barium	1 ug/L	73	-	-	-
Beryllium	0.5 ug/L	<0.5	-	-	-
Boron	10 ug/L	30	-	-	-
Cadmium	0.1 ug/L	<0.1	-	-	-
Chromium	1 ug/L	<1	-	-	-
Chromium (VI)	10 ug/L	<10	-	-	-
Cobalt	0.5 ug/L	<0.5	-	-	-
Copper	0.5 ug/L	1.4	-	-	-
Lead	0.1 ug/L	<0.1	-	-	-
Molybdenum	0.5 ug/L	4.4	-	-	-
Nickel	1 ug/L	2	-	-	-
Selenium	1 ug/L	4	-	-	-
Silver	0.1 ug/L	<0.1	-	-	-
Sodium	200 ug/L	328000	-	-	-
Thallium	0.1 ug/L	<0.1	-	-	-
Uranium	0.1 ug/L	2.3	-	-	-
Vanadium	0.5 ug/L	<0.5	-	-	-
Zinc	5 ug/L	<5	-	-	-
Semi-Volatiles					
Acenaphthene	0.05 ug/L	<0.05	-	-	-
Acenaphthylene	0.05 ug/L	<0.05	-	-	-
Anthracene	0.01 ug/L	<0.01	-	-	-
Benzo [a] anthracene	0.01 ug/L	<0.01	-	-	-
Benzo [a] pyrene	0.01 ug/L	<0.01	-	-	-
Benzo [b] fluoranthene	0.05 ug/L	<0.05	-	-	-
Benzo [g,h,i] perylene	0.05 ug/L	<0.05	-	-	-
Benzo [k] fluoranthene	0.05 ug/L	<0.05	-	-	-
Chrysene	0.05 ug/L	<0.05	-	-	-
Dibenzo [a,h] anthracene	0.05 ug/L	<0.05	-	-	-
Fluoranthene	0.01 ug/L	<0.01	-	-	-
Fluorene	0.05 ug/L	<0.05	-	-	-
Indeno [1,2,3-cd] pyrene	0.05 ug/L	<0.05	-	-	-

Certificate of Analysis

Report Date: 04-Jun-2021

Client: Paterson Group Consulting Engineers

Order Date: 28-May-2021

Client PO: 33033

Project Description: PE5267

	Client ID:	DUP1	-	-	-
	Sample Date:	25-May-21 09:00	-	-	-
	Sample ID:	2122570-05	-	-	-
	MDL/Units	Water	-	-	-
1-Methylnaphthalene	0.05 ug/L	<0.05	-	-	-
2-Methylnaphthalene	0.05 ug/L	<0.05	-	-	-
Methylnaphthalene (1&2)	0.10 ug/L	<0.10	-	-	-
Naphthalene	0.05 ug/L	<0.05	-	-	-
Phenanthrene	0.05 ug/L	<0.05	-	-	-
Pyrene	0.01 ug/L	<0.01	-	-	-
2-Fluorobiphenyl	Surrogate	92.3%	-	-	-
Terphenyl-d14	Surrogate	114%	-	-	-

Method Quality Control: Blank

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Hydrocarbons									
F1 PHCs (C6-C10)	ND	25	ug/L						
F2 PHCs (C10-C16)	ND	100	ug/L						
F3 PHCs (C16-C34)	ND	100	ug/L						
F4 PHCs (C34-C50)	ND	100	ug/L						
Metals									
Mercury	ND	0.1	ug/L						
Antimony	ND	0.5	ug/L						
Arsenic	ND	1	ug/L						
Barium	ND	1	ug/L						
Beryllium	ND	0.5	ug/L						
Boron	ND	10	ug/L						
Cadmium	ND	0.1	ug/L						
Chromium (VI)	ND	10	ug/L						
Chromium	ND	1	ug/L						
Cobalt	ND	0.5	ug/L						
Copper	ND	0.5	ug/L						
Lead	ND	0.1	ug/L						
Molybdenum	ND	0.5	ug/L						
Nickel	ND	1	ug/L						
Selenium	ND	1	ug/L						
Silver	ND	0.1	ug/L						
Sodium	ND	200	ug/L						
Thallium	ND	0.1	ug/L						
Uranium	ND	0.1	ug/L						
Vanadium	ND	0.5	ug/L						
Zinc	ND	5	ug/L						
Semi-Volatiles									
Acenaphthene	ND	0.05	ug/L						
Acenaphthylene	ND	0.05	ug/L						
Anthracene	ND	0.01	ug/L						
Benzo [a] anthracene	ND	0.01	ug/L						
Benzo [a] pyrene	ND	0.01	ug/L						
Benzo [b] fluoranthene	ND	0.05	ug/L						
Benzo [g,h,i] perylene	ND	0.05	ug/L						
Benzo [k] fluoranthene	ND	0.05	ug/L						
Chrysene	ND	0.05	ug/L						
Dibenzo [a,h] anthracene	ND	0.05	ug/L						
Fluoranthene	ND	0.01	ug/L						
Fluorene	ND	0.05	ug/L						
Indeno [1,2,3-cd] pyrene	ND	0.05	ug/L						
1-Methylnaphthalene	ND	0.05	ug/L						
2-Methylnaphthalene	ND	0.05	ug/L						
Methylnaphthalene (1&2)	ND	0.10	ug/L						
Naphthalene	ND	0.05	ug/L						
Phenanthrene	ND	0.05	ug/L						
Pyrene	ND	0.01	ug/L						
Surrogate: 2-Fluorobiphenyl	*16.8*		*ug/L*		*84.2*	*50-140*			
Surrogate: Terphenyl-d14	*23.0*		*ug/L*		*115*	*50-140*			
Volatiles									
Benzene	ND	0.5	ug/L						
Ethylbenzene	ND	0.5	ug/L						
Toluene	ND	0.5	ug/L						
m,p-Xylenes	ND	0.5	ug/L						
o-Xylene	ND	0.5	ug/L						
Xylenes, total	ND	0.5	ug/L						
Surrogate: Toluene-d8	*99.7*		*ug/L*		*125*	*50-140*			

Method Quality Control: Duplicate

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Hydrocarbons									
F1 PHCs (C6-C10)	ND	25	ug/L	ND			NC	30	
Metals									
Mercury	ND	0.1	ug/L	ND			NC	20	
Antimony	1.09	0.5	ug/L	ND			NC	20	
Arsenic	ND	1	ug/L	ND			NC	20	
Barium	81.7	1	ug/L	81.7			0.0	20	
Beryllium	ND	0.5	ug/L	ND			NC	20	
Boron	148	10	ug/L	150			1.6	20	
Cadmium	ND	0.1	ug/L	ND			NC	20	
Chromium (VI)	ND	10	ug/L	ND			NC	20	
Chromium	ND	1	ug/L	ND			NC	20	
Cobalt	ND	0.5	ug/L	ND			NC	20	
Copper	20.9	0.5	ug/L	21.1			0.9	20	
Lead	0.13	0.1	ug/L	0.14			3.7	20	
Molybdenum	2.07	0.5	ug/L	1.99			NC	20	
Nickel	ND	1	ug/L	ND			NC	20	
Selenium	ND	1	ug/L	ND			NC	20	
Silver	ND	0.1	ug/L	ND			NC	20	
Sodium	58400	200	ug/L	59600			2.1	20	
Thallium	ND	0.1	ug/L	ND			NC	20	
Uranium	1.9	0.1	ug/L	1.9			1.6	20	
Vanadium	0.78	0.5	ug/L	0.79			1.1	20	
Zinc	12	5	ug/L	ND			NC	20	
Volatiles									
Benzene	ND	0.5	ug/L	ND			NC	30	
Ethylbenzene	ND	0.5	ug/L	ND			NC	30	
Toluene	ND	0.5	ug/L	ND			NC	30	
m,p-Xylenes	ND	0.5	ug/L	ND			NC	30	
o-Xylene	ND	0.5	ug/L	ND			NC	30	
Surrogate: Toluene-d8	*95.2*		*ug/L*		*119*	*50-140*			

Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Hydrocarbons									
F1 PHCs (C6-C10)	1830	25	ug/L	ND	91.3	68-117			
F2 PHCs (C10-C16)	1310	100	ug/L	ND	81.7	60-140			
F3 PHCs (C16-C34)	3510	100	ug/L	ND	89.4	60-140			
F4 PHCs (C34-C50)	2270	100	ug/L	ND	91.7	60-140			
Metals									
Mercury	3.42	0.1	ug/L	ND	114	70-130			
Antimony	43.2	0.5	ug/L	ND	85.5	80-120			
Arsenic	43.4	1	ug/L	ND	86.1	80-120			
Barium	45.7	1	ug/L	ND	91.3	80-120			
Beryllium	40.5	0.5	ug/L	ND	80.9	80-120			
Boron	44	10	ug/L	ND	86.2	80-120			
Cadmium	38.3	0.1	ug/L	ND	76.6	80-120			QM-07
Chromium (VI)	195	10	ug/L	ND	97.5	70-130			
Chromium	52.5	1	ug/L	ND	104	80-120			
Cobalt	50.9	0.5	ug/L	ND	102	80-120			
Copper	47.4	0.5	ug/L	ND	94.8	80-120			
Lead	42.8	0.1	ug/L	0.14	85.3	80-120			
Molybdenum	51.8	0.5	ug/L	1.99	99.7	80-120			
Nickel	47.5	1	ug/L	ND	93.6	80-120			
Selenium	33.3	1	ug/L	ND	66.2	80-120			QM-07
Silver	41.3	0.1	ug/L	ND	82.6	80-120			
Sodium	8490	200	ug/L	ND	84.8	80-120			
Thallium	40.4	0.1	ug/L	ND	80.8	80-120			
Uranium	45.6	0.1	ug/L	1.9	87.3	80-120			
Vanadium	54.5	0.5	ug/L	0.79	107	80-120			
Zinc	49	5	ug/L	ND	91.8	80-120			QM-07
Semi-Volatiles									
Acenaphthene	4.82	0.05	ug/L	ND	96.3	50-140			
Acenaphthylene	3.84	0.05	ug/L	ND	76.8	50-140			
Anthracene	4.49	0.01	ug/L	ND	89.8	50-140			
Benzo [a] anthracene	4.10	0.01	ug/L	ND	82.0	50-140			
Benzo [a] pyrene	5.14	0.01	ug/L	ND	103	50-140			
Benzo [b] fluoranthene	5.71	0.05	ug/L	ND	114	50-140			
Benzo [g,h,i] perylene	4.30	0.05	ug/L	ND	86.0	50-140			
Benzo [k] fluoranthene	5.48	0.05	ug/L	ND	110	50-140			
Chrysene	5.18	0.05	ug/L	ND	104	50-140			
Dibenzo [a,h] anthracene	4.64	0.05	ug/L	ND	92.7	50-140			
Fluoranthene	4.59	0.01	ug/L	ND	91.9	50-140			
Fluorene	4.11	0.05	ug/L	ND	82.1	50-140			
Indeno [1,2,3-cd] pyrene	4.42	0.05	ug/L	ND	88.5	50-140			
1-Methylnaphthalene	3.85	0.05	ug/L	ND	77.1	50-140			
2-Methylnaphthalene	4.23	0.05	ug/L	ND	84.6	50-140			
Naphthalene	4.25	0.05	ug/L	ND	84.9	50-140			
Phenanthrene	4.49	0.05	ug/L	ND	89.9	50-140			
Pyrene	4.45	0.01	ug/L	ND	89.0	50-140			
Surrogate: 2-Fluorobiphenyl	*15.3*		*ug/L*		*76.3*	*50-140*			
Surrogate: Terphenyl-d14	*24.5*		*ug/L*		*122*	*50-140*			
Volatiles									

Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Benzene	31.4	0.5	ug/L	ND	78.4	60-130			
Ethylbenzene	35.8	0.5	ug/L	ND	89.4	60-130			
Toluene	35.5	0.5	ug/L	ND	88.6	60-130			
m,p-Xylenes	70.7	0.5	ug/L	ND	88.4	60-130			
o-Xylene	34.5	0.5	ug/L	ND	86.4	60-130			
Surrogate: Toluene-d8	*80.9*		*ug/L*		*101*	*50-140*			

Qualifier Notes:

QC Qualifiers :

QM-07 : The spike recovery was outside acceptance limits for the MS and/or MSD. The batch was accepted based on other acceptable QC.

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

CCME PHC additional information:

- The method for the analysis of PHCs complies with the Reference Method for the CWS PHC and is validated for use in the laboratory. All prescribed quality criteria identified in the method has been met.
- F1 range corrected for BTEX.
- F2 to F3 ranges corrected for appropriate PAHs where available.
- The gravimetric heavy hydrocarbons (F4G) are not to be added to C6 to C50 hydrocarbons.
- In the case where F4 and F4G are both reported, the greater of the two results is to be used for comparison to CWS PHC criteria.
- When reported, data for F4G has been processed using a silica gel cleanup.

PARACEL LABORATORIES LTD

Paracel ID: 2122570

Paracel Order Number (Lab Use Only)	Chain Of Custody (Lab Use Only)
2122570	Nº 126670

Client Name: Paterson | Project Ref: PES267 | Page 1 of 1

Contact Name: Kiary Munch | Quote #:

Address: 154 Colonnade Rd | PO #: 33033

Telephone: 613-226-7381 | E-mail: kmunch@patersongroup.ca; jcomposarone@patersongroup.ca

Turnaround Time

☐ 1 day ☐ 3 day ☑ Regular ☐ 2 day

Date Required:

Regulation 153/04	Other Regulation
☐ Table 1 ☐ Res/Park ☐ Med/Fine	☐ REG 558 ☐ PWQO
☐ Table 2 ☐ Ind/Comm ☐ Coarse	☐ CCME ☐ MISA
☑ Table 3 ☐ Agri/Other	☐ SU - Sani ☐ SU - Storm
☐ Table	Mun:
For RSC: ☐ Yes ☐ No	☐ Other:

Matrix Type: S (Soil/Sed.) GW (Ground Water) SW (Surface Water) SS (Storm/Sanitary Sewer) P (Paint) A (Air) O (Other)

	Sample ID/Location Name	Matrix	Air Volume	# of Containers	Sample Taken Date	Sample Taken Time	PHCs F1-F4+BTEX	VOCs	PAHs	Metals by ICP	Hg	CrVI	B (HWS)	Required Analysis
1	MW1-21-GW1	GW		4	5/25/2021				✓	✓	✓	✓		
2	MW2-21-GW1			3					✓	✓	✓	✓		
3	MW3-21-GW1			7			✓			✓	✓	✓		
4	MW4-21-GW1			1					✓					
5	DUP1			4					✓	✓	✓	✓		
6														
7														
8														
9														
10														

Comments:

Method of Delivery: PARACEL COURIER

Relinquished By (Sign):	Received By Driver/Depot: A. DeSousa	Received at Lab:	Verified By:
Relinquished By (Print): Jeremy Composarone	Date/Time: 28/05/21 3:10	Date/Time: May 28, 2021 17:25	Date/Time: May 29, 2021 11:24
Date/Time: May 28 2021	Temperature: °C PH.	Temperature: 9.6 °C	pH Verified: ☑ By: BS

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Certificate of Analysis

Paterson Group Consulting Engineers

154 Colonnade Road South
Nepean, ON K2E 7J5
Attn: Karyn Munch

Client PO: 33034
Project: PE5267
Custody: 126671

Report Date: 7-Jun-2021
Order Date: 1-Jun-2021

Order #: 2123228

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

Paracel ID	Client ID
2123228-01	DUP2

Approved By:

Dale Robertson, BSc
Laboratory Director

Certificate of Analysis

Client: Paterson Group Consulting Engineers

Client PO: 33034

Report Date: 07-Jun-2021

Order Date: 1-Jun-2021

Project Description: PE5267

Analysis Summary Table

Analysis	Method Reference/Description	Extraction Date	Analysis Date
Chromium, hexavalent - water	MOE E3056 - colourimetric	1-Jun-21	2-Jun-21
Mercury by CVAA	EPA 245.2 - Cold Vapour AA	7-Jun-21	7-Jun-21
Metals, ICP-MS	EPA 200.8 - ICP-MS	3-Jun-21	4-Jun-21

Certificate of Analysis

Report Date: 07-Jun-2021

Client: Paterson Group Consulting Engineers

Order Date: 1-Jun-2021

Client PO: 33034

Project Description: PE5267

	Client ID:	DUP2	-	-	-
	Sample Date:	25-May-21 09:00	-	-	-
	Sample ID:	2123228-01	-	-	-
	MDL/Units	Water	-	-	-
Metals					
Mercury	0.1 ug/L	<0.1	-	-	-
Antimony	0.5 ug/L	<0.5	-	-	-
Arsenic	1 ug/L	<1	-	-	-
Barium	1 ug/L	701	-	-	-
Beryllium	0.5 ug/L	<0.5	-	-	-
Boron	10 ug/L	87	-	-	-
Cadmium	0.1 ug/L	<0.1	-	-	-
Chromium	1 ug/L	<1	-	-	-
Chromium (VI)	10 ug/L	<10	-	-	-
Cobalt	0.5 ug/L	<0.5	-	-	-
Copper	0.5 ug/L	4.8	-	-	-
Lead	0.1 ug/L	0.1	-	-	-
Molybdenum	0.5 ug/L	3.2	-	-	-
Nickel	1 ug/L	4	-	-	-
Selenium	1 ug/L	<1	-	-	-
Silver	0.1 ug/L	<0.1	-	-	-
Sodium	200 ug/L	237000	-	-	-
Thallium	0.1 ug/L	0.2	-	-	-
Uranium	0.1 ug/L	4.1	-	-	-
Vanadium	0.5 ug/L	0.6	-	-	-
Zinc	5 ug/L	9	-	-	-

Certificate of Analysis

Report Date: 07-Jun-2021

Client: Paterson Group Consulting Engineers

Order Date: 1-Jun-2021

Client PO: 33034

Project Description: PE5267

Method Quality Control: Blank

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Metals									
Mercury	ND	0.1	ug/L						
Antimony	ND	0.5	ug/L						
Arsenic	ND	1	ug/L						
Barium	ND	1	ug/L						
Beryllium	ND	0.5	ug/L						
Boron	ND	10	ug/L						
Cadmium	ND	0.1	ug/L						
Chromium (VI)	ND	10	ug/L						
Chromium	ND	1	ug/L						
Cobalt	ND	0.5	ug/L						
Copper	ND	0.5	ug/L						
Lead	ND	0.1	ug/L						
Molybdenum	ND	0.5	ug/L						
Nickel	ND	1	ug/L						
Selenium	ND	1	ug/L						
Silver	ND	0.1	ug/L						
Sodium	ND	200	ug/L						
Thallium	ND	0.1	ug/L						
Uranium	ND	0.1	ug/L						
Vanadium	ND	0.5	ug/L						
Zinc	ND	5	ug/L						

Method Quality Control: Duplicate

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Metals									
Mercury	0.12	0.1	ug/L	ND			NC	20	
Antimony	0.55	0.5	ug/L	ND			NC	20	
Arsenic	ND	1	ug/L	ND			NC	20	
Barium	235	1	ug/L	228			2.9	20	
Beryllium	ND	0.5	ug/L	ND			NC	20	
Boron	32	10	ug/L	31			4.1	20	
Cadmium	ND	0.1	ug/L	ND			NC	20	
Chromium (VI)	63	10	ug/L	64			1.6	20	
Chromium	ND	1	ug/L	ND			NC	20	
Cobalt	7.74	0.5	ug/L	7.85			1.4	20	
Copper	2.11	0.5	ug/L	2.18			3.2	20	
Lead	0.17	0.1	ug/L	ND			NC	20	
Molybdenum	5.18	0.5	ug/L	5.10			1.5	20	
Nickel	6.5	1	ug/L	6.8			3.6	20	
Selenium	ND	1	ug/L	ND			NC	20	
Silver	ND	0.1	ug/L	ND			NC	20	
Sodium	354000	200	ug/L	380000			7.1	20	
Thallium	0.21	0.1	ug/L	0.15			NC	20	
Uranium	0.8	0.1	ug/L	0.8			1.2	20	
Vanadium	ND	0.5	ug/L	ND			NC	20	
Zinc	ND	5	ug/L	ND			NC	20	

Certificate of Analysis

Client: Paterson Group Consulting Engineers

Client PO: 33034

Report Date: 07-Jun-2021

Order Date: 1-Jun-2021

Project Description: PE5267

Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Metals									
Mercury	3.31	0.1	ug/L	ND	110	70-130			
Antimony	52.1	0.5	ug/L	ND	104	80-120			
Arsenic	53.2	1	ug/L	ND	106	80-120			
Barium	272	1	ug/L	228	88.9	80-120			
Beryllium	42.9	0.5	ug/L	ND	85.8	80-120			
Boron	66	10	ug/L	31	71.2	80-120			QM-07
Cadmium	45.7	0.1	ug/L	ND	91.3	80-120			
Chromium (VI)	257	10	ug/L	64	96.5	70-130			
Chromium	57.3	1	ug/L	ND	114	80-120			
Cobalt	60.7	0.5	ug/L	7.85	106	80-120			
Copper	51.0	0.5	ug/L	2.18	97.7	80-120			
Lead	39.1	0.1	ug/L	ND	78.1	80-120			QM-07
Molybdenum	52.8	0.5	ug/L	5.10	95.4	80-120			
Nickel	56.8	1	ug/L	6.8	100	80-120			
Selenium	44.4	1	ug/L	ND	87.1	80-120			
Silver	45.7	0.1	ug/L	ND	91.5	80-120			
Sodium	8990	200	ug/L	ND	89.9	80-120			
Thallium	46.3	0.1	ug/L	0.15	92.3	80-120			
Uranium	44.1	0.1	ug/L	0.8	86.7	80-120			
Vanadium	59.1	0.5	ug/L	ND	118	80-120			
Zinc	45	5	ug/L	ND	82.9	80-120			

Certificate of Analysis

Report Date: 07-Jun-2021

Client: Paterson Group Consulting Engineers

Order Date: 1-Jun-2021

Client PO: 33034

Project Description: PE5267

Qualifier Notes:

QC Qualifiers :

QM-07 : The spike recovery was outside acceptance limits for the MS and/or MSD. The batch was accepted based on other acceptable QC.

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

PARACEL LABORATORIES LTD.

Paracel ID: 2123228

Paracel Order Number (Lab Use Only)	Chain Of Custody (Lab Use Only)
2123228	Nº 126671

Client Name: Paterson | Project Ref: PE5267 | Page 1 of 1

Contact Name: Karyn Munch | Quote #:

Address: 154 Colonnade Rd | PO #: 33034

Telephone: 613-226-7381 | E-mail: jcamposarcone@patersongroup.ca, Kmunch@patersongroup.ca

Turnaround Time

☐ 1 day ☐ 3 day

☐ 2 day ☑ Regular

Date Required: _____

Regulation 153/04	Other Regulation
☐ Table 1 ☐ Res/Park ☐ Med/Fine	☐ REG 558 ☐ PWQO
☐ Table 2 ☐ Ind/Comm ☐ Coarse	☐ CCME ☐ MISA
☑ Table 3 ☐ Agri/Other	☐ SU - Sani ☐ SU - Storm
☐ Table ___	Mun: ___
For RSC: ☐ Yes ☐ No	☐ Other:

Matrix Type: S (Soil/Sed.) GW (Ground Water) SW (Surface Water) SS (Storm/Sanitary Sewer) P (Paint) A (Air) O (Other)

	Sample ID/Location Name	Matrix	Air Volume	# of Containers	Sample Taken Date	Sample Taken Time	PHCs F1-F4+BTEX	VOCs	PAHs	Metals by ICP	Hg	CrVI	B (HWS)
1	DUP2	GW		3	5/25/2021					✓	✓	✓	
2													
3													
4													
5													
6													
7													
8													
9													
10													

Comments:

Method of Delivery: PARACEL COURIER

Relinquished By (Sign):	Received By Driver/Depot: A. Blouse	Received at Lab: Shreeparan Dhamala	Verified By:
Relinquished By (Print): Jeremy Camposarcone	Date/Time: 01/06/21 3:20	Date/Time: June 1, 2021 04:15	Date/Time: June 1st, 2021 17:01
Date/Time: 5/31/2021	Temperature: °C PK	Temperature: 13.6 °C	pH Verified: ☑ By: BS

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Certificate of Analysis

Paterson Group Consulting Engineers

154 Colonnade Road South
Nepean, ON K2E 7J5
Attn: Karyn Munch

Client PO: 32202
Project: PE5267
Custody: 131141

Report Date: 22-Jun-2021
Order Date: 16-Jun-2021

Order #: 2125366

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

Paracel ID	Client ID
2125366-01	TP1-21-GS3
2125366-02	TP2-21-GS4
2125366-03	TP3-21-GS3
2125366-04	TP4-21-GS2
2125366-05	TP5-21-GS2
2125366-06	TP6-21-GS5
2125366-09	DUP3
2125366-10	DUP4

Approved By:

Mark Foto, M.Sc.
Lab Supervisor

Certificate of Analysis

Report Date: 22-Jun-2021

Client: Paterson Group Consulting Engineers

Order Date: 16-Jun-2021

Client PO: 32202

Project Description: PE5267

Analysis Summary Table

Analysis	Method Reference/Description	Extraction Date	Analysis Date
BTEX by P&T GC-MS	EPA 8260 - P&T GC-MS	17-Jun-21	17-Jun-21
Chromium, hexavalent - soil	MOE E3056 - Extraction, colourimetric	17-Jun-21	18-Jun-21
Mercury by CVAA	EPA 7471B - CVAA, digestion	21-Jun-21	22-Jun-21
PHC F1	CWS Tier 1 - P&T GC-FID	17-Jun-21	17-Jun-21
PHCs F2 to F4	CWS Tier 1 - GC-FID, extraction	16-Jun-21	17-Jun-21
REG 153: Metals by ICP/MS, soil	EPA 6020 - Digestion - ICP-MS	18-Jun-21	18-Jun-21
REG 153: PAHs by GC-MS	EPA 8270 - GC-MS, extraction	17-Jun-21	21-Jun-21
REG 153: VOCs by P&T GC/MS	EPA 8260 - P&T GC-MS	17-Jun-21	17-Jun-21
Solids, %	Gravimetric, calculation	17-Jun-21	18-Jun-21

Certificate of Analysis

Report Date: 22-Jun-2021

Client: Paterson Group Consulting Engineers

Order Date: 16-Jun-2021

Client PO: 32202

Project Description: PE5267

	Client ID:	TP1-21-GS3	TP2-21-GS4	TP3-21-GS3	TP4-21-GS2
	Sample Date:	15-Jun-21 09:00	15-Jun-21 09:00	15-Jun-21 09:00	15-Jun-21 09:00
	Sample ID:	2125366-01	2125366-02	2125366-03	2125366-04
	MDL/Units	Soil	Soil	Soil	Soil
Physical Characteristics					
% Solids	0.1 % by Wt.	93.3	90.3	87.7	94.9
Metals					
Antimony	1.0 ug/g dry	-	<1.0	2.1	<1.0
Arsenic	1.0 ug/g dry	-	3.2	22.3	3.9
Barium	1.0 ug/g dry	-	190	181	149
Beryllium	0.5 ug/g dry	-	<0.5	0.7	<0.5
Boron	5.0 ug/g dry	-	8.7	6.9	7.1
Cadmium	0.5 ug/g dry	-	<0.5	3.1	<0.5
Chromium	5.0 ug/g dry	-	17.6	20.6	15.1
Chromium (VI)	0.2 ug/g dry	-	<0.2	<0.2	<0.2
Cobalt	1.0 ug/g dry	-	4.9	7.4	4.9
Copper	5.0 ug/g dry	-	11.4	51.5	11.3
Lead	1.0 ug/g dry	-	11.1	270	17.8
Mercury	0.1 ug/g dry	-	<0.1	1.0	0.1
Molybdenum	1.0 ug/g dry	-	<1.0	2.3	<1.0
Nickel	5.0 ug/g dry	-	12.4	17.8	10.9
Selenium	1.0 ug/g dry	-	<1.0	4.3	<1.0
Silver	0.3 ug/g dry	-	<0.3	<0.3	<0.3
Thallium	1.0 ug/g dry	-	<1.0	<1.0	<1.0
Uranium	1.0 ug/g dry	-	<1.0	<1.0	<1.0
Vanadium	10.0 ug/g dry	-	20.1	26.4	22.5
Zinc	20.0 ug/g dry	-	27.2	1680	48.6
Volatiles					
Acetone	0.50 ug/g dry	<0.50	-	-	-
Benzene	0.02 ug/g dry	<0.02	-	-	-
Bromodichloromethane	0.05 ug/g dry	<0.05	-	-	-
Bromoform	0.05 ug/g dry	<0.05	-	-	-
Bromomethane	0.05 ug/g dry	<0.05	-	-	-
Carbon Tetrachloride	0.05 ug/g dry	<0.05	-	-	-
Chlorobenzene	0.05 ug/g dry	<0.05	-	-	-
Chloroform	0.05 ug/g dry	<0.05	-	-	-
Dibromochloromethane	0.05 ug/g dry	<0.05	-	-	-
Dichlorodifluoromethane	0.05 ug/g dry	<0.05	-	-	-
1,2-Dichlorobenzene	0.05 ug/g dry	<0.05	-	-	-
1,3-Dichlorobenzene	0.05 ug/g dry	<0.05	-	-	-

Certificate of Analysis

Report Date: 22-Jun-2021

Client: Paterson Group Consulting Engineers

Order Date: 16-Jun-2021

Client PO: 32202

Project Description: PE5267

	Client ID:	TP1-21-GS3	TP2-21-GS4	TP3-21-GS3	TP4-21-GS2
	Sample Date:	15-Jun-21 09:00	15-Jun-21 09:00	15-Jun-21 09:00	15-Jun-21 09:00
	Sample ID:	2125366-01	2125366-02	2125366-03	2125366-04
	MDL/Units	Soil	Soil	Soil	Soil
1,4-Dichlorobenzene	0.05 ug/g dry	<0.05	-	-	-
1,1-Dichloroethane	0.05 ug/g dry	<0.05	-	-	-
1,2-Dichloroethane	0.05 ug/g dry	<0.05	-	-	-
1,1-Dichloroethylene	0.05 ug/g dry	<0.05	-	-	-
cis-1,2-Dichloroethylene	0.05 ug/g dry	<0.05	-	-	-
trans-1,2-Dichloroethylene	0.05 ug/g dry	<0.05	-	-	-
1,2-Dichloropropane	0.05 ug/g dry	<0.05	-	-	-
cis-1,3-Dichloropropylene	0.05 ug/g dry	<0.05	-	-	-
trans-1,3-Dichloropropylene	0.05 ug/g dry	<0.05	-	-	-
1,3-Dichloropropene, total	0.05 ug/g dry	<0.05	-	-	-
Ethylbenzene	0.05 ug/g dry	<0.05	-	-	-
Ethylene dibromide (dibromoethane, 1,2-)	0.05 ug/g dry	<0.05	-	-	-
Hexane	0.05 ug/g dry	<0.05	-	-	-
Methyl Ethyl Ketone (2-Butanone)	0.50 ug/g dry	<0.50	-	-	-
Methyl Isobutyl Ketone	0.50 ug/g dry	<0.50	-	-	-
Methyl tert-butyl ether	0.05 ug/g dry	<0.05	-	-	-
Methylene Chloride	0.05 ug/g dry	<0.05	-	-	-
Styrene	0.05 ug/g dry	<0.05	-	-	-
1,1,1,2-Tetrachloroethane	0.05 ug/g dry	<0.05	-	-	-
1,1,2,2-Tetrachloroethane	0.05 ug/g dry	<0.05	-	-	-
Tetrachloroethylene	0.05 ug/g dry	<0.05	-	-	-
Toluene	0.05 ug/g dry	<0.05	-	-	-
1,1,1-Trichloroethane	0.05 ug/g dry	<0.05	-	-	-
1,1,2-Trichloroethane	0.05 ug/g dry	<0.05	-	-	-
Trichloroethylene	0.05 ug/g dry	<0.05	-	-	-
Trichlorofluoromethane	0.05 ug/g dry	<0.05	-	-	-
Vinyl chloride	0.02 ug/g dry	<0.02	-	-	-
m,p-Xylenes	0.05 ug/g dry	<0.05	-	-	-
o-Xylene	0.05 ug/g dry	<0.05	-	-	-
Xylenes, total	0.05 ug/g dry	<0.05	-	-	-
4-Bromofluorobenzene	Surrogate	118%	-	-	-
Dibromofluoromethane	Surrogate	102%	-	-	-
Toluene-d8	Surrogate	118%	-	-	-
Benzene	0.02 ug/g dry	-	<0.02	-	-
Ethylbenzene	0.05 ug/g dry	-	<0.05	-	-
Toluene	0.05 ug/g dry	-	<0.05	-	-

Certificate of Analysis

Report Date: 22-Jun-2021

Client: Paterson Group Consulting Engineers

Order Date: 16-Jun-2021

Client PO: 32202

Project Description: PE5267

	Client ID:	TP1-21-GS3	TP2-21-GS4	TP3-21-GS3	TP4-21-GS2
	Sample Date:	15-Jun-21 09:00	15-Jun-21 09:00	15-Jun-21 09:00	15-Jun-21 09:00
	Sample ID:	2125366-01	2125366-02	2125366-03	2125366-04
	MDL/Units	Soil	Soil	Soil	Soil
m,p-Xylenes	0.05 ug/g dry	-	<0.05	-	-
o-Xylene	0.05 ug/g dry	-	<0.05	-	-
Xylenes, total	0.05 ug/g dry	-	<0.05	-	-
Toluene-d8	Surrogate	-	115%	-	-
Hydrocarbons					
F1 PHCs (C6-C10)	7 ug/g dry	<7	<7	-	-
F2 PHCs (C10-C16)	4 ug/g dry	5	5	-	-
F3 PHCs (C16-C34)	8 ug/g dry	386	24	-	-
F4 PHCs (C34-C50)	6 ug/g dry	134	15	-	-
Semi-Volatiles					
Acenaphthene	0.02 ug/g dry	-	<0.02	15.5	-
Acenaphthylene	0.02 ug/g dry	-	<0.02	1.43	-
Anthracene	0.02 ug/g dry	-	<0.02	34.0	-
Benzo [a] anthracene	0.02 ug/g dry	-	<0.02	50.9	-
Benzo [a] pyrene	0.02 ug/g dry	-	<0.02	48.5	-
Benzo [b] fluoranthene	0.02 ug/g dry	-	<0.02	43.0	-
Benzo [g,h,i] perylene	0.02 ug/g dry	-	<0.02	23.3	-
Benzo [k] fluoranthene	0.02 ug/g dry	-	<0.02	23.6	-
Chrysene	0.02 ug/g dry	-	<0.02	52.4	-
Dibenzo [a,h] anthracene	0.02 ug/g dry	-	<0.02	6.01	-
Fluoranthene	0.02 ug/g dry	-	<0.02	123	-
Fluorene	0.02 ug/g dry	-	<0.02	12.8	-
Indeno [1,2,3-cd] pyrene	0.02 ug/g dry	-	<0.02	21.1	-
1-Methylnaphthalene	0.02 ug/g dry	-	<0.02	3.91	-
2-Methylnaphthalene	0.02 ug/g dry	-	<0.02	5.39	-
Methylnaphthalene (1&2)	0.04 ug/g dry	-	<0.04	9.30	-
Naphthalene	0.01 ug/g dry	-	<0.01	9.72	-
Phenanthrene	0.02 ug/g dry	-	<0.02	123	-
Pyrene	0.02 ug/g dry	-	<0.02	97.6	-
2-Fluorobiphenyl	Surrogate	-	72.1%	114%	-
Terphenyl-d14	Surrogate	-	89.1%	168% [5]	-

Certificate of Analysis

Report Date: 22-Jun-2021

Client: Paterson Group Consulting Engineers

Order Date: 16-Jun-2021

Client PO: 32202

Project Description: PE5267

	Client ID:	TP5-21-GS2	TP6-21-GS5	DUP3	DUP4
	Sample Date:	15-Jun-21 09:00	15-Jun-21 09:00	15-Jun-21 09:00	15-Jun-21 09:00
	Sample ID:	2125366-05	2125366-06	2125366-09	2125366-10
	MDL/Units	Soil	Soil	Soil	Soil
Physical Characteristics					
% Solids	0.1 % by Wt.	90.4	90.5	89.0	93.4
Metals					
Antimony	1.0 ug/g dry	-	2.0	-	<1.0
Arsenic	1.0 ug/g dry	-	5.0	-	3.2
Barium	1.0 ug/g dry	-	90.9	-	121
Beryllium	0.5 ug/g dry	-	<0.5	-	<0.5
Boron	5.0 ug/g dry	-	9.3	-	5.5
Cadmium	0.5 ug/g dry	-	<0.5	-	<0.5
Chromium	5.0 ug/g dry	-	18.6	-	12.7
Chromium (VI)	0.2 ug/g dry	-	<0.2	-	<0.2
Cobalt	1.0 ug/g dry	-	5.2	-	4.3
Copper	5.0 ug/g dry	-	25.8	-	10.5
Lead	1.0 ug/g dry	-	136	-	17.8
Mercury	0.1 ug/g dry	-	0.2	-	0.1
Molybdenum	1.0 ug/g dry	-	2.3	-	<1.0
Nickel	5.0 ug/g dry	-	12.8	-	9.7
Selenium	1.0 ug/g dry	-	<1.0	-	<1.0
Silver	0.3 ug/g dry	-	<0.3	-	<0.3
Thallium	1.0 ug/g dry	-	<1.0	-	<1.0
Uranium	1.0 ug/g dry	-	<1.0	-	<1.0
Vanadium	10.0 ug/g dry	-	24.3	-	18.0
Zinc	20.0 ug/g dry	-	161	-	47.7
Semi-Volatiles					
Acenaphthene	0.02 ug/g dry	1.42	<0.40 [1]	11.0	-
Acenaphthylene	0.02 ug/g dry	1.01	0.45	1.31	-
Anthracene	0.02 ug/g dry	2.40	0.59	32.9	-
Benzo [a] anthracene	0.02 ug/g dry	6.74	1.11	43.6	-
Benzo [a] pyrene	0.02 ug/g dry	7.22	1.25	38.9	-
Benzo [b] fluoranthene	0.02 ug/g dry	7.37	1.29	35.9	-
Benzo [g,h,i] perylene	0.02 ug/g dry	3.95	0.81	18.5	-
Benzo [k] fluoranthene	0.02 ug/g dry	4.47	0.59	19.2	-
Chrysene	0.02 ug/g dry	7.59	1.41	44.0	-
Dibenzo [a,h] anthracene	0.02 ug/g dry	1.07	<0.40 [1]	5.30	-
Fluoranthene	0.02 ug/g dry	18.7	2.49	105	-
Fluorene	0.02 ug/g dry	1.23	<0.40 [1]	15.7	-

Certificate of Analysis

Client: Paterson Group Consulting Engineers

Client PO: 32202

Report Date: 22-Jun-2021

Order Date: 16-Jun-2021

Project Description: PE5267

	Client ID:	TP5-21-GS2	TP6-21-GS5	DUP3	DUP4
	Sample Date:	15-Jun-21 09:00	15-Jun-21 09:00	15-Jun-21 09:00	15-Jun-21 09:00
	Sample ID:	2125366-05	2125366-06	2125366-09	2125366-10
	MDL/Units	Soil	Soil	Soil	Soil
Indeno [1,2,3-cd] pyrene	0.02 ug/g dry	3.61	0.67	17.0	-
1-Methylnaphthalene	0.02 ug/g dry	1.96	<0.40 [1]	3.72	-
2-Methylnaphthalene	0.02 ug/g dry	2.43	<0.40 [1]	5.42	-
Methylnaphthalene (1&2)	0.04 ug/g dry	4.39	<0.80 [1]	9.15	-
Naphthalene	0.01 ug/g dry	3.10	0.36	10.1	-
Phenanthrene	0.02 ug/g dry	15.7	2.18	115	-
Pyrene	0.02 ug/g dry	15.2	2.07	78.9	-
2-Fluorobiphenyl	Surrogate	85.1%	88.5%	70.5%	-
Terphenyl-d14	Surrogate	103%	122%	87.1%	-

Method Quality Control: Blank

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Hydrocarbons									
F1 PHCs (C6-C10)	ND	7	ug/g						
F2 PHCs (C10-C16)	ND	4	ug/g						
F3 PHCs (C16-C34)	ND	8	ug/g						
F4 PHCs (C34-C50)	ND	6	ug/g						
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 (VI)	ND	0.2	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						
Mercury	ND	0.1	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	*1.23*		*ug/g*		*92.1*	*50-140*			
Surrogate: Terphenyl-d14	*1.45*		*ug/g*		*109*	*50-140*			
Volatiles									
Acetone	ND	0.50	ug/g						
Benzene	ND	0.02	ug/g						
Bromodichloromethane	ND	0.05	ug/g						
Bromoform	ND	0.05	ug/g						
Bromomethane	ND	0.05	ug/g						
Carbon Tetrachloride	ND	0.05	ug/g						
Chlorobenzene	ND	0.05	ug/g						
Chloroform	ND	0.05	ug/g						
Dibromochloromethane	ND	0.05	ug/g						
Dichlorodifluoromethane	ND	0.05	ug/g						

Method Quality Control: Blank

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
1,2-Dichlorobenzene	ND	0.05	ug/g						
1,3-Dichlorobenzene	ND	0.05	ug/g						
1,4-Dichlorobenzene	ND	0.05	ug/g						
1,1-Dichloroethane	ND	0.05	ug/g						
1,2-Dichloroethane	ND	0.05	ug/g						
1,1-Dichloroethylene	ND	0.05	ug/g						
cis-1,2-Dichloroethylene	ND	0.05	ug/g						
trans-1,2-Dichloroethylene	ND	0.05	ug/g						
1,2-Dichloropropane	ND	0.05	ug/g						
cis-1,3-Dichloropropylene	ND	0.05	ug/g						
trans-1,3-Dichloropropylene	ND	0.05	ug/g						
1,3-Dichloropropene, total	ND	0.05	ug/g						
Ethylbenzene	ND	0.05	ug/g						
Ethylene dibromide (dibromoethane, 1,2	ND	0.05	ug/g						
Hexane	ND	0.05	ug/g						
Methyl Ethyl Ketone (2-Butanone)	ND	0.50	ug/g						
Methyl Isobutyl Ketone	ND	0.50	ug/g						
Methyl tert-butyl ether	ND	0.05	ug/g						
Methylene Chloride	ND	0.05	ug/g						
Styrene	ND	0.05	ug/g						
1,1,1,2-Tetrachloroethane	ND	0.05	ug/g						
1,1,2,2-Tetrachloroethane	ND	0.05	ug/g						
Tetrachloroethylene	ND	0.05	ug/g						
Toluene	ND	0.05	ug/g						
1,1,1-Trichloroethane	ND	0.05	ug/g						
1,1,2-Trichloroethane	ND	0.05	ug/g						
Trichloroethylene	ND	0.05	ug/g						
Trichlorofluoromethane	ND	0.05	ug/g						
Vinyl chloride	ND	0.02	ug/g						
m,p-Xylenes	ND	0.05	ug/g						
o-Xylene	ND	0.05	ug/g						
Xylenes, total	ND	0.05	ug/g						
Surrogate: 4-Bromofluorobenzene	*9.26*		*ug/g*		*116*	*50-140*			
Surrogate: Dibromofluoromethane	*8.21*		*ug/g*		*103*	*50-140*			
Surrogate: Toluene-d8	*9.27*		*ug/g*		*116*	*50-140*			
Benzene	ND	0.02	ug/g						
Ethylbenzene	ND	0.05	ug/g						
Toluene	ND	0.05	ug/g						
m,p-Xylenes	ND	0.05	ug/g						
o-Xylene	ND	0.05	ug/g						
Xylenes, total	ND	0.05	ug/g						
Surrogate: Toluene-d8	*9.27*		*ug/g*		*116*	*50-140*			

Method Quality Control: Duplicate

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Hydrocarbons									
F1 PHCs (C6-C10)	ND	7	ug/g dry	ND			NC	40	
F2 PHCs (C10-C16)	ND	4	ug/g dry	ND			NC	30	
F3 PHCs (C16-C34)	11	8	ug/g dry	14			27.8	30	
F4 PHCs (C34-C50)	15	6	ug/g dry	35			NC	30	
Metals									
Antimony	ND	1.0	ug/g dry	ND			NC	30	
Arsenic	3.1	1.0	ug/g dry	3.2			3.8	30	
Barium	295	1.0	ug/g dry	301			2.2	30	
Beryllium	1.1	0.5	ug/g dry	1.1			2.5	30	
Boron	13.4	5.0	ug/g dry	13.4			0.5	30	
Cadmium	ND	0.5	ug/g dry	ND			NC	30	
Chromium (VI)	ND	0.2	ug/g dry	ND			NC	35	
Chromium	49.8	5.0	ug/g dry	50.0			0.3	30	
Cobalt	15.5	1.0	ug/g dry	15.5			0.1	30	
Copper	27.4	5.0	ug/g dry	28.2			2.7	30	
Lead	10.3	1.0	ug/g dry	10.7			4.4	30	
Mercury	ND	0.1	ug/g dry	ND			NC	30	
Molybdenum	ND	1.0	ug/g dry	ND			NC	30	
Nickel	32.3	5.0	ug/g dry	32.5			0.7	30	
Selenium	ND	1.0	ug/g dry	ND			NC	30	
Silver	ND	0.3	ug/g dry	ND			NC	30	
Thallium	ND	1.0	ug/g dry	ND			NC	30	
Uranium	ND	1.0	ug/g dry	ND			NC	30	
Vanadium	63.7	10.0	ug/g dry	64.2			0.8	30	
Zinc	86.0	20.0	ug/g dry	89.6			4.1	30	
Physical Characteristics									
% Solids	83.7	0.1	% by Wt.	83.4			0.4	25	
Semi-Volatiles									
Acenaphthene	ND	0.02	ug/g dry	ND			NC	40	
Acenaphthylene	ND	0.02	ug/g dry	ND			NC	40	
Anthracene	ND	0.02	ug/g dry	ND			NC	40	
Benzo [a] anthracene	ND	0.02	ug/g dry	ND			NC	40	
Benzo [a] pyrene	ND	0.02	ug/g dry	ND			NC	40	
Benzo [b] fluoranthene	ND	0.02	ug/g dry	ND			NC	40	
Benzo [g,h,i] perylene	ND	0.02	ug/g dry	ND			NC	40	
Benzo [k] fluoranthene	ND	0.02	ug/g dry	ND			NC	40	
Chrysene	ND	0.02	ug/g dry	ND			NC	40	
Dibenzo [a,h] anthracene	ND	0.02	ug/g dry	ND			NC	40	
Fluoranthene	ND	0.02	ug/g dry	ND			NC	40	
Fluorene	0.068	0.02	ug/g dry	0.070			2.2	40	
Indeno [1,2,3-cd] pyrene	ND	0.02	ug/g dry	ND			NC	40	
1-Methylnaphthalene	ND	0.02	ug/g dry	ND			NC	40	
2-Methylnaphthalene	ND	0.02	ug/g dry	ND			NC	40	
Naphthalene	ND	0.01	ug/g dry	ND			NC	40	
Phenanthrene	0.088	0.02	ug/g dry	0.143			NC	40	
Pyrene	0.021	0.02	ug/g dry	0.020			1.1	40	
Surrogate: 2-Fluorobiphenyl	*1.13*		*ug/g dry*		*67.8*	*50-140*			
Surrogate: Terphenyl-d14	*1.49*		*ug/g dry*		*89.3*	*50-140*			
Volatiles									
Acetone	ND	0.50	ug/g dry	ND			NC	50	
Benzene	ND	0.02	ug/g dry	ND			NC	50	
Bromodichloromethane	ND	0.05	ug/g dry	ND			NC	50	
Bromoform	ND	0.05	ug/g dry	ND			NC	50	
Bromomethane	ND	0.05	ug/g dry	ND			NC	50	
Carbon Tetrachloride	ND	0.05	ug/g dry	ND			NC	50	
Chlorobenzene	ND	0.05	ug/g dry	ND			NC	50	

Method Quality Control: Duplicate

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Chloroform	ND	0.05	ug/g dry	ND			NC	50	
Dibromochloromethane	ND	0.05	ug/g dry	ND			NC	50	
Dichlorodifluoromethane	ND	0.05	ug/g dry	ND			NC	50	
1,2-Dichlorobenzene	ND	0.05	ug/g dry	ND			NC	50	
1,3-Dichlorobenzene	ND	0.05	ug/g dry	ND			NC	50	
1,4-Dichlorobenzene	ND	0.05	ug/g dry	ND			NC	50	
1,1-Dichloroethane	ND	0.05	ug/g dry	ND			NC	50	
1,2-Dichloroethane	ND	0.05	ug/g dry	ND			NC	50	
1,1-Dichloroethylene	ND	0.05	ug/g dry	ND			NC	50	
cis-1,2-Dichloroethylene	ND	0.05	ug/g dry	ND			NC	50	
trans-1,2-Dichloroethylene	ND	0.05	ug/g dry	ND			NC	50	
1,2-Dichloropropane	ND	0.05	ug/g dry	ND			NC	50	
cis-1,3-Dichloropropylene	ND	0.05	ug/g dry	ND			NC	50	
trans-1,3-Dichloropropylene	ND	0.05	ug/g dry	ND			NC	50	
Ethylbenzene	ND	0.05	ug/g dry	ND			NC	50	
Ethylene dibromide (dibromoethane, 1,2-	ND	0.05	ug/g dry	ND			NC	50	
Hexane	ND	0.05	ug/g dry	ND			NC	50	
Methyl Ethyl Ketone (2-Butanone)	ND	0.50	ug/g dry	ND			NC	50	
Methyl Isobutyl Ketone	ND	0.50	ug/g dry	ND			NC	50	
Methyl tert-butyl ether	ND	0.05	ug/g dry	ND			NC	50	
Methylene Chloride	ND	0.05	ug/g dry	ND			NC	50	
Styrene	ND	0.05	ug/g dry	ND			NC	50	
1,1,1,2-Tetrachloroethane	ND	0.05	ug/g dry	ND			NC	50	
1,1,2,2-Tetrachloroethane	ND	0.05	ug/g dry	ND			NC	50	
Tetrachloroethylene	ND	0.05	ug/g dry	ND			NC	50	
Toluene	ND	0.05	ug/g dry	ND			NC	50	
1,1,1-Trichloroethane	ND	0.05	ug/g dry	ND			NC	50	
1,1,2-Trichloroethane	ND	0.05	ug/g dry	ND			NC	50	
Trichloroethylene	ND	0.05	ug/g dry	ND			NC	50	
Trichlorofluoromethane	ND	0.05	ug/g dry	ND			NC	50	
Vinyl chloride	ND	0.02	ug/g dry	ND			NC	50	
m,p-Xylenes	ND	0.05	ug/g dry	ND			NC	50	
o-Xylene	ND	0.05	ug/g dry	ND			NC	50	
Surrogate: 4-Bromofluorobenzene	*9.64*		*ug/g dry*		*112*	*50-140*			
Surrogate: Dibromofluoromethane	*9.03*		*ug/g dry*		*105*	*50-140*			
Surrogate: Toluene-d8	*9.92*		*ug/g dry*		*115*	*50-140*			
Benzene	ND	0.02	ug/g dry	ND			NC	50	
Ethylbenzene	ND	0.05	ug/g dry	ND			NC	50	
Toluene	ND	0.05	ug/g dry	ND			NC	50	
m,p-Xylenes	ND	0.05	ug/g dry	ND			NC	50	
o-Xylene	ND	0.05	ug/g dry	ND			NC	50	
Surrogate: Toluene-d8	*9.92*		*ug/g dry*		*115*	*50-140*			

Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Hydrocarbons									
F1 PHCs (C6-C10)	192	7	ug/g	ND	96.0	80-120			
F2 PHCs (C10-C16)	75	4	ug/g	ND	80.4	60-140			
F3 PHCs (C16-C34)	249	8	ug/g	14	102	60-140			
F4 PHCs (C34-C50)	222	6	ug/g	35	128	60-140			
Metals									
Antimony	52.3	1.0	ug/g	ND	104	70-130			
Arsenic	53.3	1.0	ug/g	1.3	104	70-130			
Barium	181	1.0	ug/g	121	122	70-130			
Beryllium	54.4	0.5	ug/g	0.5	108	70-130			
Boron	53.5	5.0	ug/g	5.4	96.3	70-130			
Cadmium	51.1	0.5	ug/g	ND	102	70-130			
Chromium (VI)	0.1	0.2	ug/g	ND	67.0	70-130			QM-05
Chromium	74.5	5.0	ug/g	20.0	109	70-130			
Cobalt	59.0	1.0	ug/g	6.2	106	70-130			
Copper	62.3	5.0	ug/g	11.3	102	70-130			
Lead	46.6	1.0	ug/g	4.3	84.7	70-130			
Mercury	1.62	0.1	ug/g	ND	108	70-130			
Molybdenum	52.8	1.0	ug/g	ND	105	70-130			
Nickel	65.1	5.0	ug/g	13.0	104	70-130			
Selenium	49.9	1.0	ug/g	ND	99.4	70-130			
Silver	39.4	0.3	ug/g	ND	78.8	70-130			
Thallium	52.0	1.0	ug/g	ND	104	70-130			
Uranium	46.5	1.0	ug/g	ND	92.5	70-130			
Vanadium	81.0	10.0	ug/g	25.7	111	70-130			
Zinc	85.4	20.0	ug/g	35.8	99.1	70-130			
Semi-Volatiles									
Acenaphthene	0.117	0.02	ug/g	ND	56.4	50-140			
Acenaphthylene	0.107	0.02	ug/g	ND	51.3	50-140			
Anthracene	0.122	0.02	ug/g	ND	58.6	50-140			
Benzo [a] anthracene	0.118	0.02	ug/g	ND	56.7	50-140			
Benzo [a] pyrene	0.149	0.02	ug/g	ND	89.5	50-140			
Benzo [b] fluoranthene	0.113	0.02	ug/g	ND	54.2	50-140			
Benzo [g,h,i] perylene	0.109	0.02	ug/g	ND	52.2	50-140			
Benzo [k] fluoranthene	0.115	0.02	ug/g	ND	55.2	50-140			
Chrysene	0.128	0.02	ug/g	ND	61.5	50-140			
Dibenzo [a,h] anthracene	0.128	0.02	ug/g	ND	61.6	50-140			
Fluoranthene	0.112	0.02	ug/g	ND	53.9	50-140			
Fluorene	0.181	0.02	ug/g	0.070	53.6	50-140			
Indeno [1,2,3-cd] pyrene	0.106	0.02	ug/g	ND	50.7	50-140			
1-Methylnaphthalene	0.145	0.02	ug/g	ND	69.5	50-140			
2-Methylnaphthalene	0.140	0.02	ug/g	ND	67.2	50-140			
Naphthalene	0.156	0.01	ug/g	ND	74.8	50-140			
Phenanthrene	0.276	0.02	ug/g	0.143	63.5	50-140			
Pyrene	0.127	0.02	ug/g	0.020	51.0	50-140			
Surrogate: 2-Fluorobiphenyl	*1.07*		*ug/g*		*64.0*	*50-140*			
Surrogate: Terphenyl-d14	*1.33*		*ug/g*		*79.6*	*50-140*			
Volatiles									
Acetone	9.56	0.50	ug/g	ND	95.6	50-140			

Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Benzene	4.49	0.02	ug/g	ND	112	60-130			
Bromodichloromethane	4.37	0.05	ug/g	ND	109	60-130			
Bromoform	4.42	0.05	ug/g	ND	110	60-130			
Bromomethane	4.66	0.05	ug/g	ND	117	50-140			
Carbon Tetrachloride	4.31	0.05	ug/g	ND	108	60-130			
Chlorobenzene	4.07	0.05	ug/g	ND	102	60-130			
Chloroform	4.56	0.05	ug/g	ND	114	60-130			
Dibromochloromethane	4.23	0.05	ug/g	ND	106	60-130			
Dichlorodifluoromethane	4.66	0.05	ug/g	ND	116	50-140			
1,2-Dichlorobenzene	3.93	0.05	ug/g	ND	98.3	60-130			
1,3-Dichlorobenzene	4.10	0.05	ug/g	ND	102	60-130			
1,4-Dichlorobenzene	4.08	0.05	ug/g	ND	102	60-130			
1,1-Dichloroethane	4.56	0.05	ug/g	ND	114	60-130			
1,2-Dichloroethane	4.45	0.05	ug/g	ND	111	60-130			
1,1-Dichloroethylene	4.60	0.05	ug/g	ND	115	60-130			
cis-1,2-Dichloroethylene	4.25	0.05	ug/g	ND	106	60-130			
trans-1,2-Dichloroethylene	4.40	0.05	ug/g	ND	110	60-130			
1,2-Dichloropropane	4.42	0.05	ug/g	ND	110	60-130			
cis-1,3-Dichloropropylene	3.96	0.05	ug/g	ND	98.9	60-130			
trans-1,3-Dichloropropylene	3.88	0.05	ug/g	ND	97.1	60-130			
Ethylbenzene	4.56	0.05	ug/g	ND	114	60-130			
Ethylene dibromide (dibromoethane, 1,2-	4.36	0.05	ug/g	ND	109	60-130			
Hexane	4.85	0.05	ug/g	ND	121	60-130			
Methyl Ethyl Ketone (2-Butanone)	10.2	0.50	ug/g	ND	102	50-140			
Methyl Isobutyl Ketone	10.4	0.50	ug/g	ND	104	50-140			
Methyl tert-butyl ether	10.9	0.05	ug/g	ND	109	50-140			
Methylene Chloride	4.50	0.05	ug/g	ND	113	60-130			
Styrene	4.39	0.05	ug/g	ND	110	60-130			
1,1,1,2-Tetrachloroethane	4.57	0.05	ug/g	ND	114	60-130			
1,1,2,2-Tetrachloroethane	4.34	0.05	ug/g	ND	109	60-130			
Tetrachloroethylene	4.23	0.05	ug/g	ND	106	60-130			
Toluene	4.50	0.05	ug/g	ND	112	60-130			
1,1,1-Trichloroethane	4.72	0.05	ug/g	ND	118	60-130			
1,1,2-Trichloroethane	4.34	0.05	ug/g	ND	108	60-130			
Trichloroethylene	4.55	0.05	ug/g	ND	114	60-130			
Trichlorofluoromethane	4.25	0.05	ug/g	ND	106	50-140			
Vinyl chloride	4.24	0.02	ug/g	ND	106	50-140			
m,p-Xylenes	8.96	0.05	ug/g	ND	112	60-130			
o-Xylene	4.20	0.05	ug/g	ND	105	60-130			
Surrogate: 4-Bromofluorobenzene	*7.93*		*ug/g*		*99.2*	*50-140*			
Surrogate: Dibromofluoromethane	*8.46*		*ug/g*		*106*	*50-140*			
Surrogate: Toluene-d8	*7.83*		*ug/g*		*97.9*	*50-140*			
Benzene	4.49	0.02	ug/g	ND	112	60-130			
Ethylbenzene	4.56	0.05	ug/g	ND	114	60-130			
Toluene	4.50	0.05	ug/g	ND	112	60-130			
m,p-Xylenes	8.96	0.05	ug/g	ND	112	60-130			
o-Xylene	4.20	0.05	ug/g	ND	105	60-130			
Surrogate: Toluene-d8	*7.83*		*ug/g*		*97.9*	*50-140*			

Qualifier Notes:

Sample Qualifiers :

1 : Elevated detection limits due to the nature of the sample matrix.

5 : The surrogate recovery for this sample is not available due to sample dilution required from high analyte concentration and/or matrix interference's.

QC Qualifiers :

QM-05 : The spike recovery was outside acceptance limits for the matrix spike due to matrix interference.

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.

CCME PHC additional information:

- The method for the analysis of PHCs complies with the Reference Method for the CWS PHC and is validated for use in the laboratory. All prescribed quality criteria identified in the method has been met.
- F1 range corrected for BTEX.
- F2 to F3 ranges corrected for appropriate PAHs where available.
- The gravimetric heavy hydrocarbons (F4G) are not to be added to C6 to C50 hydrocarbons.
- In the case where F4 and F4G are both reported, the greater of the two results is to be used for comparison to CWS PHC criteria.
- When reported, data for F4G has been processed using a silica gel cleanup.

PARACE LABORATORIES LTD

Paracel ID: 2125366

Paracel Order Number (Lab Use Only)	Chain Of Custody (Lab Use Only)
2125366	№ 131141

Client Name: Paterson
Contact Name: Karyn Munch
Address: 154 Colonnade Rd
Telephone: 613-226-7381

Project Ref: PE5267
Quote #:
PO #: 32202
E-mail: mdarcy@patersongroup.ca kmunch@patersongroup.ca jcomposarone@patersongroup.ca

Page 1 of 1

Turnaround Time
☐ 1 day ☐ 3 day
☐ 2 day ☑ Regular
Date Required:

Regulation 153/04
☐ Table 1 ☐ Res/Park ☐ Med/Fine
☐ Table 2 ☐ Ind/Comm ☐ Coarse
☑ Table 3 ☐ Agri/Other
☐ Table
For RSC: ☐ Yes ☐ No

Other Regulation
☐ REG 558 ☐ PWQO
☐ CCME ☐ MISA
☐ SU - Sani ☐ SU - Storm
Mun:
☐ Other:

Matrix Type: S (Soil/Sed.) GW (Ground Water) SW (Surface Water) SS (Storm/Sanitary Sewer) P (Paint) A (Air) O (Other)

	Sample ID/Location Name	Matrix	Air Volume	# of Containers	Sample Taken Date	Sample Taken Time	PHCs F1-F4+BTEX	VOCs	PAHs	Metals by ICP	Hg	CrVI	B (HWS)	PHCs	Methyl Mercury				
1	TP1-21-G3	S		2	6/15/2021			✓						✓					
2	TP2-21-G4			2			✓		✓	✓	✓	✓							
3	TP3-21-G3			1					✓	✓	✓	✓							
4	TP4-21-G2			1						✓	✓	✓							
5	TP5-21-G2			1					✓										
6	TP6-21-G5			1					✓	✓	✓	✓							
7	TP7-G6			1											✓				
8	TP8-G5			1											✓				
9	DUP3			1					✓										
10	DUP4	↓		1	↓					✓	✓	✓							

Comments: All are "TP#-21-GS#"

Method of Delivery: PARACEL COURIER

Relinquished By (Sign):
Relinquished By (Print): Jeremy Composarone
Date/Time: 6/16/2021

Received By Driver/Depot: T. Skouse
Date/Time: 16/06/21 1:45
Temperature: °C

Received at Lab: Sumeepam Dhillon
Date/Time: JUN 16, 2021 02.30
Temperature: 20.1 °C

Verified By:
Date/Time: June 16, 2021 15:49
pH Verified: ☐ By:

Chain of Custody (Env.) xlsx

Revision 3.0

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Subcontracted Analysis

Paterson Group Consulting Engineers
154 Colonnade Road South
Nepean, ON K2E 7J5
Attn: Karyn Munch

Tel: (613) 226-7381
Fax: (613) 226-6344

Paracel Report No	**2125366**
Client Project(s):	**PE5267**
Client PO:	**32202**
Reference:	**Standing Offer**
CoC Number:	**131141**

Order Date:	16-Jun-21
Report Date:	22-Jun-21

Sample(s) from this project were subcontracted for the listed parameters. A copy of the subcontractor's report is attached

Paracel ID	Client ID	Analysis
2125366-07	TP7-21-GS6	Methyl Mercury - soil
2125366-08	TP8-21-GS5	Methyl Mercury - soil

PARACEL LABORATORIES LTD (Ottawa-London-Kingston)
ATTN: Mark Foto
360 York Road, Unit 16B
Niagara-on-the-lake ON K1G 4J8

Date Received: 17-JUN-21
Report Date: 09-JUL-21 08:10 (MT)
Version: FINAL

Client Phone: 905-682-9300

Certificate of Analysis

Lab Work Order #: L2603660

Project P.O. #: NOT SUBMITTED
Job Reference: 2125366
C of C Numbers:
Legal Site Desc:

Costas Farassoglou
Account Manager

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2603660-1 TP7-21-GS6 Sampled By: CLIENT on 15-JUN-21 Matrix: SOIL							
Physical Tests							
Moisture	13.2		0.25	%		06-JUL-21	R5513422
Speciated Metals							
Methylmercury (as MeHg)	0.000176		0.000050	mg/kg	05-JUL-21	07-JUL-21	R5516044
L2603660-2 TP8-21-GS5 Sampled By: CLIENT on 15-JUN-21 Matrix: SOIL							
Physical Tests							
Moisture	19.1		0.25	%		06-JUL-21	R5513422
Speciated Metals							
Methylmercury (as MeHg)	0.000092		0.000050	mg/kg	05-JUL-21	07-JUL-21	R5516044

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

Reference Information

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
MEHG-GCAF-VA	Soil	Methylmercury in Soil by GCAFS	DeWild et al. (2004)

This method follows procedures published by DeWild, Olund, Olsen and Tate (2004) for the US Geological Survey (Techniques and Methods 5A-7). Samples are leached with an acidic copper sulphate solution to solubilize methylmercury for inorganic complexes. The methylmercury is then extracted into dichloromethane and then an aliquot is back extracted into ultra-pure water. The extract is analyzed by aqueous phase ethylation, purge and trap, desorption and GC separation. The separated species are then pyrolized to elemental Hg and quantified by cold vapour atomic flourescence spectroscopy. Results are reported "as MeHg".

MOISTURE-VA	Soil	Moisture content	CCME PHC in Soil - Tier 1 (mod)

This analysis is carried out gravimetrically by drying the sample at 105 C for a minimum of two hours.

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

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

Laboratory Definition Code	Laboratory Location
VA	ALS ENVIRONMENTAL - VANCOUVER, BRITISH COLUMBIA, CANADA

Chain of Custody Numbers:

GLOSSARY OF REPORT TERMS

Surrogates are compounds that are similar in behaviour to target analyte(s), but that do not normally occur in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery. In reports that display the D.L. column, laboratory objectives for surrogates are listed there.
mg/kg - milligrams per kilogram based on dry weight of sample
mg/kg wwt - milligrams per kilogram based on wet weight of sample
mg/kg lwt - milligrams per kilogram based on lipid weight of sample
mg/L - unit of concentration based on volume, parts per million.
< - Less than.
D.L. - The reporting limit.
N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.
UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.
Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

Quality Control Report

Workorder: L2603660 Report Date: 09-JUL-21

Client: PARACEL LABORATORIES LTD (Ottawa-London-Kingston)
360 York Road, Unit 16B
Niagara-on-the-lake ON K1G 4J8
Contact: Mark Foto

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MEHG-GCAF-VA	Soil							
Batch R5516044								
WG3569426-2 CRM		**SQC-MEHG-RM**						
Methylmercury (as MeHg)			108.1		%		70-130	07-JUL-21
WG3569426-4 DUP		**L2603537-1**						
Methylmercury (as MeHg)		<0.000050	<0.000050	RPD-NA	mg/kg	N/A	30	07-JUL-21
WG3569426-3 LCS								
Methylmercury (as MeHg)			90.3		%		70-130	07-JUL-21
WG3569426-1 MB								
Methylmercury (as MeHg)			<0.000050		mg/kg wwt		0.00005	07-JUL-21
MOISTURE-VA	Soil							
Batch R5513422								
WG3569897-3 DUP		**L2603537-1**						
Moisture		23.2	23.0		%	0.7	20	06-JUL-21
WG3569897-2 LCS								
Moisture			100.1		%		90-110	06-JUL-21
WG3569897-1 MB								
Moisture			<0.25		%		0.25	06-JUL-21

Quality Control Report

Workorder: L2603660 Report Date: 09-JUL-21

Client: PARACEL LABORATORIES LTD (Ottawa-London-Kingston)
360 York Road, Unit 16B
Niagara-on-the-lake ON K1G 4J8
Contact: Mark Foto

Legend:

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

Sample Parameter Qualifier Definitions:

Qualifier	Description
RPD-NA	Relative Percent Difference Not Available due to result(s) being less than detection limit.

Hold Time Exceedances:

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

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

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

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

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Subcontract Order

L2603660

SENDING LABORATORY:

Paracel Laboratories Ltd.
300-2319 St. Laurent Blvd.
Ottawa, ON K1G 4J8
Phone: 613-731-9577
Fax: 613-731-9064

RECEIVING LABORATORY:

ALS Laboratory Group (Ottawa)
7-190 Colonnade Rd
Ottawa, ON K2E7J5
Phone: (613) 225-8279
Fax: (613) 225-2801

INVOICE TO:

Paracel Laboratories Ltd.
300-2319 St. Laurent Blvd.
Ottawa, ON K1G 4J8
Phone: 613-731-9577
Fax: 613-731-9064

Date Requested: **16-Jun-21**
Project Number: **2125366**
Submitted By: **Bernice Samuel**

Required Regulation	Reg 153/3
Turnaround Time	Standard

Sample ID	Matrix	Analyses Requested:	Sampled	Comments
TP7-21-GS6	Soil	Solids, % Methyl Mercury - soil	15-Jun-21 09:00	
TP8-21-GS5	Soil	Solids, % Methyl Mercury - soil	15-Jun-21 09:00	

Please email all results to mfoto@paracellabs.com, dbloom@paracellabs.com, drobertson@paracellabs.com

Released By — Date / Time: Jun 17/21 8:00

Temperature prior to Shipping: 7.1 °C

Received By: COSTAT F- — Date: 6/17/21

10.0°C
→ ICE PACK

10:30 AM

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Subcontracted Analysis

Paterson Group Consulting Engineers
154 Colonnade Road South
Nepean, ON K2E 7J5
Attn: Karyn Munch

Tel: (613) 226-7381
Fax: (613) 226-6344

Paracel Report No.	**2126129**
Client Project(s):	**PE5267**
Client PO:	**32203**
Reference:	**Standing Offer**
CoC Number:	**131142**

Order Date:	21-Jun-21
Report Date:	21-Jul-21

Sample(s) from this project were subcontracted for the listed parameters. A copy of the subcontractor's report is attached

Paracel ID	Client ID	Analysis
2126129-01	TP1-21-GS4	Methyl Mercury - soil

PARACEL LABORATORIES LTD (Ottawa-London-Kingston)
ATTN: Mark Foto
360 York Road, Unit 16B
Niagara-on-the-lake ON K1G 4J8

Date Received: 22-JUN-21
Report Date: 21-JUL-21 07:09 (MT)
Version: FINAL

Client Phone: 905-682-9300

Certificate of Analysis

Lab Work Order #: L2604653

Project P.O. #: NOT SUBMITTED
Job Reference: 2126129
C of C Numbers:
Legal Site Desc:

Costas Farassoglou
Account Manager

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2604653-1 TP1-21-GS4 Sampled By: CLIENT on 15-JUN-21 @ 09:00 Matrix: SOIL							
Physical Tests							
Moisture	5.79		0.25	%		06-JUL-21	R5513422
Speciated Metals							
Methylmercury (as MeHg)	<0.000050		0.000050	mg/kg	15-JUL-21	16-JUL-21	R5525345

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

Reference Information

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
MEHG-GCAF-VA	Soil	Methylmercury in Soil by GCAFS	DeWild et al. (2004)

This method follows procedures published by DeWild, Olund, Olsen and Tate (2004) for the US Geological Survey (Techniques and Methods 5A-7). Samples are leached with an acidic copper sulphate solution to solubilize methylmercury for inorganic complexes. The methylmercury is then extracted into dichloromethane and then an aliquot is back extracted into ultra-pure water. The extract is analyzed by aqueous phase ethylation, purge and trap, desorption and GC separation. The separated species are then pyrolized to elemental Hg and quantified by cold vapour atomic flourescence spectroscopy. Results are reported "as MeHg".

MOISTURE-VA	Soil	Moisture content	CCME PHC in Soil - Tier 1 (mod)

This analysis is carried out gravimetrically by drying the sample at 105 C for a minimum of two hours.

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

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

Laboratory Definition Code	Laboratory Location
VA	ALS ENVIRONMENTAL - VANCOUVER, BRITISH COLUMBIA, CANADA

Chain of Custody Numbers:

GLOSSARY OF REPORT TERMS

Surrogates are compounds that are similar in behaviour to target analyte(s), but that do not normally occur in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery. In reports that display the D.L. column, laboratory objectives for surrogates are listed there.
mg/kg - milligrams per kilogram based on dry weight of sample
mg/kg wwt - milligrams per kilogram based on wet weight of sample
mg/kg lwt - milligrams per kilogram based on lipid weight of sample
mg/L - unit of concentration based on volume, parts per million.
< - Less than.
D.L. - The reporting limit.
N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.
UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.
Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

Quality Control Report

Workorder: L2604653 Report Date: 21-JUL-21

Client: PARACEL LABORATORIES LTD (Ottawa-London-Kingston)
360 York Road, Unit 16B
Niagara-on-the-lake ON K1G 4J8
Contact: Mark Foto

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MEHG-GCAF-VA	Soil							
Batch R5525345								
WG3577033-2 CRM		**SQC-MEHG-RM**						
Methylmercury (as MeHg)			111.1		%		70-130	19-JUL-21
WG3577033-3 LCS								
Methylmercury (as MeHg)			94.5		%		70-130	16-JUL-21
WG3577033-1 MB								
Methylmercury (as MeHg)			<0.000050		mg/kg wwt		0.00005	16-JUL-21
MOISTURE-VA	Soil							
Batch R5513422								
WG3569897-3 DUP		**L2603537-1**						
Moisture		23.2	23.0		%	0.7	20	06-JUL-21
WG3569897-2 LCS								
Moisture			100.1		%		90-110	06-JUL-21
WG3569897-1 MB								
Moisture			<0.25		%		0.25	06-JUL-21

Quality Control Report

Workorder: L2604653 Report Date: 21-JUL-21

Client: PARACEL LABORATORIES LTD (Ottawa-London-Kingston)
360 York Road, Unit 16B
Niagara-on-the-lake ON K1G 4J8
Contact: Mark Foto

Legend:

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

Quality Control Report

Workorder: L2604653 Report Date: 21-JUL-21

Client: PARACEL LABORATORIES LTD (Ottawa-London-Kingston)
360 York Road, Unit 16B
Niagara-on-the-lake ON K1G 4J8
Contact: Mark Foto

Hold Time Exceedances:

ALS Product Description	Sample ID	Sampling Date	Date Processed	Rec. HT	Actual HT	Units	Qualifier
Speciated Metals							
Methylmercury in Soil by GCAFS							
	1	15-JUN-21 09:00	15-JUL-21 17:00	28	30	days	EHT

Legend & Qualifier Definitions:

EHTR-FM: Exceeded ALS recommended hold time prior to sample receipt. Field Measurement recommended.
EHTR: Exceeded ALS recommended hold time prior to sample receipt.
EHTL: Exceeded ALS recommended hold time prior to analysis. Sample was received less than 24 hours prior to expiry.
EHT: Exceeded ALS recommended hold time prior to analysis.
Rec. HT: ALS recommended hold time (see units).

Notes*:
Where actual sampling date is not provided to ALS, the date (& time) of receipt is used for calculation purposes.
Where actual sampling time is not provided to ALS, the earlier of 12 noon on the sampling date or the time (& date) of receipt is used for calculation purposes. Samples for L2604653 were received on 22-JUN-21 14:00.

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

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

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

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Subcontract Order

SENDING LABORATORY:

Paracel Laboratories Ltd.
300-2319 St. Laurent Blvd.
Ottawa, ON K1G 4J8
Phone: 613-731-9577

Fax: 613-731-9064

RECEIVING LABORATORY:

ALS Laboratory Group (Vancouver)
8081 Lougheed Highway
Burnaby, BC V5A 1W9
Phone: (604) 253-4188

Fax:

INVOICE TO:

Paracel Laboratories Ltd.
300-2319 St. Laurent Blvd.
Ottawa, ON K1G 4J8
Phone: 613-731-9577

Fax: 613-731-9064

Date Requested: **22-Jun-21**
Project Number: **2126129**
Submitted By: **Donna Garner**

Required Regulation	Reg 153
Turnaround Time	Regular

Sample ID	Matrix	Analyses Requested:	Sampled	Comments
TP1-21-GS4	Soil	Methyl Mercury - soil	15-Jun-21 09:00	

L2604653

L2604653-COFC

H 06/23/21 9am 11.7 melted ice packs

Please email all results to mfoto@paracellabs.com, dbloom@paracellabs.com, drobertson@paracellabs.com

Released By — Date / Time: Jun 22 2021 11:50

Received By — Date: 6/22/21

Temperature prior to Shipping: 7.6°C — 10.1°C — 14:00

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Certificate of Analysis

Paterson Group Consulting Engineers

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

Client PO: 32061
Project: PE5267
Custody: 131493

Report Date: 27-May-2021
Order Date: 20-May-2021

Order #: 2121586

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

Paracel ID	Client ID
2121586-01	BH1-21-SS3
2121586-02	BH1-21-SS5/6
2121586-03	BH2-21-SS4
2121586-04	BH3-21-SS2
2121586-05	BH3-21-SS4/5
2121586-06	BH4-21-SS2
2121586-07	DUP

Approved By:

Mark Foto

Mark Foto, M.Sc.
Lab Supervisor

Certificate of Analysis

Report Date: 27-May-2021

Client: Paterson Group Consulting Engineers

Order Date: 20-May-2021

Client PO: 32061

Project Description: PE5267

Analysis Summary Table

Analysis	Method Reference/Description	Extraction Date	Analysis Date
BTEX by P&T GC-MS	EPA 8260 - P&T GC-MS	21-May-21	22-May-21
Chromium, hexavalent - soil	MOE E3056 - Extraction, colourimetric	21-May-21	26-May-21
Mercury by CVAA	EPA 7471B - CVAA, digestion	27-May-21	27-May-21
pH, soil	EPA 150.1 - pH probe @ 25 °C, CaCl buffered ext.	21-May-21	25-May-21
PHC F1	CWS Tier 1 - P&T GC-FID	21-May-21	22-May-21
PHCs F2 to F4	CWS Tier 1 - GC-FID, extraction	21-May-21	22-May-21
REG 153: Metals by ICP/MS, soil	EPA 6020 - Digestion - ICP-MS	25-May-21	25-May-21
REG 153: PAHs by GC-MS	EPA 8270 - GC-MS, extraction	22-May-21	26-May-21
Solids, %	Gravimetric, calculation	25-May-21	25-May-21

Certificate of Analysis

Report Date: 27-May-2021

Client: Paterson Group Consulting Engineers

Order Date: 20-May-2021

Client PO: 32061

Project Description: PE5267

	Client ID:	BH1-21-SS3	BH1-21-SS5/6	BH2-21-SS4	BH3-21-SS2
	Sample Date:	14-May-21 09:00	14-May-21 09:00	17-May-21 09:00	17-May-21 09:00
	Sample ID:	2121586-01	2121586-02	2121586-03	2121586-04
	MDL/Units	Soil	Soil	Soil	Soil
Physical Characteristics					
% Solids	0.1 % by Wt.	91.9	89.4	83.8	92.5
General Inorganics					
pH	0.05 pH Units	-	-	-	8.57
Metals					
Antimony	1.0 ug/g dry	-	2.0	1.5	-
Arsenic	1.0 ug/g dry	-	4.5	7.4	-
Barium	1.0 ug/g dry	-	584	159	-
Beryllium	0.5 ug/g dry	-	<0.5	<0.5	-
Boron	5.0 ug/g dry	-	19.0	8.8	-
Cadmium	0.5 ug/g dry	-	<0.5	0.8	-
Chromium	5.0 ug/g dry	-	22.6	24.1	-
Chromium (VI)	0.2 ug/g dry	-	<0.2	<0.2	-
Cobalt	1.0 ug/g dry	-	5.2	6.0	-
Copper	5.0 ug/g dry	-	17.3	43.2	-
Lead	1.0 ug/g dry	-	61.9	212	-
Mercury	0.1 ug/g dry	-	0.2	1.3	-
Molybdenum	1.0 ug/g dry	-	2.4	1.2	-
Nickel	5.0 ug/g dry	-	11.6	14.8	-
Selenium	1.0 ug/g dry	-	<1.0	<1.0	-
Silver	0.3 ug/g dry	-	<0.3	0.3	-
Thallium	1.0 ug/g dry	-	<1.0	<1.0	-
Uranium	1.0 ug/g dry	-	<1.0	<1.0	-
Vanadium	10.0 ug/g dry	-	28.7	25.6	-
Zinc	20.0 ug/g dry	-	261	271	-
Volatiles					
Benzene	0.02 ug/g dry	<0.02	-	-	<0.02
Ethylbenzene	0.05 ug/g dry	<0.05	-	-	<0.05
Toluene	0.05 ug/g dry	<0.05	-	-	<0.05
m,p-Xylenes	0.05 ug/g dry	<0.05	-	-	<0.05
o-Xylene	0.05 ug/g dry	<0.05	-	-	<0.05
Xylenes, total	0.05 ug/g dry	<0.05	-	-	<0.05
Toluene-d8	Surrogate	116%	-	-	116%
Hydrocarbons					
F1 PHCs (C6-C10)	7 ug/g dry	<7	-	-	<7
F2 PHCs (C10-C16)	4 ug/g dry	<4	-	-	7

Certificate of Analysis

Report Date: 27-May-2021

Client: Paterson Group Consulting Engineers

Order Date: 20-May-2021

Client PO: 32061

Project Description: PE5267

	Client ID:	BH1-21-SS3	BH1-21-SS5/6	BH2-21-SS4	BH3-21-SS2
	Sample Date:	14-May-21 09:00	14-May-21 09:00	17-May-21 09:00	17-May-21 09:00
	Sample ID:	2121586-01	2121586-02	2121586-03	2121586-04
	MDL/Units	Soil	Soil	Soil	Soil
F3 PHCs (C16-C34)	8 ug/g dry	43	-	-	53
F4 PHCs (C34-C50)	6 ug/g dry	29	-	-	37
Semi-Volatiles					
Acenaphthene	0.02 ug/g dry	-	0.27	<0.02	-
Acenaphthylene	0.02 ug/g dry	-	0.23	0.15	-
Anthracene	0.02 ug/g dry	-	0.75	0.11	-
Benzo [a] anthracene	0.02 ug/g dry	-	1.50	0.24	-
Benzo [a] pyrene	0.02 ug/g dry	-	1.38	0.35	-
Benzo [b] fluoranthene	0.02 ug/g dry	-	1.29	0.31	-
Benzo [g,h,i] perylene	0.02 ug/g dry	-	0.70	0.25	-
Benzo [k] fluoranthene	0.02 ug/g dry	-	0.75	0.16	-
Chrysene	0.02 ug/g dry	-	1.44	0.22	-
Dibenzo [a,h] anthracene	0.02 ug/g dry	-	0.11	0.06	-
Fluoranthene	0.02 ug/g dry	-	2.89	0.39	-
Fluorene	0.02 ug/g dry	-	0.26	<0.02	-
Indeno [1,2,3-cd] pyrene	0.02 ug/g dry	-	0.66	0.22	-
1-Methylnaphthalene	0.02 ug/g dry	-	0.13	<0.02	-
2-Methylnaphthalene	0.02 ug/g dry	-	0.16	0.03	-
Methylnaphthalene (1&2)	0.04 ug/g dry	-	0.29	<0.04	-
Naphthalene	0.01 ug/g dry	-	0.21	0.04	-
Phenanthrene	0.02 ug/g dry	-	2.78	0.23	-
Pyrene	0.02 ug/g dry	-	2.32	0.36	-
2-Fluorobiphenyl	Surrogate	-	97.7%	78.9%	-
Terphenyl-d14	Surrogate	-	121%	103%	-

Certificate of Analysis

Report Date: 27-May-2021

Client: Paterson Group Consulting Engineers

Order Date: 20-May-2021

Client PO: 32061

Project Description: PE5267

	Client ID:	BH3-21-SS4/5	BH4-21-SS2	DUP	-
	Sample Date:	17-May-21 09:00	17-May-21 09:00	17-May-21 09:00	-
	Sample ID:	2121586-05	2121586-06	2121586-07	-
	MDL/Units	Soil	Soil	Soil	-
Physical Characteristics					
% Solids	0.1 % by Wt.	84.9	93.1	84.9	-
Metals					
Antimony	1.0 ug/g dry	<1.0	<1.0	<1.0	-
Arsenic	1.0 ug/g dry	6.2	2.7	5.2	-
Barium	1.0 ug/g dry	150	106	132	-
Beryllium	0.5 ug/g dry	0.5	<0.5	0.5	-
Boron	5.0 ug/g dry	8.4	5.5	6.8	-
Cadmium	0.5 ug/g dry	<0.5	<0.5	<0.5	-
Chromium	5.0 ug/g dry	25.7	16.0	24.2	-
Chromium (VI)	0.2 ug/g dry	<0.2	<0.2	<0.2	-
Cobalt	1.0 ug/g dry	5.7	5.4	5.2	-
Copper	5.0 ug/g dry	16.3	20.9	15.9	-
Lead	1.0 ug/g dry	72.4	21.8	78.1	-
Mercury	0.1 ug/g dry	0.5	<0.1	0.4	-
Molybdenum	1.0 ug/g dry	1.2	<1.0	1.0	-
Nickel	5.0 ug/g dry	16.3	9.6	15.3	-
Selenium	1.0 ug/g dry	<1.0	<1.0	<1.0	-
Silver	0.3 ug/g dry	<0.3	<0.3	<0.3	-
Thallium	1.0 ug/g dry	<1.0	<1.0	<1.0	-
Uranium	1.0 ug/g dry	<1.0	<1.0	<1.0	-
Vanadium	10.0 ug/g dry	31.4	17.7	30.3	-
Zinc	20.0 ug/g dry	67.4	103	69.3	-
Semi-Volatiles					
Acenaphthene	0.02 ug/g dry	<0.02	<0.02	0.03	-
Acenaphthylene	0.02 ug/g dry	0.02	0.14	0.04	-
Anthracene	0.02 ug/g dry	0.04	0.09	0.09	-
Benzo [a] anthracene	0.02 ug/g dry	0.12	0.18	0.21	-
Benzo [a] pyrene	0.02 ug/g dry	0.15	0.23	0.20	-
Benzo [b] fluoranthene	0.02 ug/g dry	0.16	0.26	0.24	-
Benzo [g,h,i] perylene	0.02 ug/g dry	0.09	0.19	0.12	-
Benzo [k] fluoranthene	0.02 ug/g dry	0.09	0.11	0.12	-
Chrysene	0.02 ug/g dry	0.16	0.18	0.19	-
Dibenzo [a,h] anthracene	0.02 ug/g dry	<0.02	0.04	0.03	-
Fluoranthene	0.02 ug/g dry	0.24	0.24	0.44	-
Fluorene	0.02 ug/g dry	<0.02	<0.02	0.03	-

Certificate of Analysis

Report Date: 27-May-2021

Client: Paterson Group Consulting Engineers

Order Date: 20-May-2021

Client PO: 32061

Project Description: PE5267

	Client ID:	BH3-21-SS4/5	BH4-21-SS2	DUP	-
	Sample Date:	17-May-21 09:00	17-May-21 09:00	17-May-21 09:00	-
	Sample ID:	2121586-05	2121586-06	2121586-07	-
	MDL/Units	Soil	Soil	Soil	-
Indeno [1,2,3-cd] pyrene	0.02 ug/g dry	0.08	0.15	0.11	-
1-Methylnaphthalene	0.02 ug/g dry	<0.02	0.12	<0.02	-
2-Methylnaphthalene	0.02 ug/g dry	<0.02	0.17	0.03	-
Methylnaphthalene (1&2)	0.04 ug/g dry	<0.04	0.29	0.05	-
Naphthalene	0.01 ug/g dry	0.02	0.11	0.03	-
Phenanthrene	0.02 ug/g dry	0.17	0.13	0.35	-
Pyrene	0.02 ug/g dry	0.21	0.22	0.38	-
2-Fluorobiphenyl	Surrogate	55.9%	97.6%	101%	-
Terphenyl-d14	Surrogate	90.3%	104%	124%	-

Method Quality Control: Blank

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Hydrocarbons									
F1 PHCs (C6-C10)	ND	7	ug/g						
F2 PHCs (C10-C16)	ND	4	ug/g						
F3 PHCs (C16-C34)	ND	8	ug/g						
F4 PHCs (C34-C50)	ND	6	ug/g						
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 (VI)	ND	0.2	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						
Mercury	ND	0.1	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	*1.36*		*ug/g*		*102*	*50-140*			
Surrogate: Terphenyl-d14	*1.86*		*ug/g*		*140*	*50-140*			
Volatiles									
Benzene	ND	0.02	ug/g						
Ethylbenzene	ND	0.05	ug/g						
Toluene	ND	0.05	ug/g						
m,p-Xylenes	ND	0.05	ug/g						
o-Xylene	ND	0.05	ug/g						
Xylenes, total	ND	0.05	ug/g						
Surrogate: Toluene-d8	*9.41*		*ug/g*		*118*	*50-140*			

Method Quality Control: Duplicate

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
General Inorganics									
pH	7.80	0.05	pH Units	7.67			1.7	2.3	
Hydrocarbons									
F1 PHCs (C6-C10)	ND	7	ug/g dry	ND			NC	40	
F2 PHCs (C10-C16)	ND	4	ug/g dry	ND			NC	30	
F3 PHCs (C16-C34)	ND	8	ug/g dry	18			NC	30	
F4 PHCs (C34-C50)	ND	6	ug/g dry	15			NC	30	
Metals									
Antimony	3.0	1.0	ug/g dry	2.0			NC	30	
Arsenic	4.6	1.0	ug/g dry	4.5			1.2	30	
Barium	610	1.0	ug/g dry	584			4.4	30	
Beryllium	ND	0.5	ug/g dry	ND			NC	30	
Boron	18.4	5.0	ug/g dry	19.0			3.4	30	
Cadmium	ND	0.5	ug/g dry	ND			NC	30	
Chromium (VI)	ND	0.2	ug/g dry	ND			NC	35	
Chromium	24.1	5.0	ug/g dry	22.6			6.5	30	
Cobalt	5.7	1.0	ug/g dry	5.2			8.3	30	
Copper	18.0	5.0	ug/g dry	17.3			3.8	30	
Mercury	0.144	0.1	ug/g dry	0.152			5.0	30	
Molybdenum	3.0	1.0	ug/g dry	2.4			20.7	30	
Nickel	12.3	5.0	ug/g dry	11.6			5.4	30	
Selenium	ND	1.0	ug/g dry	ND			NC	30	
Silver	ND	0.3	ug/g dry	ND			NC	30	
Thallium	ND	1.0	ug/g dry	ND			NC	30	
Uranium	ND	1.0	ug/g dry	ND			NC	30	
Vanadium	31.5	10.0	ug/g dry	28.7			9.1	30	
Zinc	279	20.0	ug/g dry	261			6.7	30	
Physical Characteristics									
% Solids	77.5	0.1	% by Wt.	78.3			1.0	25	
Semi-Volatiles									
Acenaphthene	0.208	0.02	ug/g dry	0.272			26.7	40	
Acenaphthylene	0.159	0.02	ug/g dry	0.226			34.9	40	
Anthracene	0.551	0.02	ug/g dry	0.753			31.0	40	
Benzo [a] anthracene	1.14	0.02	ug/g dry	1.50			27.4	40	
Benzo [a] pyrene	1.15	0.02	ug/g dry	1.38			18.6	40	
Benzo [b] fluoranthene	1.03	0.02	ug/g dry	1.29			22.2	40	
Benzo [g,h,i] perylene	0.526	0.02	ug/g dry	0.695			27.7	40	
Benzo [k] fluoranthene	0.672	0.02	ug/g dry	0.745			10.3	40	
Chrysene	1.10	0.02	ug/g dry	1.44			26.8	40	
Dibenzo [a,h] anthracene	0.156	0.02	ug/g dry	0.106			38.5	40	
Fluoranthene	2.39	0.02	ug/g dry	2.89			18.9	40	
Fluorene	0.216	0.02	ug/g dry	0.262			19.5	40	
Indeno [1,2,3-cd] pyrene	0.516	0.02	ug/g dry	0.664			25.0	40	
1-Methylnaphthalene	0.061	0.02	ug/g dry	0.130			71.5	40	QR-05
2-Methylnaphthalene	0.080	0.02	ug/g dry	0.161			67.0	40	QR-05
Naphthalene	0.112	0.01	ug/g dry	0.212			61.8	40	QR-05
Phenanthrene	2.16	0.02	ug/g dry	2.78			24.9	40	
Pyrene	1.94	0.02	ug/g dry	2.32			18.0	40	
Surrogate: 2-Fluorobiphenyl	*0.749*		*ug/g dry*		*50.2*	*50-140*			
Surrogate: Terphenyl-d14	*1.46*		*ug/g dry*		*97.9*	*50-140*			
Volatiles									
Benzene	ND	0.02	ug/g dry	ND			NC	50	
Ethylbenzene	ND	0.05	ug/g dry	ND			NC	50	
Toluene	ND	0.05	ug/g dry	ND			NC	50	
m,p-Xylenes	ND	0.05	ug/g dry	ND			NC	50	
o-Xylene	ND	0.05	ug/g dry	ND			NC	50	

Method Quality Control: Duplicate

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Surrogate: Toluene-d8	*10.5*		*ug/g dry*		*117*	*50-140*			

Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Hydrocarbons									
F1 PHCs (C6-C10)	230	7	ug/g	ND	115	80-120			
F2 PHCs (C10-C16)	73	4	ug/g	ND	82.9	60-140			
F3 PHCs (C16-C34)	247	8	ug/g	18	106	60-140			
F4 PHCs (C34-C50)	163	6	ug/g	15	108	60-140			
Metals									
Antimony	56.2	1.0	ug/g	ND	111	70-130			
Arsenic	61.6	1.0	ug/g	1.8	120	70-130			
Barium	53.7	1.0	ug/g	ND	107	70-130			
Beryllium	52.9	0.5	ug/g	ND	106	70-130			
Boron	55.9	5.0	ug/g	7.6	96.5	70-130			
Cadmium	54.3	0.5	ug/g	ND	108	70-130			
Chromium (VI)	0.1	0.2	ug/g	ND	49.5	70-130			QM-05
Chromium	68.8	5.0	ug/g	9.0	120	70-130			
Cobalt	59.4	1.0	ug/g	2.1	115	70-130			
Copper	61.9	5.0	ug/g	6.9	110	70-130			
Lead	53.8	1.0	ug/g	ND	108	70-130			
Mercury	1.53	0.1	ug/g	0.152	92.2	70-130			
Molybdenum	59.1	1.0	ug/g	1.0	116	70-130			
Nickel	60.4	5.0	ug/g	ND	112	70-130			
Selenium	54.3	1.0	ug/g	ND	108	70-130			
Silver	54.9	0.3	ug/g	ND	110	70-130			
Thallium	53.9	1.0	ug/g	ND	108	70-130			
Uranium	60.2	1.0	ug/g	ND	120	70-130			
Vanadium	73.3	10.0	ug/g	11.5	124	70-130			
Zinc	164	20.0	ug/g	104	119	70-130			
Semi-Volatiles									
Acenaphthene	0.165	0.02	ug/g	ND	98.9	50-140			
Acenaphthylene	0.101	0.02	ug/g	ND	60.6	50-140			
Anthracene	0.125	0.02	ug/g	ND	74.7	50-140			
Benzo [a] anthracene	0.116	0.02	ug/g	ND	69.8	50-140			
Benzo [a] pyrene	0.132	0.02	ug/g	ND	78.9	50-140			
Benzo [b] fluoranthene	0.149	0.02	ug/g	ND	89.2	50-140			
Benzo [g,h,i] perylene	0.143	0.02	ug/g	ND	86.1	50-140			
Benzo [k] fluoranthene	0.138	0.02	ug/g	ND	83.0	50-140			
Chrysene	0.141	0.02	ug/g	ND	84.4	50-140			
Dibenzo [a,h] anthracene	0.137	0.02	ug/g	ND	82.0	50-140			
Fluoranthene	0.116	0.02	ug/g	ND	69.6	50-140			
Fluorene	0.115	0.02	ug/g	ND	69.1	50-140			
Indeno [1,2,3-cd] pyrene	0.128	0.02	ug/g	ND	76.7	50-140			
1-Methylnaphthalene	0.142	0.02	ug/g	ND	85.4	50-140			
2-Methylnaphthalene	0.149	0.02	ug/g	ND	89.5	50-140			
Naphthalene	0.164	0.01	ug/g	ND	98.3	50-140			
Phenanthrene	0.132	0.02	ug/g	ND	79.1	50-140			
Pyrene	0.118	0.02	ug/g	ND	70.7	50-140			
Surrogate: 2-Fluorobiphenyl	*1.06*		*ug/g*		*79.4*	*50-140*			
Surrogate: Terphenyl-d14	*1.67*		*ug/g*		*125*	*50-140*			
Volatiles									
Benzene	4.57	0.02	ug/g	ND	114	60-130			

Certificate of Analysis

Client: Paterson Group Consulting Engineers

Client PO: 32061

Report Date: 27-May-2021

Order Date: 20-May-2021

Project Description: PE5267

Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Ethylbenzene	5.04	0.05	ug/g	ND	126	60-130			
Toluene	4.65	0.05	ug/g	ND	116	60-130			
m,p-Xylenes	9.64	0.05	ug/g	ND	120	60-130			
o-Xylene	4.99	0.05	ug/g	ND	125	60-130			
Surrogate: Toluene-d8	*8.19*		*ug/g*		*102*	*50-140*			

Qualifier Notes:

QC Qualifiers :

QM-05 : The spike recovery was outside acceptance limits for the matrix spike due to matrix interference.

QR-05 : Duplicate RPDs higher than normally accepted. Remaining batch QA\QC was acceptable. May be sample effect.

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.

CCME PHC additional information:

- The method for the analysis of PHCs complies with the Reference Method for the CWS PHC and is validated for use in the laboratory. All prescribed quality criteria identified in the method has been met.
- F1 range corrected for BTEX.
- F2 to F3 ranges corrected for appropriate PAHs where available.
- The gravimetric heavy hydrocarbons (F4G) are not to be added to C6 to C50 hydrocarbons.
- In the case where F4 and F4G are both reported, the greater of the two results is to be used for comparison to CWS PHC criteria.
- When reported, data for F4G has been processed using a silica gel cleanup.

PARA LABORATO

Paracel ID: 2121586

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19 St. Laurent Blvd.
, Ontario K1G 4J8
0-749-1947
cel@paracellabs.com
.....paracellabs.com

Paracel Order Number (Lab Use Only): 2121586

Chain Of Custody (Lab Use Only)
№ 131493

Client Name: Paterson Group
Contact Name: Mark D'Arcy
Address: 154 Colonnade Rd, S
Telephone: 613-226-7381

Project Ref: PE5267
Quote #:
PO #: 32061
E-mail: mdarcy@patersongroup.ca
jandrechek@ " " "

Page 1 of 1

Turnaround Time
☐ 1 day ☐ 3 day
☐ 2 day ☒ Regular
Date Required:

Regulation 153/04: ☐ Table 1 ☒ Res/Park ☐ Med/Fine ☐ Table 2 ☐ Ind/Comm ☒ Coarse ☒ Table 3 ☐ Agri/Other ☐ Table ___ For RSC: ☐ Yes ☐ No

Other Regulation: ☐ REG 558 ☐ PWQO ☐ CCME ☐ MISA ☐ SU - Sani ☐ SU - Storm Mun: ☐ Other:

Matrix Type: S (Soil/Sed.) GW (Ground Water) SW (Surface Water) SS (Storm/Sanitary Sewer) P (Paint) A (Air) O (Other)

	Sample ID/Location Name	Matrix	Air Volume	# of Containers	Sample Taken Date	Sample Taken Time	PHCs F1-F4+BTEX	VOCs	PAHs	Metals by ICP	Hg	CrVI	B (HWS)	Id						
1	BH1-21-SS3	S		2	14-MAY-21	✓	X													
2	BH1-21-SS5/6	S		1	14-MAY-21	✓			X	X	X	X								
3	BH2-21-SS4	S		1	17-MAY-21	✓			X	X	X	X								
4	BH3-21-SS2	S		2	17-MAY-21	✓	X							X						
5	BH3-21-SS4/5	S		1	17-MAY-21	✓			X	X	X	X								
6	BH4-21-SS2	S		1	17-MAY-21	✓			X	X	X	X								
7	DUP	S		1	17-MAY-21	✓			X	X	X	X								
8																				
9																				
10																				

Comments:

Method of Delivery: PARACEL COURIER

Relinquished By (Sign): [signature]
Relinquished By (Print): Jesse Andrechek
Date/Time: 20-MAY-21 12 PM

Received By Driver/Depot: M. FLOUSE
Date/Time: 20/05/21 3 34
Temperature: °C

Received at Lab: [signature]
Date/Time: May 20/21 4:28 pm
Temperature: 11.0 °C

Verified By: [signature]
Date/Time: May 21/21 10:56
pH Verified: ☐ By: NM