PATERSON GROUP

Phase II – Environmental Site Investigation

84 and 100 Gloucester Street

Ottawa, Ontario

Prepared for Claridge Homes

Report PE5571-2 dated June 28, 2022

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EXECUTIVE SUMMARY

Assessment

A Phase II ESA was conducted for the properties addressed 84 and 100 Gloucester 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 subsurface investigation consisted of drilling six boreholes across the Phase II Property. Three of the boreholes were constructed with groundwater monitoring wells. The general soil profile encountered during the field program consisted of a layer of asphaltic concrete or concrete, followed by fill material, brown silty clay, glacial till, underlain by shale bedrock (encountered/inferred from 4.22–8.05 mbgs).

A total of 14 soil samples (including three duplicates) were submitted for analysis of metals (including As, Sb, Se and/or Hg and CrVI), Volatile Organic Compounds (VOCs) and/or Polycyclic Aromatic Hydrocarbons (PAHs). VOC parameter concentrations were not detected above the laboratory detection limit, while metal and PAH parameter concentrations were identified in the soil samples analyzed. Based on the analytical test results, metal and/or PAH concentrations were identified in soil samples BH4-22-SS3 and BH7-22-AU1 in exceedance of the MECP Table 3 Standards. Concentrations of cobalt and vanadium exceeding the MECP Table 3 Standards were identified in the native silty clay soils beneath the fill material in BH4-22 and BH7-22. These parameters are considered to be naturally occurring and are not considered to be contamination of concern on the Phase II Property. All remaining parameter concentrations analyzed in the soil samples are in compliance with the selected MECP Table 3 Standards.

Groundwater samples from monitoring wells installed in BH2-22, BH3-22, and BH4-22 were collected during the April 22, 2022 and May 16, 2022 sampling events. No sheen, free product or odour was noted during the groundwater sampling event. A total of three Groundwater samples were analyzed for metals (including As, Sb and Se), VOCs, and/or Petroleum Hydrocarbons F1-F4 (PHCs, F1-F4). All groundwater results comply with the selected MECP Table 3 Standards.

Recommendations

Soil

Based on the findings of the Phase II ESA, fill material impacted with metal and/or PAH concentrations exceeding MECP Table 3 Standards, is present on the Phase II Property. It is our understanding that the Phase II Property is to be redeveloped with a residential high rise building with associated underground parking levels.

It is our recommendation that an environmental site remediation program, involving the removal of all impacted fill material, be completed concurrently with the site redevelopment. Prior to off-site disposal at a licensed 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 personally be on-site during construction activities to direct the excavation and segregation of impacted soil and to conduct confirmatory sampling as required. Excess soil generated during the construction excavation 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. Prior to site redevelopment, the monitoring wells must be decommissioned in accordance with O.Reg 903.

1.0 INTRODUCTION

At the request of Claridge Homes, Paterson Group (Paterson) conducted a Phase II Environmental Site Assessment for the properties addressed 84 and 100 Gloucester Street, in the City of Ottawa, Ontario. The purpose of this Phase II ESA has been to address areas of potential environmental concern (APECs) identified on the Phase II Property, during the Phase I ESA conducted by Paterson in February of 2022.

1.1 Site Description

Address:	84 & 100 Gloucester Street, Ottawa, Ontario
Location:	The Phase II Property is located on the south side of Gloucester Street, approximately 50m east of O'Connor Street in the City of Ottawa, Ontario. For the purposes of this report, Gloucester Street is considered to run east-west. The Phase II Property is shown on Figure 1 - Key Plan following the body of this report.
Latitude and Longitude:	45° 25' 07.9" N, 75° 41' 44.7" W

Site Description:

Configuration:	Rectangular
Site Area:	1800 m^2 (approximate)
Zoning:	R5B – Residential Fifth Density Zone

1.2 Property Ownership

Paterson was engaged to conduct this Phase I-ESA by Mr. Vincent Dénommé with Claridge Homes. Mr. Dénommé can be reached by telephone at (613)-233-6030.

1.3 Current and Proposed Future Uses

The Phase II Property is currently occupied by a six-storey commercial building (100 Gloucester Street) and a commercial parking lot (84 Gloucester Street). It is our understanding that the Phase II Property redevelopment will consist of a residential high rise building with associated 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.

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.

Coarse-grained soil standards were chosen as a conservative approach. Grain size analysis was not completed. 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 south side of Gloucester Street, approximately 50m east of O'Connor Street in the City of Ottawa, Ontario. The Phase II Property is situated in a mixed use downtown zone consisting of commercial and residential land use. The setting of the Phase II Property is shown on Drawing PE5571-2 – Surrounding Land Use Plan.

At the time of the Phase II ESA, the northwest portion of the Phase II Property (100 Gloucester Street) was occupied by a six-storey office building with ground floor commercial businesses (Grounded Kitchen Coffee & Bar, and Commissionaires fingerprinting services). The building was constructed circa 1961 with a poured concrete foundation and is finished with brick and a flat tar-and-gravel style roof. The southwest portion of the Phase II Property is occupied by an in-ground swimming pool. A small toll booth is present on the northeast corner of the Phase II Property (84 Gloucester Street); the booth is associated with the commercial parking lot which occupied this portion of the site.

Site topography is generally flat, and the regional topography slopes gently downwards to the north, towards the Ottawa River. Site drainage consists primarily of surface runoff into catch basins along Gloucester Street. Multiple underground utilities were identified on the Phase II Property including electrical, gas, water, sewer and telecommunication lines.

2.2 Past Investigations

Paterson completed a Phase I ESA in February of 2022 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 Printers	East portion of the Phase I Property (86 Gloucester Street)	*"Item NA – Commercial Printers"*	On-site	VOCs	Soil Groundwater
APEC 2 Former Printers	Northwest portion of the Phase I Property (100 Gloucester Street)	*"Item NA – Commercial Printers"*	On-site	VOCs	Soil Groundwater
APEC 3 Fill Material of Unknown Quality	Throughout the Phase I Property	*"Item 30 – Importation of Fill Material of Unknown Quality"*	On-site	Metals As, Sb, Se PAHs	Soil
APEC 4[1] Application of Road Salt	Central and east portions of the Phase I Property (84 & 100 Gloucester Street)	*"Item NA: Application of road salt for the safety of vehicular or pedestrian traffic under conditions of snow or ice"*	On-site	Electrical Conductivity (EC) Sodium Adsorption Ratio (SAR)	Soil
APEC 5 Possible Former Dry Cleaner	West portion of the Phase I Property (100 Gloucester Street)	*"Item 37: Operation of Dry Cleaning Equipment"*	Off-site	VOCs	Soil Groundwater

1 – In accordance with Section 49.1 of O.Reg. 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 that a substance has been applied to surfaces for the safety of vehicular or pedestrian traffic under conditions of snow or ice or both. The exemption outlined in Section 49.1 is being relied up 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 March 31, 2022 through April 5, 2022. The field program consisted of drilling six boreholes to address the APECs identified on the Phase II Property. Three of the boreholes (BH2-22 through BH4-22) were instrumented with groundwater monitoring wells. Boreholes were drilled to a maximum depth of 8.23 m below the ground surface (mbgs).

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/or groundwater on the Phase II Property include the following:

- ❒ Volatile Organic Compounds (VOCs)
- ❒ Metals (including arsenic (As), antimony (Sb) and selenium (Se))
- ❒ Polycyclic Aromatic Hydrocarbons (PAHs)

In accordance with Section 49.1 of O.Reg.153/04, as amended, electrical conductivity (EC) and sodium adsorption ratio (SAR) are not considered to be CPCs.

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 the information from NRCAN, bedrock in the area of the site consists of shale of the Billings Formation. Based on the maps, the surficial geology consists of offshore marine sediments (erosional terraces) with an overburden thickness ranging from 10 to 15m.

The regional topography in the general area of the Phase I Property slopes down gently to the north, towards the Ottawa River. Groundwater within the Phase I Study Area is generally expected to flow towards the north.

Buildings and Structures

The Phase I Property is occupied by a six-storey office building with ground floor commercial businesses (Grounded Kitchen Coffee & Bar, and Commissionaires fingerprinting services). The building is constructed with a poured concrete foundation and is finished with brick and a flat tar-and-gravel style roof. The subject building is currently heated via natural gas fired furnaces. It is our opinion that natural gas has been the only heating source for the subject building since its construction. A small wood framed, toll booth is present on the northeast corner of the Phase I Property, constructed with vinyl siding and sloped shingled roof.

No other buildings or permanent structures are present on the Phase I Property.

Subsurface Structures and Utilities

The Phase I Property is situated in a municipally serviced area. Underground utility services on the subject land include natural gas, electricity, cable and water services. Services enter the Phase I Property from Gloucester Street.

No potable wells or private sewage systems were observed on the Phase I Property at the time of the site visit. No other subsurface structures were identified at the time of the site visit.

Water Bodies and Areas of Natural Significance

No areas of natural significance or water bodies were identified on the Phase I Property or within the Phase I Study Area.

Drinking Water Wells

There are no potable water wells on the Phase I Property or within the Phase I Study Area.

Monitoring Well Records

A total of 26 monitoring well records were identified within the Phase I Study Area. Three monitoring well records, dated June 19, 2018 were identified for the property addressed 170 Metcalfe Street, approximately 35 m southeast of the Phase I Property. These monitoring well records are assumed to be present as part of the RSC filing that was done for the 170 Metcalfe Street property. As a record of site condition has been filed for the 154 O'Connor Street property, the presence of these monitoring wells is not considered to represent an environmental concern on the Phase I Property. Several monitoring well records were identified for the 154 O'Connor Street property, approximately 60 m west of the Phase I Property. The presence of these monitoring well records is assumed to be in relation to the historic function of the 154 O'Connor Street property as a retail fuel outlet. Based on the separation distance and cross-gradient orientation with respect to the Phase I Property, the presence of these monitoring wells (and associated former retail fuel outlet) are not considered to represent an environmental concern on the Phase I Property. All remaining well records correspond to properties a minimum of 65 m from the Phase I Property and are not considered to be representative of a potential environmental concern to the Phase I Property.

Based on the monitoring well records, the general stratigraphy in the area of the Phase I Property consists of sand underlain by clay and shale bedrock. Bedrock was reportedly encountered at depths ranging from approximately 4.3 to 11.3 m below grade. Static water levels were not recorded on the well records. A copy of the well records has been included in Appendix 2.

Neighbouring Land Use

Neighbouring land use within the Phase I Study consists of a mixture of residential, and commercial land use. Current land use and PCAs identified in the Phase I Study Area are presented on Drawing PE5571-2 – Surrounding Land Use Plan.

Potentially Contaminating Activities (PCAs) and Areas of Potential Environmental Concern (APECs)

Based on the findings of the Phase I ESA, the following on and off-site PCAs (as listed in Column A, Table 2 of O.Reg.153/04) were considered to result in areas of potential environmental concern (APECs) on the Phase I Property:

- PCA NA – Commercial Printer – this PCA is associated with the former commercial printers reported to have been present on the Phase I Property at 86 Gloucester Street (part of 84 Gloucester Street parcel) and 100 Gloucester Street (APECs 1 and 2).
- PCA 30 – Importation of Fill Material of Unknown Quality – this PCA is associated with potential presence of fill material of unknown quality identified on the central and east portions of Phase I Property (APEC 3)
- PCA 37 – Operation of Dry Cleaning Equipment (where chemicals are used) – this PCA is associated with the former possible off-site dry cleaners reported to have been present at 114 Gloucester Street (present day 112 Gloucester Street), approximately 20 m west of the Phase I Property (APEC 5).

Based on the findings of the Phase I ESA, it is considered likely that road salt was applied to the surface of the parking lot on the Phase I Property for the safety of vehicular and pedestrian traffic under conditions of ice and/or snow. Although not defined as a specific PCA under Column A of Table 2 of O.Reg. 153/04, the use of salt for safety purposes is considered to result in an APEC on the Phase I Property (APEC 4).

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 4.

The remaining 31 off-site PCAs (existing or historical) identified within the Phase I Study Area are not considered to result in APECs on the Phase I Property due to their respective separation distance and/or cross/down-gradient orientations with respect to the Phase I Property.

All APECs are outlined on Drawing PE5571-1 – Site Plan, while all PCAs identified within the Phase I Study Area are presented on Drawing PE5571-2 – Surrounding Land Use Plan in the Figures section of this report, following the text.

Contaminants of Potential Concern

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

- ❒ Volatile Organic Compounds (VOCs)
- ❒ Metals (including arsenic (As), antimony (Sb) and selenium (Se))
- ❒ Polycyclic Aromatic Hydrocarbons (PAHs)

In accordance with Section 49.1 of O.Reg.153/04, as amended, electrical conductivity (EC) and sodium adsorption ratio (SAR) are not considered to be CPCs.

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 historical on-site and off-site PCAs that have resulted in APECs on the Phase I Property. Additional off-site PCAs identified within the study area are not considered to represent APECs on the Phase I Property based on their separation distances and/or orientations relative to the subject land.

A variety of independent sources were consulted as part of this assessment, 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. No deviations from the sampling and analysis plan were identified during the Phase II ESA.

3.5 Impediments

Physical impediments encountered during the Phase II ESA program include underground utilities and occupied spaces within the subject building (100 Gloucester Street) limiting the location of interior boreholes.

4.0 INVESTIGATION METHOD

4.1 Subsurface Investigation

The subsurface investigation was conducted during the interim of March 31, 2022 to April 5, 2022. The field program consisted of drilling seven boreholes (BH1-22 through BH7-22) across the Phase II Property.

The boreholes were drilled to a maximum depth of 8.23 m below ground surface (bgs) and three were completed as groundwater monitoring wells to access the groundwater table.

Boreholes BH1-22 through BH7-22 were placed to address the aforementioned APECs as listed in Table 1. Boreholes BH1-22 and BH2-22 were drilled on the interior of the subject building (100 Gloucester Street) using a portable drill rig while BH3-22 through BH7-22 were drilled on the exterior of the Phase II Property using a low clearance drill rig operated by CCC Drilling of Ottawa, Ontario, under full-time supervision of Paterson personnel. Borehole BH1-22 was abandoned due to a potential service encountered at the time of drilling. The borehole locations are indicated on the attached Drawing PE5571-3 - Test Hole Location Plan.

4.2 Soil Sampling

A total of 52 soil samples were obtained from the boreholes by means of grab sampling from auger flights/auger samples and split spoon sampling. Interior borehole soil samples were taken continuously while split spoon samples from exterior boreholes 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.

The borehole profiles generally consist of a layer of asphaltic concrete or concrete (ranging from 0-0.20 mbgs), followed by fill material (ranging from 0.08-2.74 mbgs) consisting of brown silty sand with crushed stone, gravel and trace clay, brown silty clay (ranging from 0.30-5.30 mbgs), glacial till (ranging from 1.52-8.05 mbgs) consisting of brown silty clay with sand and gravel and shale bedrock (encountered/inferred from 4.22–8.05 mbgs).

Borehole locations are shown on Drawing PE5571-3 – 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 photo ionization 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 maximum vapour reading measured was 3.3 ppm in the soil samples obtained. 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 visual or olfactory indications of potential contamination were identified in the soil samples. The results of the vapour survey are presented on the Soil Profile and Test Data sheets.

4.4 Groundwater Monitoring Well Installation

Three groundwater monitoring wells were installed on the Phase II Property as part of the subsurface investigation. The monitoring wells consisted of 32 mm (interior borehole) or 50 mm diameter (exterior boreholes) Schedule 40 threaded PVC risers and screens. Monitoring well construction details are listed in Table 2 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 2 - 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**
BH2-22	69.72	4.70	1.65-4.70	1.50-4.70	0.15-1.50	Flushmount
BH3-22	71.25	8.23	5.18-8.23	4.98-8.23	0.15-4.98	Flushmount
BH4-22	71.59	7.62	4.57-7.62	4.27-7.62	0.15-4.27	Flushmount

4.5 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.

4.6 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 3 and 4.

Table 3 - Testing Parameters for Submitted Soil Samples					
Sample ID	**Sample Depth & Stratigraphic Unit**	**Parameters Analyzed**			**Rationale**
		Metals[1]	**VOCs**	**PAHs**	
March 31, 2022					
BH2-22-SS4	1.52 - 2.13 m Brown Silty Clay (Glacial Till)		X		Assess potential soil impacts resulting from the historical on-site printers (west portion of Phase II Property) and off-site historical possible dry cleaner
April 1, 2022					
BH2-22-SS8A	3.96 – 4.50 m Brown Silty Clay (Glacial Till)		X		Assess potential soil impacts resulting from the historical on-site printers (west portion of Phase II Property) and off-site historical possible dry cleaner
DUP1	3.96 – 4.50 m Brown Silty Clay (Glacial Till)		X		Duplicate soil sample (BH2-22-SS8A) for QA/QC purposes

Notes:
- 1 – including arsenic (As), antimony (Sb) and selenium (Se)
- 2 – including hexavalent chromium (CrVI) and mercury (Hg)

Table 3 continued - Testing Parameters for Submitted Soil Samples

Sample ID	Sample Depth & Stratigraphic Unit	Parameters Analyzed			Rationale
		Metals[1]	VOCs	PAHs	
April 4, 2022					
BH3-22-SS2	0.76 – 1.37 m Brown Silty Sand (Fill Material)	X		X	Assess potential soil impacts resulting from the presence of fill material
BH3-22-SS7	4.57 – 5.18 m Dark Brown Silty Clay (Glacial Till)		X		Assess potential soil impacts resulting from the historical on-site printers (east portion of Phase II Property)
BH5-22-SS6	3.81 – 4.42 m Dark Brown Silty Clay (Glacial Till)		X		Assess potential soil impacts resulting from the historical on-site printers (west portion of Phase II Property)
April 5, 2022					
BH4-22-SS3	1.52 – 2.13 m Brown Silty Sand (Fill Material)	X		X	Assess potential soil impacts resulting from the presence of fill material
BH4-22-SS4B	2.74 – 2.90 m Brown Silty Clay (Native Material)	X[2]		X	Vertically delineate any potential impacts present in the native material
BH4-22-SS7	4.57 – 5.18 m Brown Silty Clay		X		Assess potential soil impacts resulting from the historical on-site printers (east portion of Phase II Property)
BH7-22-AU1	0.30 – 0.46 m Brown Silty Sand (Fill Material)	X		X	Assess potential soil impacts resulting from the presence of fill material
BH7-22-SS3	1.52 – 2.13 m Brown Silty Clay (Native Material)	X[2]		X	Vertically delineate any potential impacts present in the native material
BH7-22-SS7	4.57 – 5.18 m Dark Brown Silty Clay (Glacial Till)		X		Assess potential soil impacts resulting from the (east portion of Phase II Property) historical on-site printers
DUP1	1.52 – 2.13 m Brown Silty Sand (Fill Material)	X		X	Duplicate soil sample (BH4-22-SS3) for QA/QC purposes
DUP2	4.57 – 5.18 m Brown Silty Clay		X		Duplicate soil sample (BH4-22-SS7) for QA/QC purposes

Notes:
- 1 – including arsenic (As), antimony (Sb) and selenium (Se)
- 2 – including hexavalent chromium (CrVI) and mercury (Hg)

TABLE 4 - Testing Parameters for Submitted Groundwater Samples

Sample ID	Screened Interval	Parameters Analyzed			Rationale
		Metals[1]	VOCs	PHCs F_1-F_4	
April 22, 2022					
BH4-22-GW1(2)	4.57 – 7.62 m Silty Clay / Glacial Till	X	X	X	Assess potential groundwater impacts resulting from the (east portion of Phase II Property) historical on-site printers
DUP1(2)	4.57 – 7.62 m Silty Clay / Glacial Till	X			Duplicate groundwater sample (BH4-22-GW1(2)) for QA/QC purposes
May 16, 2022					
BH2-22-GW1	1.65 – 4.70 m Glacial Till / Bedrock		X		Assess potential groundwater impacts resulting from the historical on-site printers (west portion of Phase II Property) and off-site historical possible dry cleaner
BH3-22-GW1	5.18 – 8.23 m Glacial Till / Bedrock		X		Assess potential groundwater impacts resulting from the (east portion of Phase II Property) historical on-site printers

Notes:
- 1 – including arsenic (As), antimony (Sb) and selenium (Se)

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.

4.7 Residue Management

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

4.8 Elevation Surveying

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

4.9 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

The borehole profiles generally consist of a layer of asphaltic concrete or concrete (ranging from 0-0.20 mbgs), followed by fill material (ranging from 0.08-2.74 mbgs) consisting of brown silty sand with crushed stone, gravel and trace clay, brown silty clay (ranging from 0.30-5.30 mbgs), glacial till (ranging from 1.52-8.05 mbgs) consisting of brown silty clay with sand and gravel, underlain by shale bedrock (encountered/inferred from 4.22–8.05 mbgs).

Groundwater was encountered within the overburden or near the overburden/bedrock interface in BH2-22, BH3-22 and BH4-22 at depths ranging from 3.72 to 8.13 mbgs.

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 April 22, 2021 and May 16, 2022 using an electronic water level meter. Groundwater levels are summarized in Table 5.

TABLE 5 - Groundwater Level Measurements

Borehole Location	Ground Surface Elevation (m)	Water Level Depth (m below grade)	Water Level Elevation (m ASL)	Date of Measurement
BH2-22	69.72	4.61	65.11	May 16, 2022
BH3-22	71.25	8.13	63.12	May 16, 2022
BH4-22	71.59	3.72	67.87	April 22, 2022

Based on the groundwater elevations measured during the sampling events, groundwater contour mapping was completed. Groundwater contours are shown on Drawing PE5571-3. Based on the contour mapping, groundwater flow at the subject site is in a northwestern direction. A horizontal hydraulic gradient of approximately 0.31 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

Field screening of the soil samples collected during drilling resulted in vapour readings ranging from 0 to 3.3 ppm. No obvious visual or olfactory indications of potential environmental concerns were identified in the soil samples. Fill material was encountered in each borehole, however no deleterious material was identified, trace amounts of brick were identified at one location only (BH4-22). 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, 14 soil samples (including three duplicates) were submitted for analysis of metals (including As, Sb, Se, Hg and CrVI), VOCs and/or PAHs. The results of the analytical testing are presented in Tables 6 to 8. The laboratory certificate of analysis is provided in Appendix 1.

TABLE 6 - Analytical Test Results – Soil
Metals

Parameter	MDL (µg/g)	Soil Samples (µg/g)						MECP Table 3 Residential Standards (µg/g)
		April 4, 2022	April 5, 2022					
		BH3-22-SS2	BH4-22-SS3	BH4-22-SS4B	BH7-22-AU1	BH7-22-SS3	DUP1[1]	
Antimony	1.0	nd	1.5	nd	nd	nd	nd	7.5
Arsenic	1.0	3.1	8.3	2.9	4.0	3.5	4.0	18
Barium	1.0	164	320	309	113	373	114	390
Beryllium	0.5	nd	0.5	0.7	nd	1.1	nd	4
Boron	5.0	nd	9.5	0.8	9.0	nd	8.2	120

Notes:
- MDL – Method Detection Limit
- nd – not detected above the MDL
- NA – not analyzed
- **Bold and underlined –** Results exceed selected MECP standard
- 1 – Duplicate of sample BH4-22-SS3

TABLE 6 continued - Analytical Test Results – Soil
Metals

Parameter	MDL (µg/g)	Soil Samples (µg/g)						MECP Table 3 Residential Standards (µg/g)
		April 4, 2022	April 5, 2022					
		BH3-22-SS2	BH4-22-SS3	BH4-22-SS4B	BH7-22-AU1	BH7-22-SS3	DUP1[1]	
Cadmium	0.5	nd	0.9	5.3	nd	nd	nd	1.2
Chromium	5.0	45.1	26.2	98.6	24.4	118	22.0	160
Chromium (VI)	0.2	N/A	N/A	0.7	N/A	0.4	N/A	8
Cobalt	1.0	9.0	5.3	17.8	6.2	**24.9**	5.8	22
Copper	5.0	22.9	50.6	44.3	43.5	42.9	49.2	140
Lead	1.0	117	**663**	10.1	**176**	7.9	**184**	120
Mercury	0.1	N/A	N/A	nd	N/A	nd	N/A	0.27
Molybdenum	1.0	nd	1.1	nd	nd	nd	nd	6.9
Nickel	5.0	24.9	13.2	55.1	16.1	65.7	15.0	100
Selenium	1.0	nd	1.3	nd	nd	nd	nd	2.4
Silver	0.3	nd	0.5	nd	nd	nd	nd	20
Thallium	1.0	nd	nd	nd	nd	nd	nd	1
Uranium	1.0	nd	nd	nd	nd	nd	1.4	23
Vanadium	10.0	45.2	25.8	81.8	33.6	**106**	31.1	86
Zinc	20.0	107	**372**	0.4	113	130	113	340

Notes:
- MDL – Method Detection Limit
- nd – not detected above the MDL
- NA – not analyzed
- **Bold and underlined –** Results exceed selected MECP standard
- 1 – Duplicate of sample BH4-22-SS3

Lead, zinc, cobalt and/or vanadium concentrations in samples BH4-22-SS3 (and DUP1), BH7-22-AU1 and BH7-22-SS3 exceed the MECP Table 3 Standards. The cobalt and vanadium concentrations identified are consistent with naturally occurring levels present in post-glacial Champlain Sea clay deposits, which characterize much of the Ottawa region. These elevated levels are considered to be of geological origin and not the result of anthropogenic sources. As such the cobalt and vanadium concentrations are not considered to be a contaminant of concern. 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 PE5571-4 – Analytical Testing Plan – Soil.

TABLE 7 - Analytical Test Results – Soil
VOCs

Parameter	MDL (µg/g)	Soil Sample (µg/g)				MECP Table 3 Residential Standards (µg/g)
		Mar 31, 2021	April 1, 2022		April 4, 2022	
		BH2-22-SS4	BH2-22-SS8A	DUP1[1]	BH2-22-SS7	
Acetone	0.50	nd	nd	nd	nd	16
Benzene	0.02	nd	nd	nd	nd	0.21
Bromodichloromethane	0.05	nd	nd	nd	nd	13
Bromoform	0.05	nd	nd	nd	nd	0.27
Bromomethane	0.05	nd	nd	nd	nd	0.05
Carbon Tetrachloride	0.05	nd	nd	nd	nd	0.05
Chlorobenzene	0.05	nd	nd	nd	nd	2.4
Chloroform	0.05	nd	nd	nd	nd	0.05
Dibromochloromethane	0.05	nd	nd	nd	nd	9.4
Dichlorodifluoromethane	0.05	nd	nd	nd	nd	16
1,2-Dichlorobenzene	0.05	nd	nd	nd	nd	3.4
1,3-Dichlorobenzene	0.05	nd	nd	nd	nd	4.8
1,4-Dichlorobenzene	0.05	nd	nd	nd	nd	0.083
1,1-Dichloroethane	0.05	nd	nd	nd	nd	3.5
1,2-Dichloroethane	0.05	nd	nd	nd	nd	0.05
1,1-Dichloroethylene	0.05	nd	nd	nd	nd	0.05
cis-1,2-Dichloroethylene	0.05	nd	nd	nd	nd	3.4
trans-1,2-Dichloroethylene	0.05	nd	nd	nd	nd	0.084
1,2-Dichloropropane	0.05	nd	nd	nd	nd	0.05
1,3-Dichloropropene, total	0.05	nd	nd	nd	nd	0.05
Ethylbenzene	0.05	nd	nd	nd	nd	2
Ethylene dibromide	0.05	nd	nd	nd	nd	0.05
Hexane	0.05	nd	nd	nd	nd	2.8
Methyl Ethyl Ketone	0.50	nd	nd	nd	nd	16
Methyl Isobutyl Ketone	0.50	nd	nd	nd	nd	1.7
Methyl tert-butyl ether	0.05	nd	nd	nd	nd	0.75
Methylene Chloride	0.05	nd	nd	nd	nd	0.1
Styrene	0.05	nd	nd	nd	nd	0.7
1,1,1,2-Tetrachloroethane	0.05	nd	nd	nd	nd	0.058
1,1,2,2-Tetrachloroethane	0.05	nd	nd	nd	nd	0.05
Tetrachloroethylene	0.05	nd	nd	nd	nd	0.28
Toluene	0.05	nd	nd	nd	nd	2.3
1,1,1-Trichloroethane	0.05	nd	nd	nd	nd	0.38
1,1,2-Trichloroethane	0.05	nd	nd	nd	nd	0.05
Trichloroethylene	0.05	nd	nd	nd	nd	0.061
Trichlorofluoromethane	0.05	nd	nd	nd	nd	4
Vinyl Chloride	0.02	nd	nd	nd	nd	0.02
Xylenes, total	0.05	nd	nd	nd	nd	3.1

Notes:
- MDL – Method Detection Limit
- nd – not detected above the MDL
- 1 - Duplicate of sample BH2-22-SS8A

TABLE 7 continued- Analytical Test Results – Soil
VOCs

Parameter	MDL (µg/g)	Soil Sample (µg/g)				MECP Table 3 Residential Standards (µg/g)
		April 4, 2022	April 5, 2022			
		BH5-22-SS6	BH4-22-SS7	BH7-22-SS7	DUP2[2]	
Acetone	0.50	nd	nd	nd	nd	16
Benzene	0.02	nd	nd	nd	nd	0.21
Bromodichloromethane	0.05	nd	nd	nd	nd	13
Bromoform	0.05	nd	nd	nd	nd	0.27
Bromomethane	0.05	nd	nd	nd	nd	0.05
Carbon Tetrachloride	0.05	nd	nd	nd	nd	0.05
Chlorobenzene	0.05	nd	nd	nd	nd	2.4
Chloroform	0.05	nd	nd	nd	nd	0.05
Dibromochloromethane	0.05	nd	nd	nd	nd	9.4
Dichlorodifluoromethane	0.05	nd	nd	nd	nd	16
1,2-Dichlorobenzene	0.05	nd	nd	nd	nd	3.4
1,3-Dichlorobenzene	0.05	nd	nd	nd	nd	4.8
1,4-Dichlorobenzene	0.05	nd	nd	nd	nd	0.083
1,1-Dichloroethane	0.05	nd	nd	nd	nd	3.5
1,2-Dichloroethane	0.05	nd	nd	nd	nd	0.05
1,1-Dichloroethylene	0.05	nd	nd	nd	nd	0.05
cis-1,2-Dichloroethylene	0.05	nd	nd	nd	nd	3.4
trans-1,2-Dichloroethylene	0.05	nd	nd	nd	nd	0.084
1,2-Dichloropropane	0.05	nd	nd	nd	nd	0.05
1,3-Dichloropropene, total	0.05	nd	nd	nd	nd	0.05
Ethylbenzene	0.05	nd	nd	nd	nd	2
Ethylene dibromide	0.05	nd	nd	nd	nd	0.05
Hexane	0.05	nd	nd	nd	nd	2.8
Methyl Ethyl Ketone	0.50	nd	nd	nd	nd	16
Methyl Isobutyl Ketone	0.50	nd	nd	nd	nd	1.7
Methyl tert-butyl ether	0.05	nd	nd	nd	nd	0.75
Methylene Chloride	0.05	nd	nd	nd	nd	0.1
Styrene	0.05	nd	nd	nd	nd	0.7
1,1,1,2-Tetrachloroethane	0.05	nd	nd	nd	nd	0.058
1,1,2,2-Tetrachloroethane	0.05	nd	nd	nd	nd	0.05
Tetrachloroethylene	0.05	nd	nd	nd	nd	0.28
Toluene	0.05	nd	nd	nd	nd	2.3
1,1,1-Trichloroethane	0.05	nd	nd	nd	nd	0.38
1,1,2-Trichloroethane	0.05	nd	nd	nd	nd	0.05
Trichloroethylene	0.05	nd	nd	nd	nd	0.061
Trichlorofluoromethane	0.05	nd	nd	nd	nd	4
Vinyl Chloride	0.02	nd	nd	nd	nd	0.02
Xylenes, total	0.05	nd	nd	nd	nd	3.1

Notes:
- MDL – Method Detection Limit
- nd – not detected above the MDL
- 2 - Duplicate of sample BH4-22-SS7

No VOC parameters were detected in the soil samples analyzed. The results are in compliance with the selected MECP Table 3 standards. The analytical results for VOC tested in soil are shown on Drawing PE5571-4 – Analytical Testing Plan – Soil.

TABLE 8 - Analytical Test Results – Soil
PAHs

Parameter	MDL (µg/g)	Soil Sample (µg/g)						MECP Table 3 Residential Standards (µg/g)
		April 4, 2022	April 5, 2022					
		BH3-22-SS2	BH4-22-SS3	BH4-22-SS4B	BH7-22-AU1	BH7-22-SS3	DUP 1[2]	
Acenaphthene	0.02	nd	0.05	nd	nd	nd	nd	7.9
Acenaphthylene	0.02	nd	**0.38**	nd	nd[1]	nd	nd[1]	0.15
Anthracene	0.02	nd	0.34	nd	nd[1]	nd	nd[1]	0.67
Benzo[a]anthracene	0.02	0.06	**1.08**	nd	nd[1]	nd	nd[1]	0.5
Benzo[a]pyrene	0.02	0.06	**1.38**	nd	nd[1]	nd	nd[1]	0.3
Benzo[b]fluoranthene	0.02	0.08	**1.34**	nd	nd[1]	nd	nd[1]	0.78
Benzo[g,h,i]perylene	0.02	0.05	0.84	nd	nd	nd	nd	6.6
Benzo[k]fluoranthene	0.02	0.04	0.75	nd	nd[1]	nd	nd[1]	0.78
Chrysene	0.02	0.06	0.96	nd	nd	nd	nd	7
Dibenzo[a,h]anthracene	0.02	nd	**0.24**	nd	nd[1]	nd	nd[1]	0.1
Fluoranthene	0.02	0.11	**2.31**	nd	nd[1]	nd	nd[1]	0.69
Fluorene	0.02	nd	0.05	nd	nd	nd	nd	62
Indeno[1,2,3-cd]pyrene	0.02	0.04	**0.84**	nd	nd[1]	nd	nd[1]	0.38
1-Methylnaphthalene	0.02	nd	0.02	nd	nd	nd	nd	0.99
2-Methylnaphthalene	0.02	nd	0.04	nd	nd	nd	nd	0.99
Methylnaphthalene (1&2)	0.04	nd	0.06	nd	nd[1]	nd	nd[1]	0.99
Naphthalene	0.01	nd	0.04	nd	nd	nd	nd	0.6
Phenanthrene	0.02	0.06	0.73	nd	nd	nd	nd	6.2
Pyrene	0.02	0.10	2.05	nd	nd	nd	nd	78

Notes:
- MDL – Method Detection Limit
- nd – not detected above the MDL
- **Bold and underlined –** Results exceed selected MECP standard
- 1 – Sample qualified - elevated detection limits due to the nature of the sample matrix
- 2 – Duplicate of sample BH4-22-SS3

Various PAH parameter concentrations in samples BH4-22-SS3 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. It should be noted that several test parameters for samples BH7-22-AU1 and DUP1 were qualified due to elevated detection limits due to the nature of the sample matrix. The analytical results for PAHs tested in soil are shown on PE5571-4 – Analytical Testing Plan – Soil.

TABLE 9 - Analytical Test Results – Soil
General Inorganics

Parameter	MDL	Soil Samples (µg/g)					MECP Table 3 Residential Standards
		April 4, 2022	April 5, 2022				
		BH3-22-SS2	BH4-22-SS3	BH7-22-AU1	BH7-22-SS7	DUP1[1]	
Electrical Conductivity	0.01	**1340**	**2540**	544	NA	544	700 uS/cm
Sodium Adsorption Ratio	5	**7.82**	2.59	3.34	NA	3.43	5
pH	0.05	NA	NA	7.96	7.88	NA	5-11

Notes:
- MDL – Method Detection Limit
- NA – Not Analyzed
- **Bold and underlined –** Results exceed selected MECP standard
- 1 – Duplicate of sample BH4-22-SS3

All soil samples analyzed for pH comply with the MECP Table 3 Standards. As noted in Table 1, in accordance with Section 49.1 of Ontario Regulation 153/04, EC and SAR 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. All soil samples analyzed for pH comply with the MECP Table 3 Standards. The analytical results for pH, EC and SAR in the tested soil are not shown on the drawings appended to this report as they have been deemed to meet the standard based on Section 49.1 of O.Reg. 153/04.

The maximum concentrations of analyzed parameters in the soil at the site are summarized in Table 10.

TABLE 10 - Maximum Concentrations – Soil

Parameter	Maximum Concentration (µg/g)	Sample ID	Depth Interval (m BGS)
Antimony	1.5	BH4-22-SS3	1.52 – 2.13; Fill Material
Arsenic	8.3	BH4-22-SS3	1.52 – 2.13; Fill Material
Barium	373	BH7-22-SS3	1.52 – 2.13; Native Material
Beryllium	1.1	BH7-22-SS3	1.52 – 2.13; Native Material
Boron	9.5	BH4-22-SS3	1.52 – 2.13; Fill Material
Cadmium	0.9	BH4-22-SS3	1.52 – 2.13; Fill Material
Chromium	118	BH7-22-SS3	1.52 – 2.13; Native Material
Chromium (VI)	0.7	BH4-22-SS4B	2.74 – 2.90; Native Material
Cobalt	**24.9**	BH7-22-SS3	1.52 – 2.13; Native Material
Copper	50.6	BH4-22-SS3	1.52 – 2.13; Fill Material
Lead	**663**	BH4-22-SS3	1.52 – 2.13; Fill Material

Notes:
- **Bold and underlined –** Results exceed selected MECP standard

TABLE 10 continued - Maximum Concentrations – Soil

Parameter	Maximum Concentration (µg/g)	Sample ID	Depth Interval (m BGS)
Molybdenum	1.1	BH4-22-SS3	1.52 – 2.13; Fill Material
Nickel	65.7	BH7-22-SS3	1.52 – 2.13; Native Material
Selenium	1.3	BH4-22-SS3	1.52 – 2.13; Fill Material
Silver	0.5	BH4-22-SS3	1.52 – 2.13; Fill Material
Uranium	1.4	DUP1 (BH4-22-SS3)	1.52 – 2.13; Fill Material
Vanadium	**106**	BH7-22-SS3	1.52 – 2.13; Native Material
Zinc	**372**	BH4-22-SS3	1.52 – 2.13; Fill Material
Acenaphthene	0.05	BH4-22-SS3	1.52 – 2.13; Fill Material
Acenaphthylene	**0.38**	BH4-22-SS3	1.52 – 2.13; Fill Material
Anthracene	0.34	BH4-22-SS3	1.52 – 2.13; Fill Material
Benzo[a]anthracene	**1.08**	BH4-22-SS3	1.52 – 2.13; Fill Material
Benzo[a]pyrene	**1.38**	BH4-22-SS3	1.52 – 2.13; Fill Material
Benzo[b]fluoranthene	**1.34**	BH4-22-SS3	1.52 – 2.13; Fill Material
Benzo[g,h,i]perylene	0.84	BH4-22-SS3	1.52 – 2.13; Fill Material
Benzo[k]fluoranthene	0.75	BH4-22-SS3	1.52 – 2.13; Fill Material
Chrysene	0.96	BH4-22-SS3	1.52 – 2.13; Fill Material
Dibenzo[a,h]anthracene	**0.24**	BH4-22-SS3	1.52 – 2.13; Fill Material
Fluoranthene	**2.31**	BH4-22-SS3	1.52 – 2.13; Fill Material
Fluorene	0.05	BH4-22-SS3	1.52 – 2.13; Fill Material
Indeno[1,2,3-cd]pyrene	**0.84**	BH4-22-SS3	1.52 – 2.13; Fill Material
1-Methylnaphthalene	0.02	BH4-22-SS3	1.52 – 2.13; Fill Material
2-Methylnaphthalene	0.04	BH4-22-SS3	1.52 – 2.13; Fill Material
Methylnaphthalene (1&2)	0.06	BH4-22-SS3	1.52 – 2.13; Fill Material
Naphthalene	0.04	BH4-22-SS3	1.52 – 2.13; Fill Material
Phenanthrene	0.73	BH4-22-SS3	1.52 – 2.13; Fill Material
Pyrene	2.05	BH4-22-SS3	1.52 – 2.13; Fill Material

Notes:
- **Bold and underlined –** Results exceed selected MECP standard

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

5.6 Groundwater Quality

Groundwater samples (including one duplicates) from monitoring wells installed in BH2 through BH4 were submitted for laboratory analysis of metals, VOCs and/or PHCs (F1-F4). The groundwater samples were obtained from the screened intervals noted in Table 2.

The results of the analytical testing are presented in Tables 11 to 17. The laboratory certificates of analysis are provided in Appendix 1.

TABLE 11 - Analytical Test Results – Groundwater
Metals

Parameter	MDL (µg/g)	Groundwater Samples (µg/g)		MECP Table 3 Residential Standards (µg/g)
		April 22, 2022		
		BH4-22-GW1 (2)	DUP1(2)[1]	
Antimony	0.5	0.9	nd	20,000
Arsenic	1	nd	nd	1,900
Barium	1	177	194	29,000
Beryllium	0.5	nd	nd	67
Boron	10	53	55	45,000
Cadmium	0.1	nd	nd	2.7
Chromium	1	nd	nd	810
Cobalt	0.5	1.6	1.8	66
Copper	0.5	1.5	4.1	87
Lead	0.1	0.2	0.4	25
Molybdenum	0.5	2.6	2.7	9,200
Nickel	1	7	7	490
Selenium	1	3	3	63
Silver	0.1	nd	nd	1.5
Sodium	200	62,500	62,800	2,300,000
Thallium	0.1	nd	nd	510
Uranium	0.1	7.3	7.4	420
Vanadium	0.5	0.9	1.4	250
Zinc	5	nd	nd	1,100

Notes:
- MDL – Method Detection Limit
- nd – not detected above the MDL
- 1 – Duplicate of sample BH4-22-GW1 (2)

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 PE5571-5– Analytical Testing Plan – Groundwater.

TABLE 12 - Analytical Test Results – Groundwater
PHCs

Parameter	MDL (µg/L)	Groundwater Sample (µg/L)	MECP Table 3 Standards (µg/L)
		April 22, 2022	
		BH4-22-GW1 (2)	
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, there the groundwater tested is in compliance with the selected MECP Table 3 standards. The analytical results for groundwater tested are shown on Drawing PE5571-5– Analytical Testing Plan – Groundwater.

TABLE 13 - Analytical Test Results – Groundwater
VOCs

Parameter	MDL (µg/L)	Groundwater Samples (µg/g)			MECP Table 3 Residential Standards (µg/g)
		April 22, 2022	May 16, 2022		
		BH4-22-GW1 (2)	BH2-22-GW1	BH3-22-GW1	
Acetone	5.0	nd	nd	nd	130000
Benzene	0.5	nd	nd	nd	44
Bromodichloromethane	0.5	nd	nd	nd	85000
Bromoform	0.5	nd	nd	nd	380
Bromomethane	0.5	nd	nd	nd	5.6
Carbon Tetrachloride	0.2	nd	nd	nd	0.79
Chlorobenzene	0.5	nd	nd	nd	630
Chloroform	0.5	nd	0.8	0.8	2.4
Dibromochloromethane	0.5	nd	nd	nd	82000
Dichlorodifluoromethane	1.0	nd	nd	nd	4400
1,2-Dichlorobenzene	0.5	nd	nd	nd	4600
1,3-Dichlorobenzene	0.5	nd	nd	nd	9600
1,4-Dichlorobenzene	0.5	nd	nd	nd	8
1,1-Dichloroethane	0.5	nd	nd	nd	320
1,2-Dichloroethane	0.5	nd	nd	nd	1.6
1,1-Dichloroethylene	0.5	nd	nd	nd	1.6
cis-1,2-Dichloroethylene	0.5	nd	nd	nd	1.6
trans-1,2-Dichloroethylene	0.5	nd	nd	nd	1.6
1,2-Dichloropropane	0.5	nd	nd	nd	16
1,3-Dichloropropene	0.5	nd	nd	nd	5.2
Ethylbenzene	0.5	nd	nd	1.6	2300
Ethylene dibromide	0.2	nd	nd	nd	0.25
Hexane	1.0	nd	nd	nd	51
Methyl Ethyl Ketone	5.0	nd	nd	nd	470000
Methyl Isobutyl Ketone	5.0	nd	nd	nd	140000
Methyl tert-butyl ether	2.0	nd	nd	nd	190
Methylene Chloride	5.0	nd	nd	nd	610
Styrene	0.5	nd	nd	nd	1300
1,1,1,2-Tetrachloroethane	0.5	nd	nd	nd	3.3
1,1,2,2-Tetrachloroethane	0.5	nd	nd	nd	3.2
Tetrachloroethylene	0.5	nd	nd	nd	1.6
Toluene	0.5	nd	nd	1.7	18000
1,1,1-Trichloroethane	0.5	nd	nd	nd	640
1,1,2-Trichloroethane	0.5	nd	nd	nd	4.7
Trichloroethylene	0.5	nd	nd	nd	1.6
Trichlorofluoromethane	1.0	nd	nd	nd	2500
Vinyl Chloride	0.5	nd	nd	nd	0.5
Xylenes	0.5	nd	nd	12.2	4200

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

All detected VOC 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 PE5571-5– Analytical Testing Plan – Groundwater.

5.7 Quality Assurance and Quality Control Results

All samples submitted as part of the March and April 2022 sampling events 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 BH4-22-SS3, BH4-22-SS7 and BH1-22-GW1(2) were submitted for laboratory analysis of metals and/or VOCs. 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.

The RPD calculations for the original soil and duplicate sample are provided in Tables 14 to 15.

Table 14 - QA/QC Calculations – Soil

Parameter	MDL (µg/L)	BH4-22-SS3	DUP1 (BH4-22-SS3)	RPD (%)	QA/QC Result
Arsenic	1.0	4.0	4.0	0	Meets Target
Barium	1.0	113	114	0.88	Meets Target
Boron	5.0	9.0	8.2	9.30	Meets Target
Chromium	5.0	24.4	22.0	10.34	Meets Target
Cobalt	1.0	6.2	5.8	6.67	Meets Target
Copper	5.0	43.5	49.2	12.30	Meets Target
Lead	1.0	**176**	**184**	4.44	Meets Target
Nickel	5.0	16.1	15.0	7.07	Meets Target
Vanadium	10.0	33.6	31.1	7.73	Meets Target
Zinc	20.0	113	113	0	Meets Target

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

The remaining parameter concentrations were not detected in either or both the original sample and duplicate. The RPD values are therefore considered to be 0% and meet the 20% target.

Table 15 - QA/QC Calculations – Groundwater					
Parameter	**MDL (µg/L)**	**BH4-22-GW1 (2)**	**DUP1 (2) (BH4-22-GW1 (2))**	**RPD (%)**	**QA/QC Result**
Barium	1	177	194	9.2	Meets Target
Boron	10	53	55	3.7	Meets Target
Cobalt	0.5	1.6	1.8	11.8	Meets Target
Copper	0.5	1.5	4.1	93.0	Does Not Meet Target
Lead	0.1	0.2	0.4	66.7	Meets Target
Molybdenum	0.5	2.6	2.7	3.8	Meets Target
Nickel	1	7	7	0	Meets Target
Selenium	1	3	3	0	Meets Target
Sodium	200	62,500	62,800	0.5	Meets Target
Uranium	0.1	7.3	7.4	1.4	Meets Target
Vanadium	0.5	0.9	1.4	43.5	Does Not Meet Target

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

The remaining parameter concentrations were not detected in either or both the original sample and duplicate. The RPD values are therefore considered to be 0% and meet the 20% target.

Typically, RPD values below 20% are considered to be of satisfactory quality. The relative percent difference (RPD) results calculated for one soil parameter (uranium) fell outside of the acceptable range of 20%, and thus does not meet the data quality objectives outlined in the Sampling and Analysis Plan, appended to this report.

Despite the exceeded RPD values calculated for sample BH4-22-GW1(2) between the original and duplicate samples, it should be noted that the concentration of the parameters were well within the selected MECP Table 3 standards in both samples by a large margin. 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.

Site Description

Potentially Contaminating Activity and Areas of Potential Environmental Concern

Based on the results of the Phase I ESA completed for the subject property, 36 PCAs were identified, five 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 commercial printer (PCA #N/A);
- APEC 2: Resulting from the historical presence of an on-site commercial printer (PCA #N/A);
- APEC 3: Resulting from the presence of fill material of unknown quality (PCA #30).
- APEC 4: Resulting from the application of de-icing salt associated with on-site parking areas and adjacent roadways (PCA #N/A).
- APEC 5: Resulting from the historical presence of an off-site possible former dry cleaners (PCA #37).

Based on the findings of the Phase I ESA, it is considered likely that road salt was applied to the surface of the parking lot on the Phase I Property for the safety of vehicular and pedestrian traffic under conditions of ice and/or snow. Although not defined as a specific PCA under Column A of Table 2 of O.Reg. 153/04, the use of salt for safety purposes is considered to result in an APEC on the Phase I Property (APEC 4).

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 4.

Contaminants of Potential Concern

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

- ❒ Volatile Organic Compounds (VOCs)
- ❒ Metals (including arsenic (As), antimony (Sb) and selenium (Se))
- ❒ Polycyclic Aromatic Hydrocarbons (PAHs)

In accordance with Section 49.1 of O.Reg.153/04, as amended, electrical conductivity (EC) and sodium adsorption ratio (SAR) are not considered to be CPCs.

Although PHCs were not identified as a CPC for the Phase II Property, groundwater from BH4-22 was sampled for PHCs (F1-F4) for future off-site disposal purposes.

Subsurface Structures and Utilities

No subsurface structures are present on the Phase I Property. Multiple underground utilities were identified on the Phase I Property including electrical, gas, water, sewer and telecommunication lines.

Physical Setting

Site Stratigraphy

The stratigraphy of the Phase II Property generally consists of:

- ❒ Concrete or asphaltic concrete; encountered at depths ranging from approximately 0.00 to 0.20 m below ground surface
- ❒ Fill material, consisting of brown silty sand with crushed stone, gravel and trace clay; encountered at depths ranging from approximately 0.08 to 2.74 m below ground surface
- ❒ Brown silty clay; encountered at depths ranging from approximately 0.30 to 5.30 m below ground surface

- Glacial till, consisting of brown silty clay with sand and gravel, cobbles; encountered at depths ranging from approximately 1.52 to 8.05 m below ground surface
- Shale bedrock; encountered/inferred at depths ranging from approximately 4.22 to 8.05 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 was encountered within the overburden or near the overburden/bedrock interface in BH2-22, BH3-22 and BH4-22 at depths ranging from 3.72 to 8.13 mbgs. During the most recent groundwater monitoring event, groundwater flow was measured in a northwestern direction, with a hydraulic gradient of 0.31 m/m. Groundwater contours are shown on Drawing PE5571-3 – Groundwater Contour Plan.

Approximate Depth to Bedrock

Weathered bedrock was encountered in the spoon at a depth of 4.50 and 8.05 mbgs in BH2-22 and BH3-22, respectively. Additionally, practical refusal to augering on inferred bedrock was encountered at a depth of 4.22 mbgs in BH5-22.

Approximate Depth to Water Table

The depth to the water table at the subject site varies between approximately 3.74 to 8.23 m below existing grade. The difference in measured groundwater elevations across the Phase II Property may be attributed to dewatering by the deep foundations construction on the adjacent properties to the east and northwest, across Gloucester Street.

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, the pH of surface soil is between 5 and 9 and the pH of subsurface soil is between 5 and 11.

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 or clay with crushed stone, gravel, and/or trace brick was identified throughout the Phase II Property.

Existing Buildings and Structures

The Phase I Property is occupied by a six-storey office building with ground floor commercial businesses (Grounded Kitchen Coffee & Bar, and Commissionaires fingerprinting services), constructed circa 1961.

Proposed Buildings and Other Structures

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

Concentrations of metal parameters (lead and/or zinc) and/or various PAH parameters exceeding the MECP Table 3 Standards were identified in the fill material at BH4-22 and BH7-22, on the eastern portion of the Phase II Property.

Concentrations of cobalt and vanadium exceeding the MECP Table 3 Standards were identified in the native silty clay soils beneath the fill material in BH4-22 and BH7-22. These parameters are considered to be naturally occurring and are not considered to be contamination of concern on the Phase II Property.

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

Types of Contaminants

Based on the findings of this Phase II ESA, the contaminant of concern (COCs) at the Phase II Property are considered to be metals and PAHs in soil (fill material).

Contaminated Media

Based on the findings of this Phase II ESA, lead, zinc and/or PAH impacts are considered to be confined to the layer of fill material on the eastern portion of the Phase II Property.

All groundwater beneath the Phase II Property complies with the MECP Table 3 Standards.

What Is Known About Areas Where Contaminants Are Present

The impacted soil identified on the Phase II Property is interpreted to be the result of the importation of fill material of a poor quality. The areas in which the impacts were identified in boreholes have historically been used for commercial (printers) or residential purposes.

Distribution and Migration of Contaminants

Based on the findings of the Phase II ESA, contaminants are present in the fill material only. With the exception of several naturally occurring parameters associated with the native silty clay, metal and/or PAH parameters in the native soils underlying the fill material were determined to comply with the MECP Table 3 Standards. Furthermore, groundwater beneath the Phase II Property, was determined to comply with the MECP Table 3 Standards. As such, no significant migration of contaminants is considered to have occurred at the Phase II Property. It should be noted however, that based on the non-homogenous nature of the fill material, pockets of impacted fill may be encountered elsewhere 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 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 does not appear to have significantly affected contaminant distribution at the Phase II Property. Site groundwater was in compliance with MECP standards; as such, the fluctuation of the groundwater table was considered to have a limited effect on the distribution of contaminants at 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 negligible. It is our understanding that all soil will be removed from the Phase II Property in conjunction with redevelopment. Given the fact that soil will be removed, in combination with clean groundwater results, the risk for potential vapour intrusion into future buildings and services is negligible.

6.0 CONCLUSIONS

Assessment

A Phase II ESA was conducted for the properties addressed 84 and 100 Gloucester 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 subsurface investigation consisted of drilling six boreholes across the Phase II Property. Three of the boreholes were constructed with groundwater monitoring wells. The general soil profile encountered during the field program consisted of a layer of asphaltic concrete or concrete, followed by fill material, brown silty clay, glacial till, underlain by shale bedrock (encountered/inferred from 4.22–8.05 mbgs).

A total of 14 soil samples (including three duplicates) were submitted for analysis of metals (including As, Sb, Se and/or Hg and CrVI), Volatile Organic Compounds (VOCs) and/or Polycyclic Aromatic Hydrocarbons (PAHs). VOC parameter concentrations were not detected above the laboratory detection limit, while metal and PAH parameter concentrations were identified in the soil samples analyzed. Based on the analytical test results, metal and/or PAH concentrations were identified in soil samples BH4-22-SS3 and BH7-22-AU1 in exceedance of the MECP Table 3 Standards. Concentrations of cobalt and vanadium exceeding the MECP Table 3 Standards were identified in the native silty clay soils beneath the fill material in BH4-22 and BH7-22. These parameters are considered to be naturally occurring and are not considered to be contamination of concern on the Phase II Property. All remaining parameter concentrations analyzed in the soil samples are in compliance with the selected MECP Table 3 Standards.

Groundwater samples from monitoring wells installed in BH2-22, BH3-22, and BH4-22 were collected during the April 22, 2022 and May 16, 2022 sampling events. No sheen, free product or odour was noted during the groundwater sampling event. A total of three Groundwater samples were analyzed for metals (including As, Sb and Se), VOCs, and/or Petroleum Hydrocarbons F1-F4 (PHCs, F1-F4). All groundwater results comply with the selected MECP Table 3 Standards.

Recommendations

Soil

Based on the findings of the Phase II ESA, fill material impacted with metal and/or PAH concentrations exceeding MECP Table 3 Standards, is present on the Phase II Property. It is our understanding that the Phase II Property is to be redeveloped with a residential high rise building with associated underground parking levels.

It is our recommendation that an environmental site remediation program, involving the removal of all impacted fill material, be completed concurrently with the site redevelopment. Prior to off-site disposal at a licensed 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 personally be on-site during construction activities to direct the excavation and segregation of impacted soil and to conduct confirmatory sampling as required. Excess soil generated during the construction excavation 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. Prior to site redevelopment, the monitoring wells must be decommissioned in accordance with O.Reg 903.

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 (reaffirmed, 2016). 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 Claridge Homes. Notification from Claridge Homes 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:

- ❒ Claridge Homes
- ❒ Paterson Group

FIGURES

FIGURE 1 – KEY PLAN

DRAWING PE5571-1 – SITE PLAN

DRAWING PE5571-2 – SURROUNDING LAND USE PLAN

DRAWING PE5571-3 – TEST HOLE LOCATION PLAN

DRAWING PE5571-4 – ANALYTICAL TESTING PLAN – SOIL

DRAWING PE5571-4A – CROSS SECTION A-A' – SOIL

DRAWING PE5571-5 – ANALYTICAL TESTING PLAN – GROUNDWATER

DRAWING PE5571-5A – CROSS-SECTION A – A' – GROUNDWATER

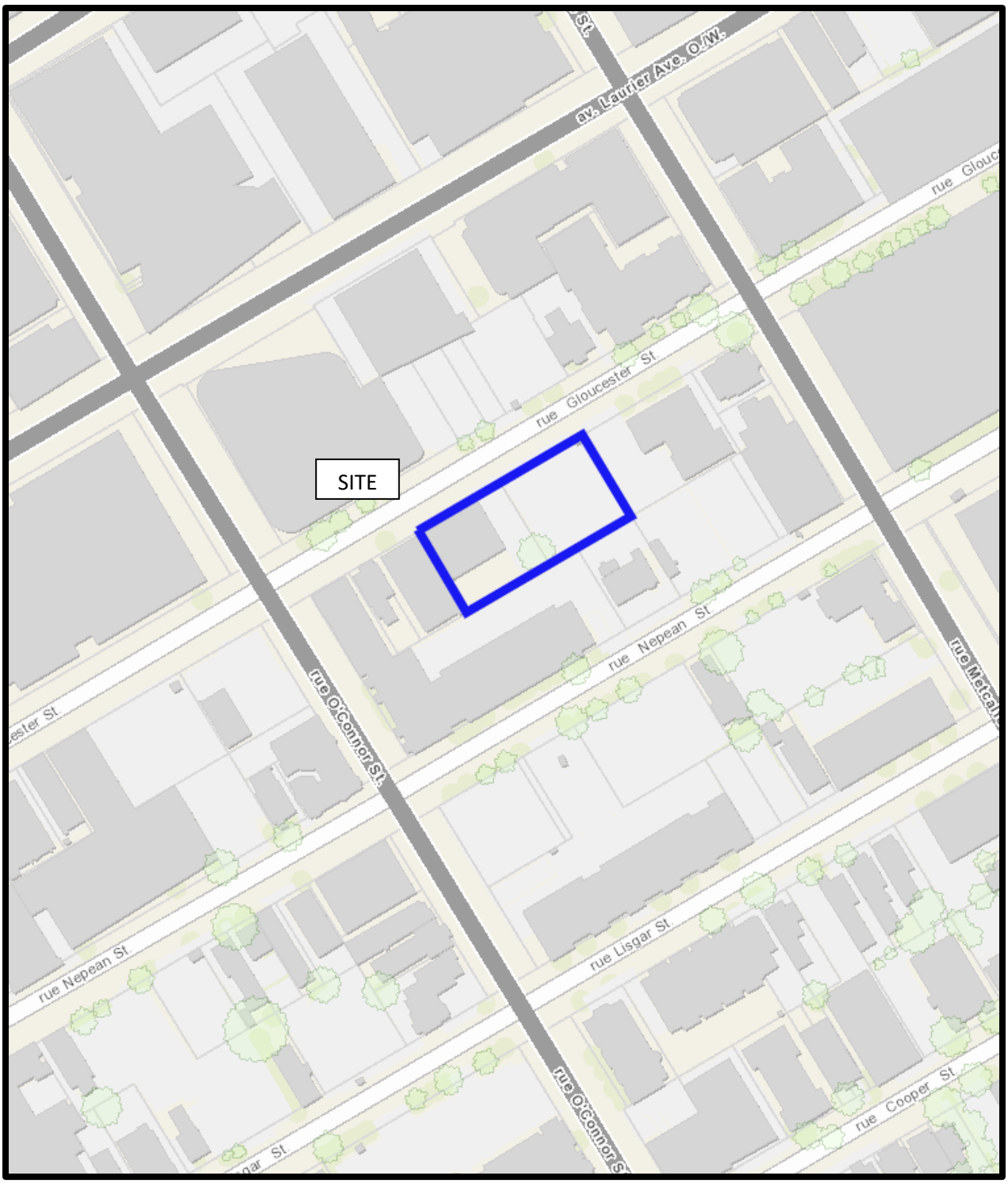
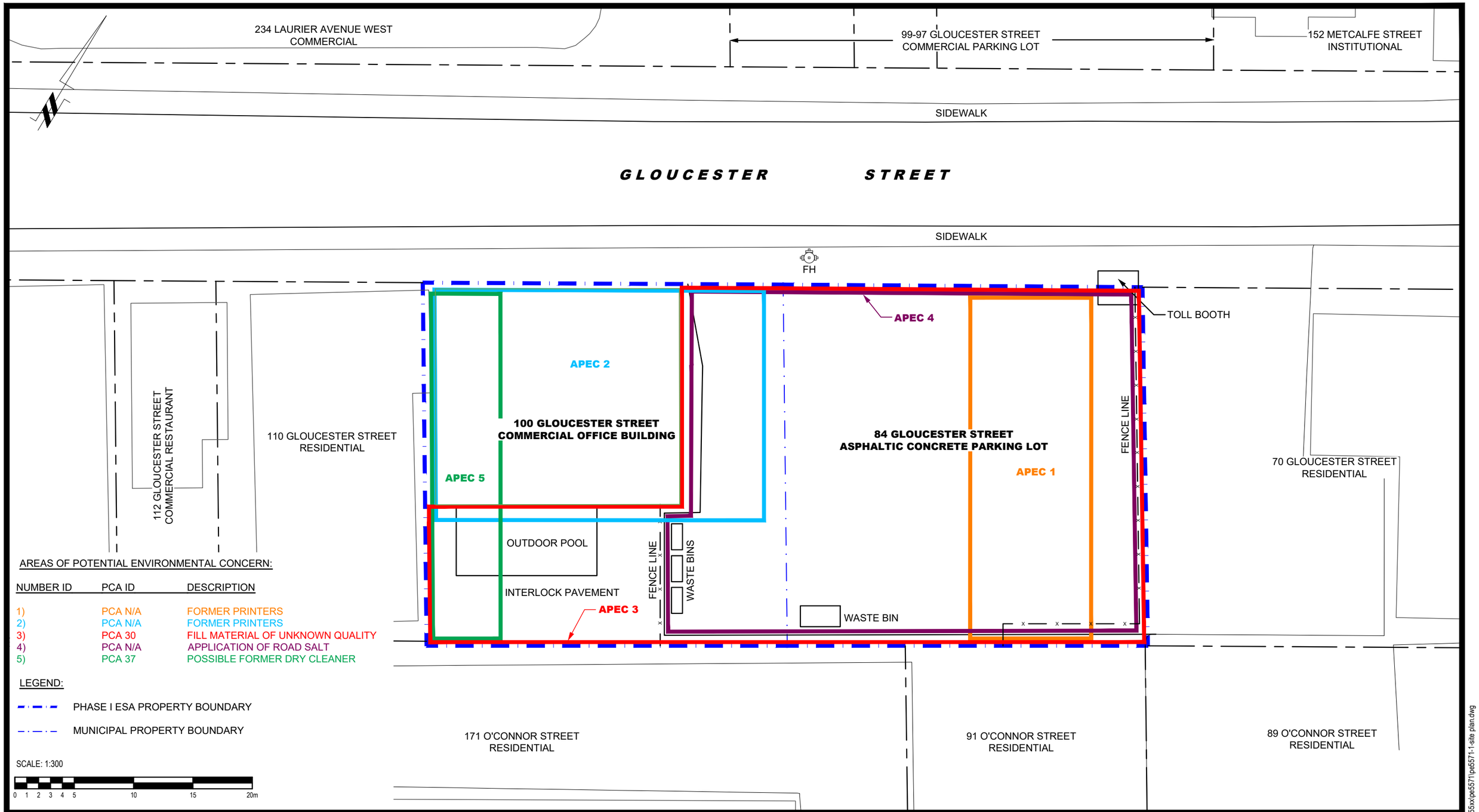


FIGURE 1

KEY PLAN



AREAS OF POTENTIAL ENVIRONMENTAL CONCERN:

NUMBER ID	PCA ID	DESCRIPTION
1)	PCA N/A	FORMER PRINTERS
2)	PCA N/A	FORMER PRINTERS
3)	PCA 30	FILL MATERIAL OF UNKNOWN QUALITY
4)	PCA N/A	APPLICATION OF ROAD SALT
5)	PCA 37	POSSIBLE FORMER DRY CLEANER

LEGEND:

PHASE I ESA PROPERTY BOUNDARY

MUNICIPAL PROPERTY BOUNDARY

SCALE: 1:300

0 1 2 3 4 5 10 15 20m

PATERSON GROUP
SOLUTION ORIENTED ENGINEERING

NO.	REVISIONS	DATE	INITIAL

CLARIDGE HOMES

PHASE I - ENVIRONMENTAL SITE ASSESSMENT
84 GLOUCESTER STREET

OTTAWA, ONTARIO

Title: SITE PLAN

Scale: 1:300	Date: 06/2022
Drawn by: YA	Report No.: PE5571-1
Checked by: JC	Dwg. No.: PE5571-1
Approved by: MSD	Revision No.:

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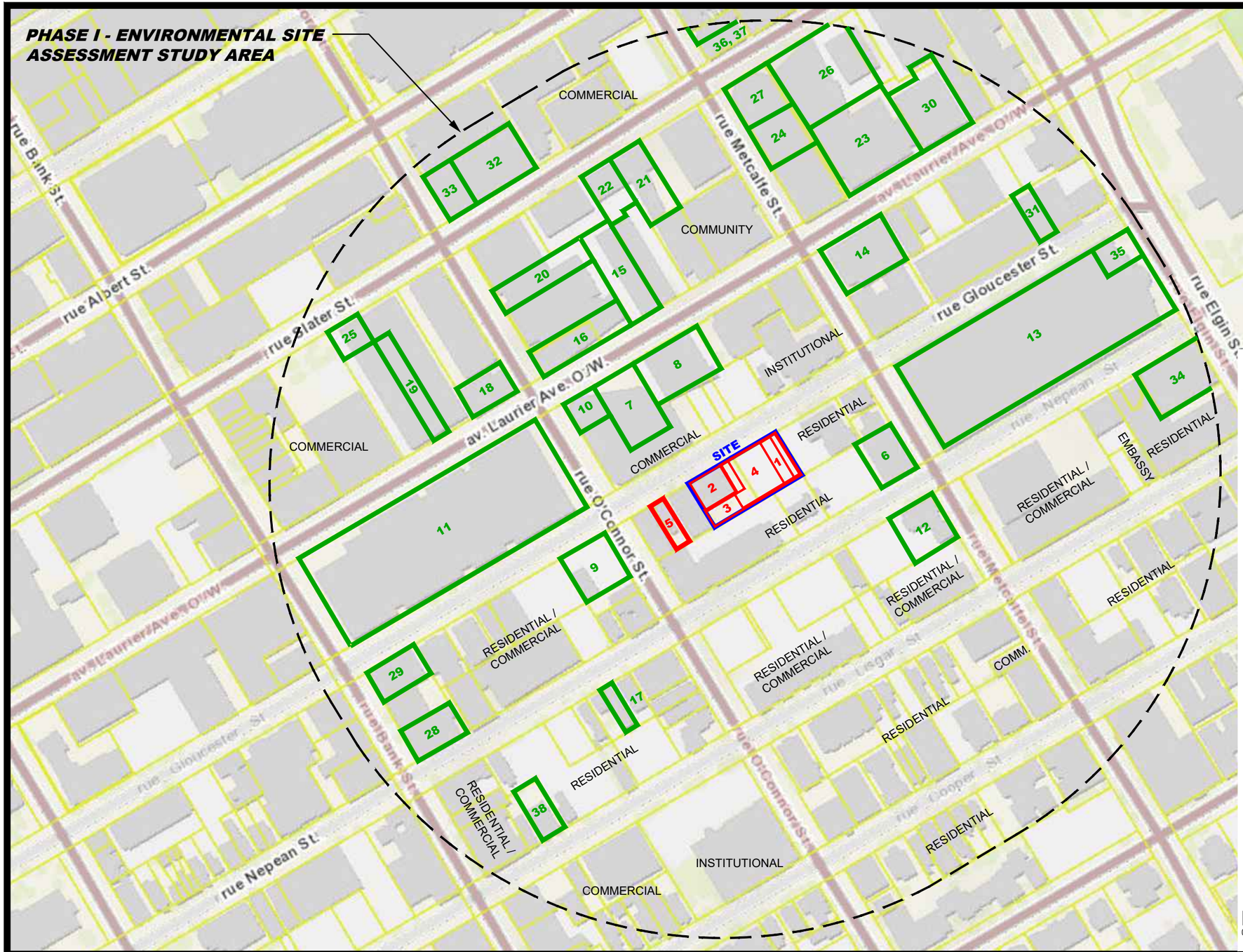

POTENTIALLY CONTAMINATING ACTIVITIES:

ID	PCA ID	ADDRESS	DESCRIPTION
1)	PCA N/A	ON-SITE	FORMER PRINTERS
2)	PCA N/A	ON-SITE	FORMER PRINTERS
3)	PCA 30	ON-SITE	FILL MATERIAL OF UNKNOWN QUALITY
4)	PCA N/A	ON-SITE	APPLICATION OF ROAD SALT
5)	PCA 37	112 GLOUCESTER ST.	POSSIBLE FORMER DRY CLEANER
6)	PCA 37	170 METCALFE ST.	FORMER DRY CLEANERS
7)	PCA N/A	234 LAURIER AVE W.	FORMER PRINTERS
8)	PCA N/A	220 LAURIER AVE W.	FORMER PRINTERS
9)	PCA 28	154 O'CONNOR ST.	FORMER RETAIL FUEL OUTLET
10)	PCA 28	133 O'CONNOR ST.	FORMER RETAIL FUEL OUTLET
11)	PCA N/A	171 BANK ST.	FORMER PCB SITE
12)	PCA N/A	180 METCALFE ST.	FORMER PRINTERS
13)	PCA N/A	160 ELGIN ST.	FORMER PCB SITE
14)	PCA 26	170 LAURIER AVE W.	FORMER FOAM MANUFACTURING
15)	PCA 37	227 LAURIER AVE. W.	FORMER DRY CLEANERS
16)	PCA 37	235 LAURIER AVE W.	FORMER DRY CLEANERS
17)	PCA 37	146 NEPEAN ST.	FORMER DRY CLEANERS
18)	PCA N/A	O'CONNOR ST.	FORMER PRINTERS
19)	PCA 52	261 & 263 LAURIER AVE. W.	FORMER AUTOMOTIVE SERVICE GARAGE
20)	PCA N/A	111 O'CONNOR ST.	FORMER MACHINE SHOP
21)	PCA N/A	118 SLATRER STREET	FORMER PRINTERS
22)	PCA N/A	130 SLATER STREET	FORMER PRINTERS
23)	PCA N/A	161 LAURIER AVE W.	FORMER PCB SITE
24)	PCA N/A	99 METCALFE ST.	FORMER PRINTERS
25)	PCA 52	184 SLATER ST.	FORMER AUTOMOTIVE SERVICE GARAGE
26)	PCA 18	82-92 SLATER ST.	EXISTING CITY OF OTTAWA HYDRO SUB-STATION
27)	PCA 52	94 SLATER ST.	FORMER AUTOMOTIVE SERVICE GARAGE
28)	PCA N/A	207 BANK ST.	FORMER PRINTERS
29)	PCA 37	174 GLOUCESTER ST.	FORMER DRY CLEANERS
30)	PCA 37	141 LAURIER AVE W.	FORMER DRY CLEANERS
31)	PCA 52	15 GLOUCESTER ST.	FORMER AUTOMOTIVE SERVICE GARAGE
32)	PCA N/A	151 SLATER ST.	FORMER PRINTERS
33)	PCA 28	79-83 O'CONNOR ST.	FORMER RETAIL FUEL OUTLET
34)	PCA 28	196 ELGIN ST.	FORMER RETAIL FUEL OUTLET
35)	PCA 28	170 ELGIN ST.	FORMER RETAIL FUEL OUTLET
36)	PCA N/A	77 METCALFE ST.	FORMER PRINTERS
37)	PCA 37	77 METCALFE ST.	FORMER DRY CLEANERS
38)	PCA N/A	175 NEPEAN ST.	FORMER PRINTERS

SCALE: 1:2500

0 25 50 75 100 125 150 175m

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NO.	REVISIONS	DATE	INITIAL

CLARIDGE HOMES

PHASE I - ENVIRONMENTAL SITE ASSESSMENT
84 GLOUCESTER STREET

OTTAWA, ONTARIO

Title:

SURROUNDING LAND USE PLAN

Scale: 1:2500	Date: 06/2022
Drawn by: YA	Report No.: PE5571-1
Checked by: JC	Dwg. No.: PE5571-2
Approved by: MSD	Revision No.:

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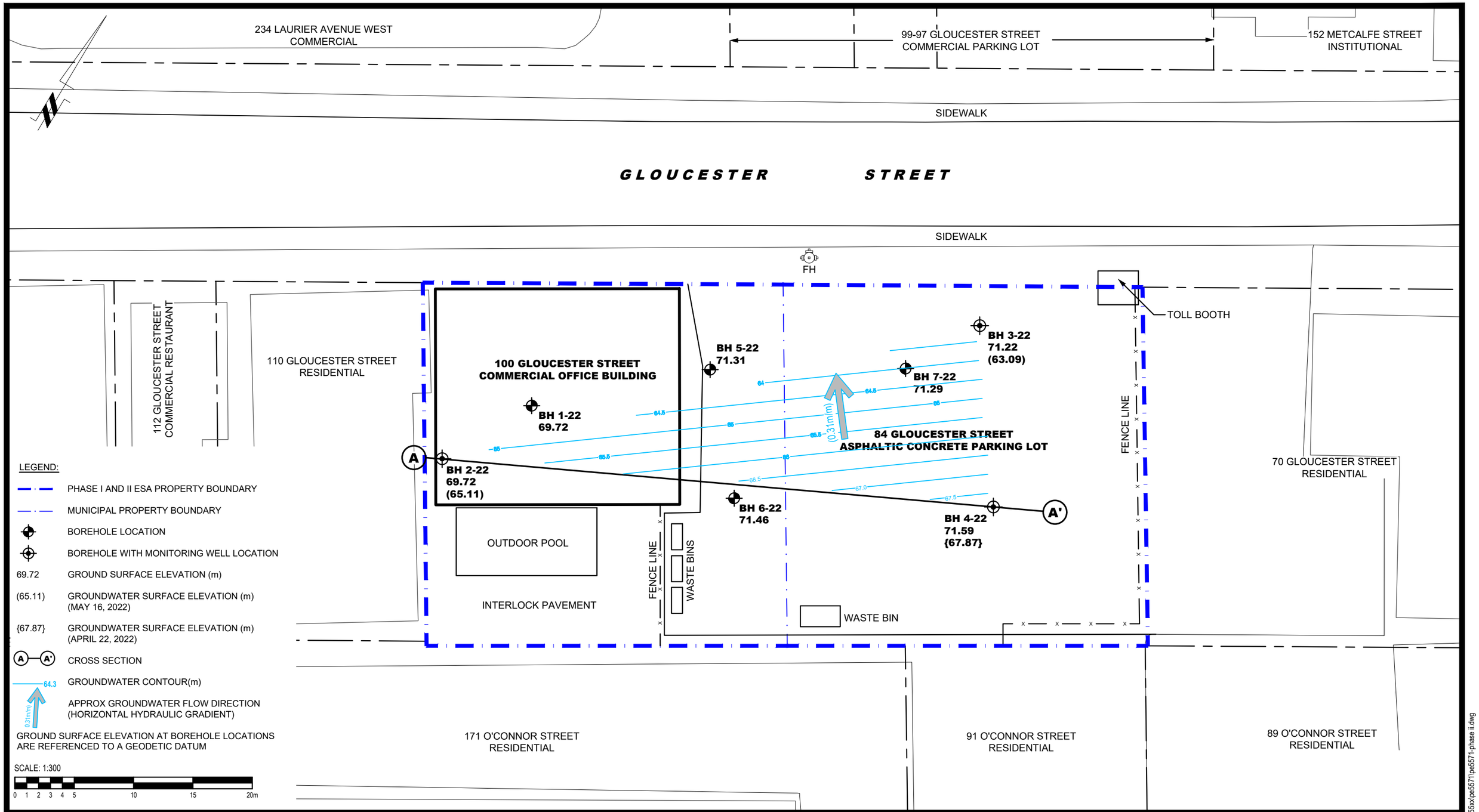

LEGEND:

- PHASE I AND II ESA PROPERTY BOUNDARY
- MUNICIPAL PROPERTY BOUNDARY
- BOREHOLE LOCATION
- BOREHOLE WITH MONITORING WELL LOCATION
- 69.72 GROUND SURFACE ELEVATION (m)
- (65.11) GROUNDWATER SURFACE ELEVATION (m) (MAY 16, 2022)
- {67.87} GROUNDWATER SURFACE ELEVATION (m) (APRIL 22, 2022)
- A — A' CROSS SECTION
- 64.3 GROUNDWATER CONTOUR(m)
- 0.31m/m APPROX GROUNDWATER FLOW DIRECTION (HORIZONTAL HYDRAULIC GRADIENT)

GROUND SURFACE ELEVATION AT BOREHOLE LOCATIONS ARE REFERENCED TO A GEODETIC DATUM

SCALE: 1:300

0 1 2 3 4 5 10 15 20m

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NO.	REVISIONS	DATE	INITIAL

CLARIDGE HOMES

PHASE II - ENVIRONMENTAL SITE ASSESSMENT
84 GLOUCESTER STREET

OTTAWA, ONTARIO

Title:

TEST HOLE LOCATION PLAN

Scale: 1:300	Date: 06/2022
Drawn by: YA	Report No.: PE5571-2
Checked by: JC	Dwg. No.: PE5571-3
Approved by: KM	Revision No.:

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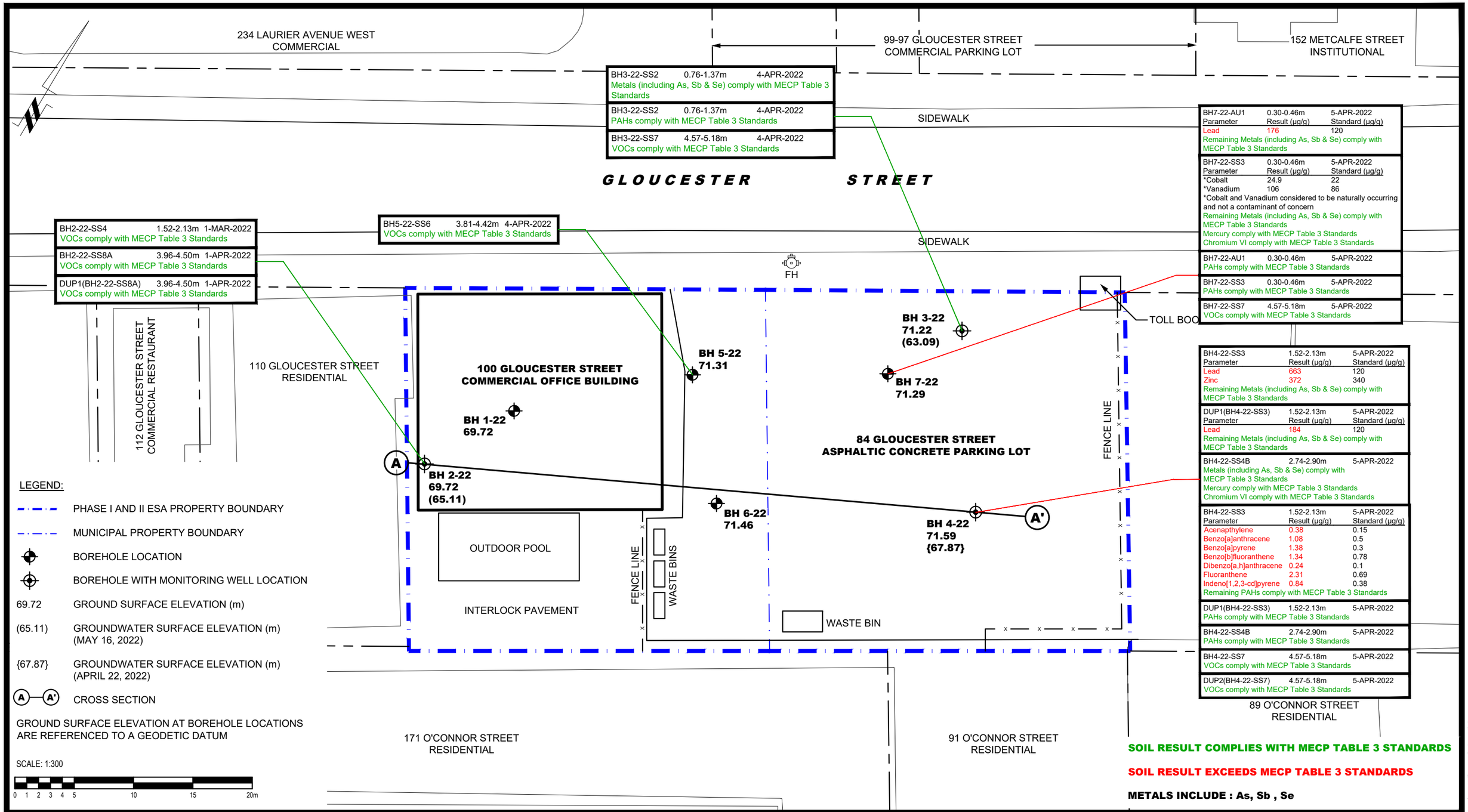

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NO.	REVISIONS	DATE	INITIAL

CLARIDGE HOMES

PHASE II - ENVIRONMENTAL SITE ASSESSMENT
84 GLOUCESTER STREET

OTTAWA, ONTARIO

Title:

ANALYTICAL TESTING PLAN - SOIL

Scale: 1:300	Date: 06/2022
Drawn by: YA	Report No.: PE5571-2
Checked by: JC	Dwg. No.: PE5571-4
Approved by: KM	Revision No.:

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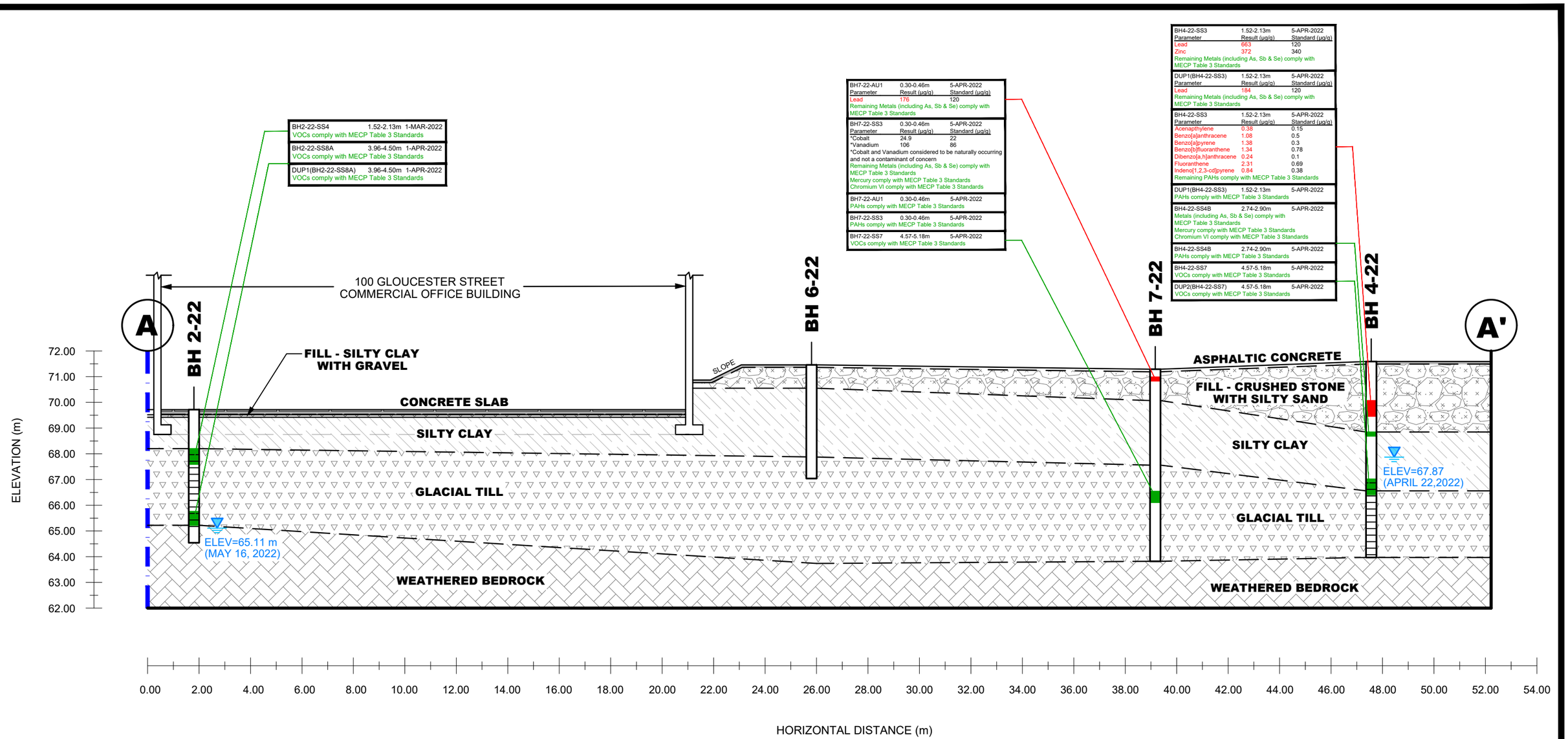

SOIL RESULT COMPLIES WITH MECP TABLE 3 STANDARDS

SOIL RESULT EXCEEDS MECP TABLE 3 STANDARDS

METALS INCLUDE : As, Sb , Se

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NO.	REVISIONS	DATE	INITIAL

CLARIDGE HOMES

PHASE II - ENVIRONMENTAL SITE ASSESSMENT
84 GLOUCESTER STREET

OTTAWA, ONTARIO

Title:

CROSS SECTION A-A' - SOIL

Scale: AS SHOWN	Date: 06/2022
Drawn by: YA	Report No.: PE5571-2
Checked by: JC	Dwg. No.: PE5571-4A
Approved by: MSD	Revision No.:

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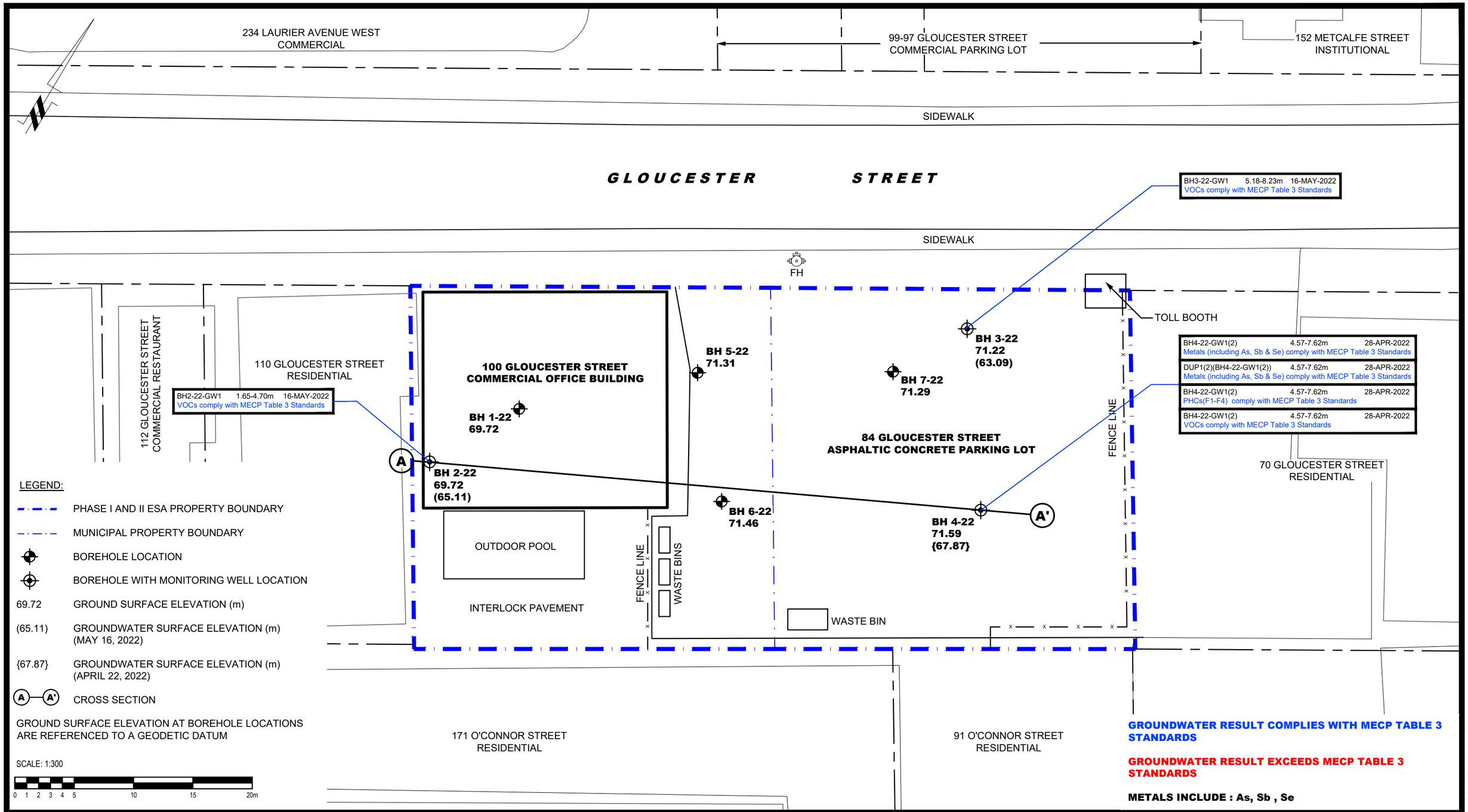

LEGEND:

- PHASE I AND II ESA PROPERTY BOUNDARY
- MUNICIPAL PROPERTY BOUNDARY
- BOREHOLE LOCATION
- BOREHOLE WITH MONITORING WELL LOCATION
- 69.72 GROUND SURFACE ELEVATION (m)
- (65.11) GROUNDWATER SURFACE ELEVATION (m) (MAY 16, 2022)
- {67.87} GROUNDWATER SURFACE ELEVATION (m) (APRIL 22, 2022)
- A — A' CROSS SECTION

GROUND SURFACE ELEVATION AT BOREHOLE LOCATIONS ARE REFERENCED TO A GEODETIC DATUM

SCALE: 1:300

0 1 2 3 4 5 10 15 20m

GROUNDWATER RESULT COMPLIES WITH MECP TABLE 3 STANDARDS

GROUNDWATER RESULT EXCEEDS MECP TABLE 3 STANDARDS

METALS INCLUDE : As, Sb , Se

PATERSON GROUP
SOLUTION ORIENTED ENGINEERING

NO.	REVISIONS	DATE	INITIAL

CLARIDGE HOMES

PHASE II - ENVIRONMENTAL SITE ASSESSMENT
84 GLOUCESTER STREET

OTTAWA, ONTARIO

Title:

ANALYTICAL TESTING PLAN - GROUNDWATER

Scale: 1:300	Date: 06/2022
Drawn by: YA	Report No.: PE5571-2
Checked by: JC	Dwg. No.: PE5571-5
Approved by: KM	Revision No.:

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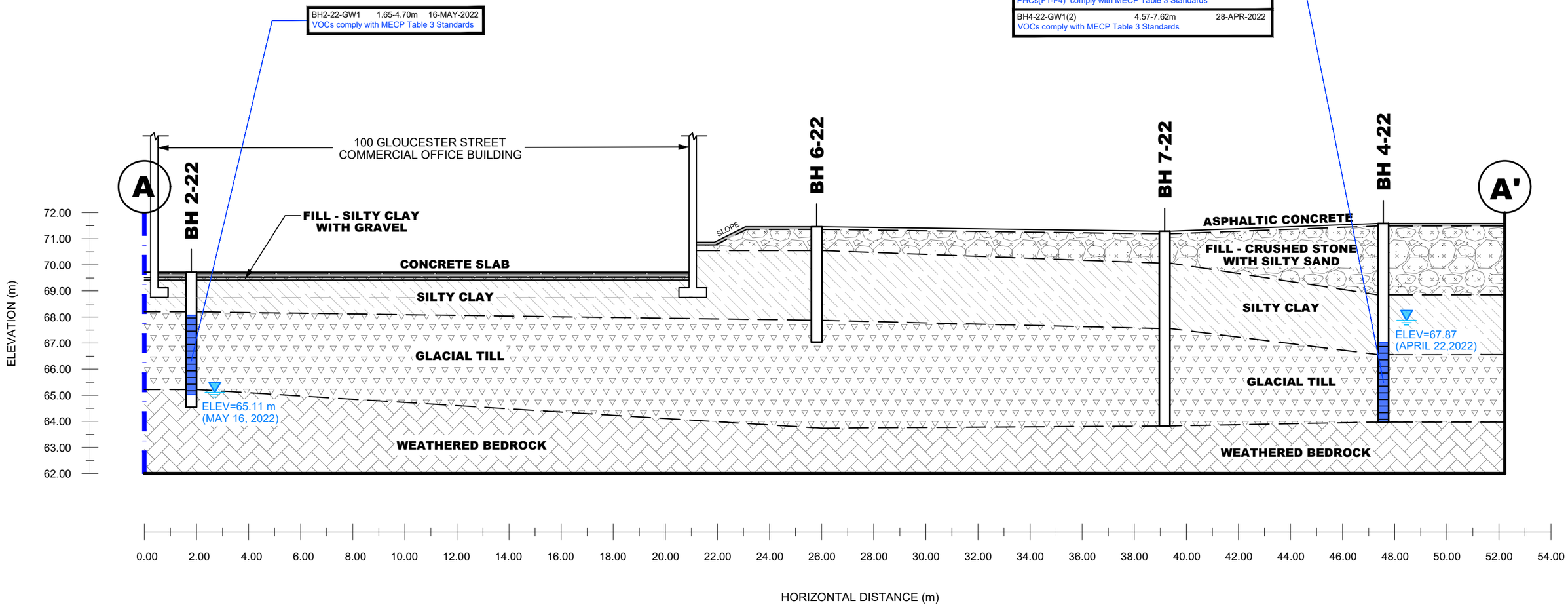

GROUNDWATER RESULT COMPLIES WITH MECP TABLE 3 STANDARDS

GROUNDWATER RESULT EXCEEDS MECP TABLE 3 STANDARDS

METALS INCLUDE : As, Sb , Se

PATERSON GROUP
SOLUTION ORIENTED ENGINEERING

NO.	REVISIONS	DATE	INITIAL

CLARIDGE HOMES

PHASE II - ENVIRONMENTAL SITE ASSESSMENT
84 GLOUCESTER STREET

OTTAWA, ONTARIO

Title:

CROSS SECTION A-A' - GROUNDWATER

Scale: AS SHOWN	Date: 06/2022
Drawn by: YA	Report No.: PE5571-2
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APPENDIX 1

SAMPLING AND ANALYSIS PLAN

SOIL PROFILE AND TEST DATA SHEETS

SYMBOLS AND TERMS

LABORATORY CERTIFICATES OF ANALYSIS

PATERSON GROUP

Sampling and Analysis Plan

Phase II – Environmental Site Assessment

84 and 100 Gloucester Street

Ottawa, Ontario

Prepared for Claridge Homes

Report PE5571-SAP dated March 24, 2022

TABLE OF CONTENTS

1.0 SAMPLING PROGRAM

Paterson was retained by Mr. Vincent Denomme of Claridge Homes to conduct a Phase II Environmental Site Assessment (ESA) for the properties addressed 84 & 100 Gloucester 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
BH1-22	Place on the west portion of the Phase II Property to assess the potential impact due to APECs 2 and 5.	Borehole to be advanced to approximately 4 mbgs for coverage purposes.
BH2-22	Place on the west portion of the Phase II Property to assess the potential impact due to APECs 2 and 5.	Borehole to be advanced to a depth of at least 1.5 m below the water table to install a monitoring well.
BH3-22	Place on the northeast portion of the Phase II Property to assess the potential impact due to APECs 1,3 and 4.	Borehole to be advanced to approximately 1.5 m below the water table to install a monitoring well.
BH4-22	Place on the east-central portion of the Phase II Property to assess the potential impact due to APECs 1,3 and 4.	Borehole to be advanced to approximately 1.5 m below the water table to install a monitoring well.
BH5-22	Place on the north-central portion of the Phase II Property to assess the potential impact due to APECs 3 and 4.	Borehole to be advanced to approximately 4 mbgs for coverage purposes.
BH6-22	Place on the central portion of the Phase II Property to assess the potential impact due to APECs 3 and 4.	Borehole to be advanced to approximately 4 mbgs for coverage purposes.
BH7-22	Place on the central portion of the Phase II Property to assess the potential impact due to APECs 3 and 4.	Borehole to be advanced to approximately 7 mbgs for coverage purposes.

Borehole locations are shown on Drawing PE5571-3-Test Hole Location Plan, appended to the main report.

At each borehole, continuous sampling (with the portable drill) and 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.

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 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 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 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 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 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 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.

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

154 Colonnade Road South, Ottawa, Ontario K2E 7J5

SOIL PROFILE AND TEST DATA

Phase II - Environmental Site Assessment
84 and 100 Gloucester Street
Ottawa, Ontario

DATUM Geodetic

FILE NO. PE5571

REMARKS

HOLE NO. BH 1-22

BORINGS BY Portable Drill **DATE** March 31, 2022

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			
Concrete slab 0.20									
FILL: Crushed stone with gravel, some clay 0.30		AU	1						
Brown **SILTY CLAY**		SS	2	50					
0.91									
End of Borehole									
Practical spoon refusal at 0.91m 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
84 and 100 Gloucester Street
Ottawa, Ontario

DATUM Geodetic

FILE NO. PE5571

REMARKS

HOLE NO. BH 2-22

BORINGS BY Portable Drill **DATE** April 1, 2022

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)
GROUND SURFACE							
Concrete slab 0.20						0	
FILL: Brown silty clay, trace grave 0.30		AU	1				
		SS	2	100			
Brown **SILTY CLAY**						1	
		SS	3	75			
1.52							
		SS	4	100		2	
		SS	5	100			
GLACIAL TILL: Brown silty clay with sand, gravel and weathered shale		SS	6	100		3	
		SS	83	7			
		SS	8	100		4	
4.50							
BEDROCK: Weathered shale		SS	9	33		5	
5.18							
End of Borehole							
(GWL @ 4.61m - May 16, 2022)							

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
84 and 100 Gloucester Street
Ottawa, Ontario

DATUM Geodetic

FILE NO. PE5571

REMARKS

HOLE NO. BH 3-22

BORINGS BY Truck-Mount Power Auger **DATE** April 4, 2022

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)
GROUND SURFACE							
Asphaltic concrete 0.08						0	71.22
FILL: Brown silty sand with crushed stone and gravel, trace clay		AU	1				
1.32		SS	2	100	13	1	70.22
		SS	3	46	4	2	69.22
Brown **SILTY CLAY,** trace sand		SS	4	100	3		
3.48		SS	5	100	2	3	68.22
		SS	6	62	6	4	67.22
		SS	7	67	9	5	66.22
GLACIAL TILL: Dark brown silty clay with sand and gravel		SS	8	67	6	6	65.22
		SS	9	71	9		
		SS	10	33	50+	7	64.22
8.05		SS	11	50	34	8	63.22
Weathered **BEDROCK** 8.23							
End of Borehole							
(GWL @ 8.13m - May 16, 2022)							

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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154 Colonnade Road South, Ottawa, Ontario K2E 7J5

SOIL PROFILE AND TEST DATA

Phase II - Environmental Site Assessment
84 and 100 Gloucester Street
Ottawa, Ontario

DATUM Geodetic

FILE NO. PE5571

REMARKS

HOLE NO. BH 4-22

BORINGS BY Truck-Mount Power Auger **DATE** April 5, 2022

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)
GROUND SURFACE							
Asphaltic concrete 0.08		AU	1			0	71.51
FILL: Brown silty sand with crushed stone and gravel, trace clay and brick		SS	2	33	40	1	70.51
		SS	3	58	4	2	69.51
2.74		SS	4	58	15	3	68.51
Brown **SILTY CLAY**		SS	5	100	4	4	67.51
		SS	6	100	2	5	66.51
5.03		SS	7	100	5	6	65.51
GLACIAL TILL: Dark brown silty clay with sand and gravel		SS	8	67	3	7	64.51
		SS	9	38	3		
		SS	10	71	1		
7.62							
End of Borehole							
(GWL @ 3.72m - April 22, 2022)							

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
84 and 100 Gloucester Street
Ottawa, Ontario

DATUM Geodetic

FILE NO. PE5571

REMARKS

HOLE NO. BH 5-22

BORINGS BY Truck-Mount Power Auger **DATE** April 4, 2022

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)
GROUND SURFACE							
Asphaltic concrete 0.08						0	99.43
FILL: Brown silty sand with crushed stone and gravel, trace clay		AU	1				
1.01		SS	2	100	6	1	98.43
Brown **SILTY CLAY**		SS	3	100	5	2	97.43
2.64		SS	4	100	8	3	96.43
GLACIAL TILL: Dark brown silty clay with sand and gravel		SS	5	58	7		
		SS	6	56	50+	4	95.43
4.22							
End of Borehole							
Practical refusal to augering at 4.22m 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.

Monitoring Well Construction

patersongroup Consulting Engineers

154 Colonnade Road South, Ottawa, Ontario K2E 7J5

SOIL PROFILE AND TEST DATA

Phase II - Environmental Site Assessment
84 and 100 Gloucester Street
Ottawa, Ontario

DATUM Geodetic

FILE NO. PE5571

REMARKS

HOLE NO. BH 6-22

BORINGS BY Truck-Mount Power Auger **DATE** April 4, 2022

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									
Asphaltic concrete 0.08						0	99.58		
FILL: Brown silty clay with crushed stone and gravel, trace sand 0.60		AU	1						
FILL: Brown silty sand with crushed stone and gravel 0.91		SS	2	100	15	1	98.58		
Brown **SILTY CLAY**		SS	3	100	7	2	97.58		
		SS	4	100	4				
		SS	5	75	10	3	96.58		
3.58									
GLACIAL TILL: Dark brown silty clay with sand and gravel		SS	6	62	13	4	95.58		
4.42									
End of Borehole									

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
84 and 100 Gloucester Street
Ottawa, Ontario

DATUM Geodetic

FILE NO. PE5571

REMARKS

HOLE NO. BH 7-22

BORINGS BY Truck-Mount Power Auger **DATE** April 5, 2022

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									
Asphaltic concrete 0.08						0	71.37		
FILL: Brown silty sand with crushed stone and gravel, trace clay		AU	1						
1.22		SS	2	50	6	1	70.37		
		SS	3	100	7	2	69.37		
Brown **SILTY CLAY**		SS	4	100	5				
		SS	5	46	5	3	68.37		
3.73		SS	6	71	6	4	67.37		
		SS	7	50	9	5	66.37		
GLACIAL TILL: Dark brown silty clay with sand and gravel		SS	8	38	7	6	65.37		
		SS	9	79	6				
		SS	10	54	17	7	64.37		
7.47									
End of Borehole									

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.

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 x 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

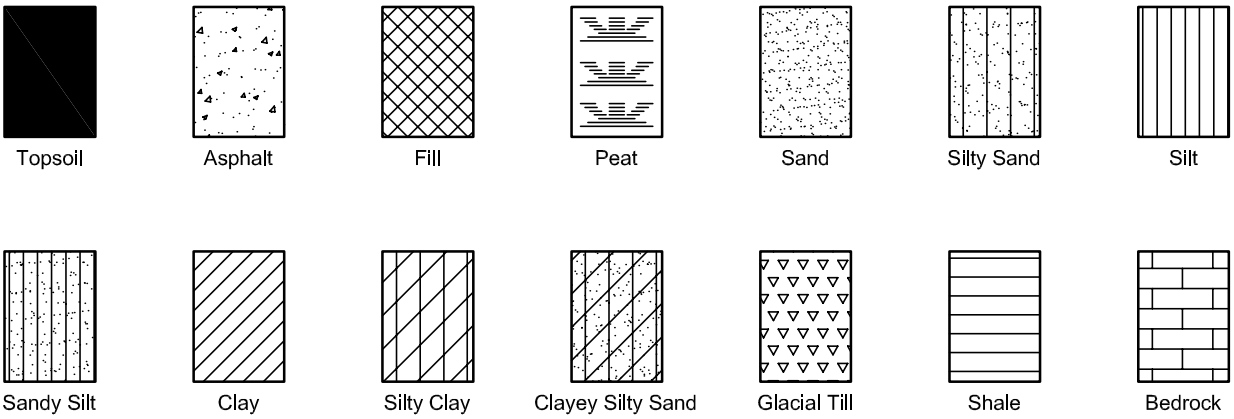
p'_o	-	Present effective overburden pressure at sample depth
p'_c	-	Preconsolidation pressure of (maximum past pressure on) sample
Ccr	-	Recompression index (in effect at pressures below p'_c)
Cc	-	Compression index (in effect at pressures above p'_c)
OC Ratio		Overconsolidaton ratio = p'_c / p'_o
Void 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.

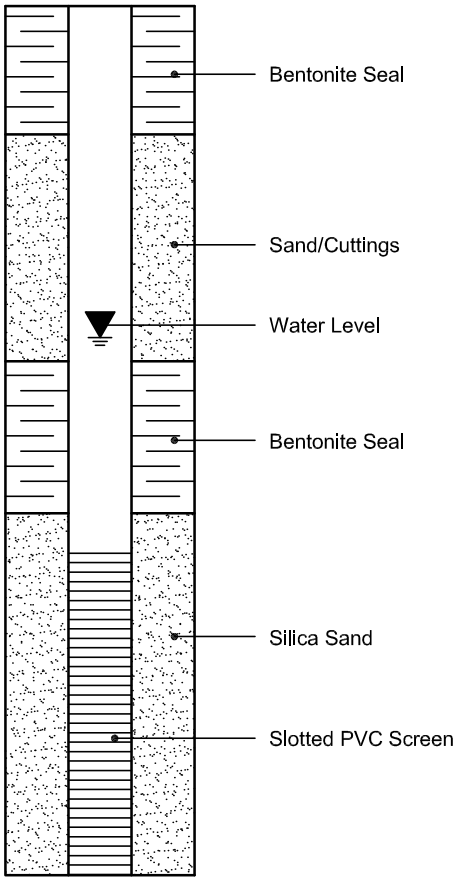
SYMBOLS AND TERMS (continued)

STRATA PLOT

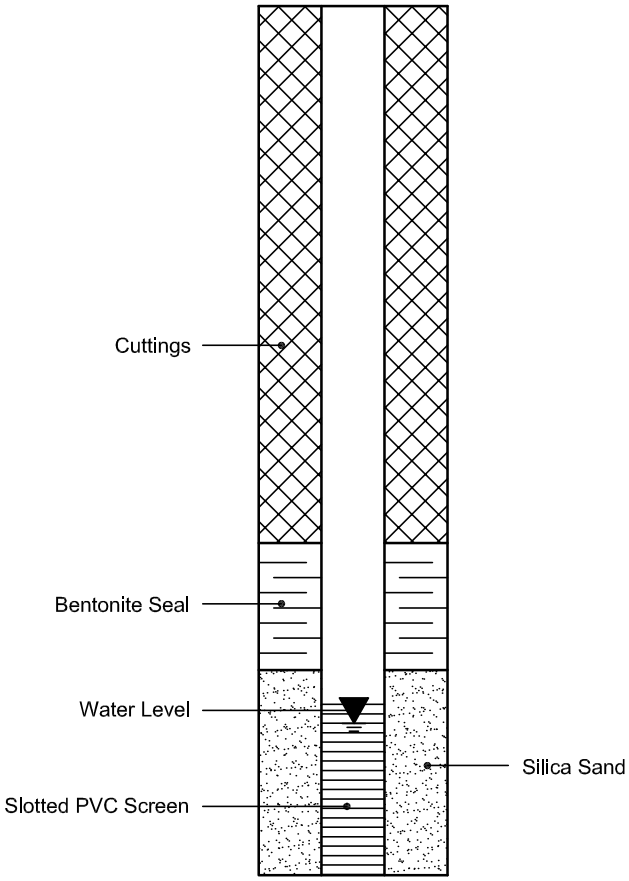


MONITORING WELL AND PIEZOMETER CONSTRUCTION

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: 33679
Project: PE5571
Custody: 136875

Report Date: 8-Apr-2022
Order Date: 1-Apr-2022

Order #: 2215097

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

Paracel ID	Client ID
2215097-01	BH2-22-SS4
2215097-02	BH2-22-SS8A
2215097-03	DUP1

Approved By:

Dale Robertson, BSc
Laboratory Director

Certificate of Analysis

Report Date: 08-Apr-2022

Client: Paterson Group Consulting Engineers

Order Date: 1-Apr-2022

Client PO: 33679

Project Description: PE5571

Analysis Summary Table

Analysis	Method Reference/Description	Extraction Date	Analysis Date
REG 153: VOCs by P&T GC/MS	EPA 8260 - P&T GC-MS	6-Apr-22	7-Apr-22
Solids, %	Gravimetric, calculation	7-Apr-22	7-Apr-22

Certificate of Analysis

Report Date: 08-Apr-2022

Client: Paterson Group Consulting Engineers

Order Date: 1-Apr-2022

Client PO: 33679

Project Description: PE5571

	Client ID:	BH2-22-SS4	BH2-22-SS8A	DUP1	-
	Sample Date:	31-Mar-22 00:00	01-Apr-22 00:00	01-Apr-22 00:00	-
	Sample ID:	2215097-01	2215097-02	2215097-03	-
	MDL/Units	Soil	Soil	Soil	-
Physical Characteristics					
% Solids	0.1 % by Wt.	88.1	89.6	89.3	-
Volatiles					
Acetone	0.50 ug/g dry	<0.50	<0.50	<0.50	-
Benzene	0.02 ug/g dry	<0.02	<0.02	<0.02	-
Bromodichloromethane	0.05 ug/g dry	<0.05	<0.05	<0.05	-
Bromoform	0.05 ug/g dry	<0.05	<0.05	<0.05	-
Bromomethane	0.05 ug/g dry	<0.05	<0.05	<0.05	-
Carbon Tetrachloride	0.05 ug/g dry	<0.05	<0.05	<0.05	-
Chlorobenzene	0.05 ug/g dry	<0.05	<0.05	<0.05	-
Chloroform	0.05 ug/g dry	<0.05	<0.05	<0.05	-
Dibromochloromethane	0.05 ug/g dry	<0.05	<0.05	<0.05	-
Dichlorodifluoromethane	0.05 ug/g dry	<0.05	<0.05	<0.05	-
1,2-Dichlorobenzene	0.05 ug/g dry	<0.05	<0.05	<0.05	-
1,3-Dichlorobenzene	0.05 ug/g dry	<0.05	<0.05	<0.05	-
1,4-Dichlorobenzene	0.05 ug/g dry	<0.05	<0.05	<0.05	-
1,1-Dichloroethane	0.05 ug/g dry	<0.05	<0.05	<0.05	-
1,2-Dichloroethane	0.05 ug/g dry	<0.05	<0.05	<0.05	-
1,1-Dichloroethylene	0.05 ug/g dry	<0.05	<0.05	<0.05	-
cis-1,2-Dichloroethylene	0.05 ug/g dry	<0.05	<0.05	<0.05	-
trans-1,2-Dichloroethylene	0.05 ug/g dry	<0.05	<0.05	<0.05	-
1,2-Dichloropropane	0.05 ug/g dry	<0.05	<0.05	<0.05	-
cis-1,3-Dichloropropylene	0.05 ug/g dry	<0.05	<0.05	<0.05	-
trans-1,3-Dichloropropylene	0.05 ug/g dry	<0.05	<0.05	<0.05	-
1,3-Dichloropropene, total	0.05 ug/g dry	<0.05	<0.05	<0.05	-
Ethylbenzene	0.05 ug/g dry	<0.05	<0.05	<0.05	-
Ethylene dibromide (dibromoethane, 1,2-)	0.05 ug/g dry	<0.05	<0.05	<0.05	-
Hexane	0.05 ug/g dry	<0.05	<0.05	<0.05	-
Methyl Ethyl Ketone (2-Butanone)	0.50 ug/g dry	<0.50	<0.50	<0.50	-
Methyl Isobutyl Ketone	0.50 ug/g dry	<0.50	<0.50	<0.50	-
Methyl tert-butyl ether	0.05 ug/g dry	<0.05	<0.05	<0.05	-
Methylene Chloride	0.05 ug/g dry	<0.05	<0.05	<0.05	-
Styrene	0.05 ug/g dry	<0.05	<0.05	<0.05	-
1,1,1,2-Tetrachloroethane	0.05 ug/g dry	<0.05	<0.05	<0.05	-
1,1,2,2-Tetrachloroethane	0.05 ug/g dry	<0.05	<0.05	<0.05	-
Tetrachloroethylene	0.05 ug/g dry	<0.05	<0.05	<0.05	-

Certificate of Analysis

Report Date: 08-Apr-2022

Client: Paterson Group Consulting Engineers

Order Date: 1-Apr-2022

Client PO: 33679

Project Description: PE5571

	Client ID:	BH2-22-SS4	BH2-22-SS8A	DUP1	-
	Sample Date:	31-Mar-22 00:00	01-Apr-22 00:00	01-Apr-22 00:00	-
	Sample ID:	2215097-01	2215097-02	2215097-03	-
	MDL/Units	Soil	Soil	Soil	-
Toluene	0.05 ug/g dry	<0.05	<0.05	<0.05	-
1,1,1-Trichloroethane	0.05 ug/g dry	<0.05	<0.05	<0.05	-
1,1,2-Trichloroethane	0.05 ug/g dry	<0.05	<0.05	<0.05	-
Trichloroethylene	0.05 ug/g dry	<0.05	<0.05	<0.05	-
Trichlorofluoromethane	0.05 ug/g dry	<0.05	<0.05	<0.05	-
Vinyl chloride	0.02 ug/g dry	<0.02	<0.02	<0.02	-
m,p-Xylenes	0.05 ug/g dry	<0.05	<0.05	<0.05	-
o-Xylene	0.05 ug/g dry	<0.05	<0.05	<0.05	-
Xylenes, total	0.05 ug/g dry	<0.05	<0.05	<0.05	-
4-Bromofluorobenzene	Surrogate	91.1%	78.9%	79.3%	-
Dibromofluoromethane	Surrogate	132%	139%	128%	-
Toluene-d8	Surrogate	74.3%	67.2%	66.8%	-

Method Quality Control: Blank

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
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						
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	*3.12*		*ug/g*		*97.5*	*50-140*			
Surrogate: Dibromofluoromethane	*4.27*		*ug/g*		*133*	*50-140*			
Surrogate: Toluene-d8	*2.12*		*ug/g*		*66.3*	*50-140*			

Method Quality Control: Duplicate

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Physical Characteristics									
% Solids	94.2	0.1	% by Wt.	95.0			0.8	25	
Volatiles									
Acetone	ND	0.50	ug/g	ND			NC	50	
Benzene	ND	0.02	ug/g	ND			NC	50	
Bromodichloromethane	ND	0.05	ug/g	ND			NC	50	
Bromoform	ND	0.05	ug/g	ND			NC	50	
Bromomethane	ND	0.05	ug/g	ND			NC	50	
Carbon Tetrachloride	ND	0.05	ug/g	ND			NC	50	
Chlorobenzene	ND	0.05	ug/g	ND			NC	50	
Chloroform	ND	0.05	ug/g	ND			NC	50	
Dibromochloromethane	ND	0.05	ug/g	ND			NC	50	
Dichlorodifluoromethane	ND	0.05	ug/g	ND			NC	50	
1,2-Dichlorobenzene	ND	0.05	ug/g	ND			NC	50	
1,3-Dichlorobenzene	ND	0.05	ug/g	ND			NC	50	
1,4-Dichlorobenzene	ND	0.05	ug/g	ND			NC	50	
1,1-Dichloroethane	ND	0.05	ug/g	ND			NC	50	
1,2-Dichloroethane	ND	0.05	ug/g	ND			NC	50	
1,1-Dichloroethylene	ND	0.05	ug/g	ND			NC	50	
cis-1,2-Dichloroethylene	ND	0.05	ug/g	ND			NC	50	
trans-1,2-Dichloroethylene	ND	0.05	ug/g	ND			NC	50	
1,2-Dichloropropane	ND	0.05	ug/g	ND			NC	50	
cis-1,3-Dichloropropylene	ND	0.05	ug/g	ND			NC	50	
trans-1,3-Dichloropropylene	ND	0.05	ug/g	ND			NC	50	
Ethylbenzene	ND	0.05	ug/g	ND			NC	50	
Ethylene dibromide (dibromoethane, 1,2-	ND	0.05	ug/g	ND			NC	50	
Hexane	ND	0.05	ug/g	ND			NC	50	
Methyl Ethyl Ketone (2-Butanone)	ND	0.50	ug/g	ND			NC	50	
Methyl Isobutyl Ketone	ND	0.50	ug/g	ND			NC	50	
Methyl tert-butyl ether	ND	0.05	ug/g	ND			NC	50	
Methylene Chloride	ND	0.05	ug/g	ND			NC	50	
Styrene	ND	0.05	ug/g	ND			NC	50	
1,1,1,2-Tetrachloroethane	ND	0.05	ug/g	ND			NC	50	
1,1,2,2-Tetrachloroethane	ND	0.05	ug/g	ND			NC	50	
Tetrachloroethylene	ND	0.05	ug/g	ND			NC	50	
Toluene	ND	0.05	ug/g	ND			NC	50	
1,1,1-Trichloroethane	ND	0.05	ug/g	ND			NC	50	
1,1,2-Trichloroethane	ND	0.05	ug/g	ND			NC	50	
Trichloroethylene	ND	0.05	ug/g	ND			NC	50	
Trichlorofluoromethane	ND	0.05	ug/g	ND			NC	50	
Vinyl chloride	ND	0.02	ug/g	ND			NC	50	
m,p-Xylenes	ND	0.05	ug/g	ND			NC	50	
o-Xylene	ND	0.05	ug/g	ND			NC	50	
Surrogate: 4-Bromofluorobenzene	*4.38*		*ug/g*		*110*	*50-140*			
Surrogate: Dibromofluoromethane	*5.44*		*ug/g*		*137*	*50-140*			
Surrogate: Toluene-d8	*3.07*		*ug/g*		*77.3*	*50-140*			

Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Volatiles									
Acetone	21.8	0.50	ug/g	ND	109	50-140			
Benzene	8.54	0.02	ug/g	ND	107	60-130			
Bromodichloromethane	8.68	0.05	ug/g	ND	108	60-130			
Bromoform	8.07	0.05	ug/g	ND	101	60-130			
Bromomethane	9.32	0.05	ug/g	ND	116	50-140			
Carbon Tetrachloride	9.25	0.05	ug/g	ND	116	60-130			
Chlorobenzene	7.42	0.05	ug/g	ND	92.7	60-130			
Chloroform	9.64	0.05	ug/g	ND	120	60-130			
Dibromochloromethane	7.14	0.05	ug/g	ND	89.2	60-130			
Dichlorodifluoromethane	9.02	0.05	ug/g	ND	113	50-140			
1,2-Dichlorobenzene	6.29	0.05	ug/g	ND	78.6	60-130			
1,3-Dichlorobenzene	6.41	0.05	ug/g	ND	80.1	60-130			
1,4-Dichlorobenzene	6.36	0.05	ug/g	ND	79.5	60-130			
1,1-Dichloroethane	9.42	0.05	ug/g	ND	118	60-130			
1,2-Dichloroethane	9.24	0.05	ug/g	ND	116	60-130			
1,1-Dichloroethylene	9.33	0.05	ug/g	ND	117	60-130			
cis-1,2-Dichloroethylene	9.45	0.05	ug/g	ND	118	60-130			
trans-1,2-Dichloroethylene	9.73	0.05	ug/g	ND	122	60-130			
1,2-Dichloropropane	8.81	0.05	ug/g	ND	110	60-130			
cis-1,3-Dichloropropylene	8.15	0.05	ug/g	ND	102	60-130			
trans-1,3-Dichloropropylene	9.01	0.05	ug/g	ND	113	60-130			
Ethylbenzene	7.58	0.05	ug/g	ND	94.8	60-130			
Ethylene dibromide (dibromoethane, 1,2	7.22	0.05	ug/g	ND	90.2	60-130			
Hexane	6.06	0.05	ug/g	ND	75.7	60-130			
Methyl Ethyl Ketone (2-Butanone)	21.4	0.50	ug/g	ND	107	50-140			
Methyl Isobutyl Ketone	23.2	0.50	ug/g	ND	116	50-140			
Methyl tert-butyl ether	26.3	0.05	ug/g	ND	131	50-140			
Methylene Chloride	9.10	0.05	ug/g	ND	114	60-130			
Styrene	8.62	0.05	ug/g	ND	108	60-130			
1,1,1,2-Tetrachloroethane	7.41	0.05	ug/g	ND	92.6	60-130			
1,1,2,2-Tetrachloroethane	4.80	0.05	ug/g	ND	60.0	60-130			
Tetrachloroethylene	7.16	0.05	ug/g	ND	89.5	60-130			
Toluene	7.09	0.05	ug/g	ND	88.6	60-130			
1,1,1-Trichloroethane	8.43	0.05	ug/g	ND	105	60-130			
1,1,2-Trichloroethane	8.34	0.05	ug/g	ND	104	60-130			
Trichloroethylene	9.64	0.05	ug/g	ND	121	60-130			
Trichlorofluoromethane	8.98	0.05	ug/g	ND	112	50-140			
Vinyl chloride	9.16	0.02	ug/g	ND	114	50-140			
m,p-Xylenes	17.4	0.05	ug/g	ND	109	60-130			
o-Xylene	7.40	0.05	ug/g	ND	92.5	60-130			
Surrogate: 4-Bromofluorobenzene	*2.03*		*ug/g*		*63.3*	*50-140*			
Surrogate: Dibromofluoromethane	*4.45*		*ug/g*		*139*	*50-140*			
Surrogate: Toluene-d8	*2.45*		*ug/g*		*76.7*	*50-140*			

Qualifier Notes:

None

Sample Data Revisions

None

Work Order Revisions / Comments:

None

Other Report Notes:

n/a: not applicable
ND: Not Detected
MDL: Method Detection Limit
Source Result: Data used as source for matrix and duplicate samples
%REC: Percent recovery.
RPD: Relative percent difference.
NC: Not Calculated

Soil results are reported on a dry weight basis when the units are denoted with 'dry'.
Where %Solids is reported, moisture loss includes the loss of volatile hydrocarbons.

PARACE LABORATORIES LTI

Paracel ID: 2215097

Paracel Order Number (Lab Use Only)	Chain Of Custody (Lab Use Only)
2215097	№ 136875

Client Name: Paterson	Project Ref: PE5571	Page 1 of 1
Contact Name: Kaygan Munch	Quote #:	Turnaround Time
Address: 154 Colonnade Road	PO #: 33679	☐ 1 day ☐ 3 day
	E-mail: Kmunch@patersongroup.ca	☐ 2 day ☒ Regular
Telephone: 613-226-7381		Date Required:

☒ REG 153/04 ☐ REG 406/19

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

☐ Table 1 ☐ Res/Park ☐ Med/Fine
☐ Table 2 ☐ Ind/Comm ☐ Coarse
☒ Table 3 ☐ Agri/Other
☐ Table

For RSC: ☐ Yes ☐ No

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)					
1	BH2-22-SS4	S		2	March 31/22			X										
2	BH2-22-SS8A	S		2	April 1/22			X										
3	DUP1	S		2	↓			X										
4																		
5																		
6																		
7																		
8																		
9																		
10																		

Comments:

Method of Delivery: walk drop box

Relinquished By (Sign):	Received By Driver/Depot:	Received at Lab:	Verified By:
Relinquished By (Print): Joshua Dempsey	Date/Time:	Date/Time: April 1/22 5:00	Date/Time: Apr 4/22 4:52p
Date/Time:	Temperature: °C	Temperature: 6.0 °C	pH Verified: ☐ By: N/A

8.4

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Certificate of Analysis

Paterson Group Consulting Engineers

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

Client PO: 33900
Project: PE5571
Custody: 136983

Report Date: 19-Apr-2022
Order Date: 12-Apr-2022

Order #: 2216251

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

Paracel ID	Client ID
2216251-01	BH3-22-SS2
2216251-02	BH3-22-SS7
2216251-03	BH4-22-SS3
2216251-04	BH4-22-SS7
2216251-05	BH5-22-SS6
2216251-06	BH7-22-AU1
2216251-07	BH7-22-SS7
2216251-08	DUP1
2216251-09	DUP2

Approved By:

Dale Robertson, BSc
Laboratory Director

Analysis Summary Table

Analysis	Method Reference/Description	Extraction Date	Analysis Date
Conductivity	MOE E3138 - probe @25 °C, water ext	14-Apr-22	16-Apr-22
pH, soil	EPA 150.1 - pH probe @ 25 °C, CaCl buffered ext.	13-Apr-22	14-Apr-22
REG 153: Metals by ICP/MS, soil	EPA 6020 - Digestion - ICP-MS	14-Apr-22	14-Apr-22
REG 153: PAHs by GC-MS	EPA 8270 - GC-MS, extraction	13-Apr-22	19-Apr-22
REG 153: VOCs by P&T GC/MS	EPA 8260 - P&T GC-MS	14-Apr-22	16-Apr-22
SAR	Calculated	14-Apr-22	15-Apr-22
Solids, %	Gravimetric, calculation	14-Apr-22	16-Apr-22

Certificate of Analysis

Report Date: 19-Apr-2022

Client: Paterson Group Consulting Engineers

Order Date: 12-Apr-2022

Client PO: 33900

Project Description: PE5571

	Client ID:	BH3-22-SS2	BH3-22-SS7	BH4-22-SS3	BH4-22-SS7
	Sample Date:	04-Apr-22 09:00	04-Apr-22 09:00	05-Apr-22 09:00	05-Apr-22 09:00
	Sample ID:	2216251-01	2216251-02	2216251-03	2216251-04
	MDL/Units	Soil	Soil	Soil	Soil
Physical Characteristics					
% Solids	0.1 % by Wt.	79.3	89.8	83.1	86.0
General Inorganics					
SAR	0.01 N/A	7.82	-	2.59	-
Conductivity	5 uS/cm	1340	-	2540	-
Metals					
Antimony	1.0 ug/g dry	<1.0	-	1.5	-
Arsenic	1.0 ug/g dry	3.1	-	8.3	-
Barium	1.0 ug/g dry	164	-	320	-
Beryllium	0.5 ug/g dry	<0.5	-	0.5	-
Boron	5.0 ug/g dry	<5.0	-	9.5	-
Cadmium	0.5 ug/g dry	<0.5	-	0.9	-
Chromium	5.0 ug/g dry	45.1	-	26.2	-
Cobalt	1.0 ug/g dry	9.0	-	5.3	-
Copper	5.0 ug/g dry	22.9	-	50.6	-
Lead	1.0 ug/g dry	117	-	663	-
Molybdenum	1.0 ug/g dry	<1.0	-	1.1	-
Nickel	5.0 ug/g dry	24.9	-	13.2	-
Selenium	1.0 ug/g dry	<1.0	-	1.3	-
Silver	0.3 ug/g dry	<0.3	-	0.5	-
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	45.2	-	25.8	-
Zinc	20.0 ug/g dry	107	-	372	-
Volatiles					
Acetone	0.50 ug/g dry	-	<0.50	-	<0.50
Benzene	0.02 ug/g dry	-	<0.02	-	<0.02
Bromodichloromethane	0.05 ug/g dry	-	<0.05	-	<0.05
Bromoform	0.05 ug/g dry	-	<0.05	-	<0.05
Bromomethane	0.05 ug/g dry	-	<0.05	-	<0.05
Carbon Tetrachloride	0.05 ug/g dry	-	<0.05	-	<0.05
Chlorobenzene	0.05 ug/g dry	-	<0.05	-	<0.05
Chloroform	0.05 ug/g dry	-	<0.05	-	<0.05
Dibromochloromethane	0.05 ug/g dry	-	<0.05	-	<0.05
Dichlorodifluoromethane	0.05 ug/g dry	-	<0.05	-	<0.05
1,2-Dichlorobenzene	0.05 ug/g dry	-	<0.05	-	<0.05

Certificate of Analysis

Client: Paterson Group Consulting Engineers

Client PO: 33900

Report Date: 19-Apr-2022

Order Date: 12-Apr-2022

Project Description: PE5571

	Client ID:	BH3-22-SS2	BH3-22-SS7	BH4-22-SS3	BH4-22-SS7
	Sample Date:	04-Apr-22 09:00	04-Apr-22 09:00	05-Apr-22 09:00	05-Apr-22 09:00
	Sample ID:	2216251-01	2216251-02	2216251-03	2216251-04
	MDL/Units	Soil	Soil	Soil	Soil
1,3-Dichlorobenzene	0.05 ug/g dry	-	<0.05	-	<0.05
1,4-Dichlorobenzene	0.05 ug/g dry	-	<0.05	-	<0.05
1,1-Dichloroethane	0.05 ug/g dry	-	<0.05	-	<0.05
1,2-Dichloroethane	0.05 ug/g dry	-	<0.05	-	<0.05
1,1-Dichloroethylene	0.05 ug/g dry	-	<0.05	-	<0.05
cis-1,2-Dichloroethylene	0.05 ug/g dry	-	<0.05	-	<0.05
trans-1,2-Dichloroethylene	0.05 ug/g dry	-	<0.05	-	<0.05
1,2-Dichloropropane	0.05 ug/g dry	-	<0.05	-	<0.05
cis-1,3-Dichloropropylene	0.05 ug/g dry	-	<0.05	-	<0.05
trans-1,3-Dichloropropylene	0.05 ug/g dry	-	<0.05	-	<0.05
1,3-Dichloropropene, total	0.05 ug/g dry	-	<0.05	-	<0.05
Ethylbenzene	0.05 ug/g dry	-	<0.05	-	<0.05
Ethylene dibromide (dibromoethane, 1,2-)	0.05 ug/g dry	-	<0.05	-	<0.05
Hexane	0.05 ug/g dry	-	<0.05	-	<0.05
Methyl Ethyl Ketone (2-Butanone)	0.50 ug/g dry	-	<0.50	-	<0.50
Methyl Isobutyl Ketone	0.50 ug/g dry	-	<0.50	-	<0.50
Methyl tert-butyl ether	0.05 ug/g dry	-	<0.05	-	<0.05
Methylene Chloride	0.05 ug/g dry	-	<0.05	-	<0.05
Styrene	0.05 ug/g dry	-	<0.05	-	<0.05
1,1,1,2-Tetrachloroethane	0.05 ug/g dry	-	<0.05	-	<0.05
1,1,2,2-Tetrachloroethane	0.05 ug/g dry	-	<0.05	-	<0.05
Tetrachloroethylene	0.05 ug/g dry	-	<0.05	-	<0.05
Toluene	0.05 ug/g dry	-	<0.05	-	<0.05
1,1,1-Trichloroethane	0.05 ug/g dry	-	<0.05	-	<0.05
1,1,2-Trichloroethane	0.05 ug/g dry	-	<0.05	-	<0.05
Trichloroethylene	0.05 ug/g dry	-	<0.05	-	<0.05
Trichlorofluoromethane	0.05 ug/g dry	-	<0.05	-	<0.05
Vinyl chloride	0.02 ug/g dry	-	<0.02	-	<0.02
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
4-Bromofluorobenzene	Surrogate	-	103%	-	119%
Dibromofluoromethane	Surrogate	-	107%	-	121%
Toluene-d8	Surrogate	-	124%	-	110%
Semi-Volatiles					
Acenaphthene	0.02 ug/g dry	<0.02	-	0.05	-

Certificate of Analysis

Report Date: 19-Apr-2022

Client: Paterson Group Consulting Engineers

Order Date: 12-Apr-2022

Client PO: 33900

Project Description: PE5571

	Client ID:	BH3-22-SS2	BH3-22-SS7	BH4-22-SS3	BH4-22-SS7
	Sample Date:	04-Apr-22 09:00	04-Apr-22 09:00	05-Apr-22 09:00	05-Apr-22 09:00
	Sample ID:	2216251-01	2216251-02	2216251-03	2216251-04
	MDL/Units	Soil	Soil	Soil	Soil
Acenaphthylene	0.02 ug/g dry	<0.02	-	0.38	-
Anthracene	0.02 ug/g dry	<0.02	-	0.34	-
Benzo [a] anthracene	0.02 ug/g dry	0.06	-	1.08	-
Benzo [a] pyrene	0.02 ug/g dry	0.06	-	1.38	-
Benzo [b] fluoranthene	0.02 ug/g dry	0.08	-	1.34	-
Benzo [g,h,i] perylene	0.02 ug/g dry	0.05	-	0.84	-
Benzo [k] fluoranthene	0.02 ug/g dry	0.04	-	0.75	-
Chrysene	0.02 ug/g dry	0.06	-	0.96	-
Dibenzo [a,h] anthracene	0.02 ug/g dry	<0.02	-	0.24	-
Fluoranthene	0.02 ug/g dry	0.11	-	2.31	-
Fluorene	0.02 ug/g dry	<0.02	-	0.05	-
Indeno [1,2,3-cd] pyrene	0.02 ug/g dry	0.04	-	0.84	-
1-Methylnaphthalene	0.02 ug/g dry	<0.02	-	0.02	-
2-Methylnaphthalene	0.02 ug/g dry	<0.02	-	0.04	-
Methylnaphthalene (1&2)	0.04 ug/g dry	<0.04	-	0.06	-
Naphthalene	0.01 ug/g dry	<0.01	-	0.04	-
Phenanthrene	0.02 ug/g dry	0.06	-	0.73	-
Pyrene	0.02 ug/g dry	0.10	-	2.05	-
2-Fluorobiphenyl	Surrogate	119%	-	121%	-
Terphenyl-d14	Surrogate	124%	-	122%	-

Certificate of Analysis

Client: Paterson Group Consulting Engineers

Client PO: 33900

Report Date: 19-Apr-2022

Order Date: 12-Apr-2022

Project Description: PE5571

	Client ID:	BH5-22-SS6	BH7-22-AU1	BH7-22-SS7	DUP1
	Sample Date:	04-Apr-22 09:00	05-Apr-22 09:00	05-Apr-22 09:00	05-Apr-22 09:00
	Sample ID:	2216251-05	2216251-06	2216251-07	2216251-08
	MDL/Units	Soil	Soil	Soil	Soil
Physical Characteristics					
% Solids	0.1 % by Wt.	90.6	93.9	89.8	93.4
General Inorganics					
SAR	0.01 N/A	-	3.34	-	3.43
Conductivity	5 uS/cm	-	544	-	544
pH	0.05 pH Units	-	7.96	7.88	-
Metals					
Antimony	1.0 ug/g dry	-	<1.0	-	<1.0
Arsenic	1.0 ug/g dry	-	4.0	-	4.0
Barium	1.0 ug/g dry	-	113	-	114
Beryllium	0.5 ug/g dry	-	<0.5	-	<0.5
Boron	5.0 ug/g dry	-	9.0	-	8.2
Cadmium	0.5 ug/g dry	-	<0.5	-	<0.5
Chromium	5.0 ug/g dry	-	24.4	-	22.0
Cobalt	1.0 ug/g dry	-	6.2	-	5.8
Copper	5.0 ug/g dry	-	43.5	-	49.2
Lead	1.0 ug/g dry	-	176	-	184
Molybdenum	1.0 ug/g dry	-	<1.0	-	<1.0
Nickel	5.0 ug/g dry	-	16.1	-	15.0
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	-	1.4
Vanadium	10.0 ug/g dry	-	33.6	-	31.1
Zinc	20.0 ug/g dry	-	113	-	113
Volatiles					
Acetone	0.50 ug/g dry	<0.50	-	<0.50	-
Benzene	0.02 ug/g dry	<0.02	-	<0.02	-
Bromodichloromethane	0.05 ug/g dry	<0.05	-	<0.05	-
Bromoform	0.05 ug/g dry	<0.05	-	<0.05	-
Bromomethane	0.05 ug/g dry	<0.05	-	<0.05	-
Carbon Tetrachloride	0.05 ug/g dry	<0.05	-	<0.05	-
Chlorobenzene	0.05 ug/g dry	<0.05	-	<0.05	-
Chloroform	0.05 ug/g dry	<0.05	-	<0.05	-
Dibromochloromethane	0.05 ug/g dry	<0.05	-	<0.05	-
Dichlorodifluoromethane	0.05 ug/g dry	<0.05	-	<0.05	-

Certificate of Analysis

Report Date: 19-Apr-2022

Client: Paterson Group Consulting Engineers

Order Date: 12-Apr-2022

Client PO: 33900

Project Description: PE5571

	Client ID:	BH5-22-SS6	BH7-22-AU1	BH7-22-SS7	DUP1
	Sample Date:	04-Apr-22 09:00	05-Apr-22 09:00	05-Apr-22 09:00	05-Apr-22 09:00
	Sample ID:	2216251-05	2216251-06	2216251-07	2216251-08
	MDL/Units	Soil	Soil	Soil	Soil
1,2-Dichlorobenzene	0.05 ug/g dry	<0.05	-	<0.05	-
1,3-Dichlorobenzene	0.05 ug/g dry	<0.05	-	<0.05	-
1,4-Dichlorobenzene	0.05 ug/g dry	<0.05	-	<0.05	-
1,1-Dichloroethane	0.05 ug/g dry	<0.05	-	<0.05	-
1,2-Dichloroethane	0.05 ug/g dry	<0.05	-	<0.05	-
1,1-Dichloroethylene	0.05 ug/g dry	<0.05	-	<0.05	-
cis-1,2-Dichloroethylene	0.05 ug/g dry	<0.05	-	<0.05	-
trans-1,2-Dichloroethylene	0.05 ug/g dry	<0.05	-	<0.05	-
1,2-Dichloropropane	0.05 ug/g dry	<0.05	-	<0.05	-
cis-1,3-Dichloropropylene	0.05 ug/g dry	<0.05	-	<0.05	-
trans-1,3-Dichloropropylene	0.05 ug/g dry	<0.05	-	<0.05	-
1,3-Dichloropropene, total	0.05 ug/g dry	<0.05	-	<0.05	-
Ethylbenzene	0.05 ug/g dry	<0.05	-	<0.05	-
Ethylene dibromide (dibromoethane, 1	0.05 ug/g dry	<0.05	-	<0.05	-
Hexane	0.05 ug/g dry	<0.05	-	<0.05	-
Methyl Ethyl Ketone (2-Butanone)	0.50 ug/g dry	<0.50	-	<0.50	-
Methyl Isobutyl Ketone	0.50 ug/g dry	<0.50	-	<0.50	-
Methyl tert-butyl ether	0.05 ug/g dry	<0.05	-	<0.05	-
Methylene Chloride	0.05 ug/g dry	<0.05	-	<0.05	-
Styrene	0.05 ug/g dry	<0.05	-	<0.05	-
1,1,1,2-Tetrachloroethane	0.05 ug/g dry	<0.05	-	<0.05	-
1,1,2,2-Tetrachloroethane	0.05 ug/g dry	<0.05	-	<0.05	-
Tetrachloroethylene	0.05 ug/g dry	<0.05	-	<0.05	-
Toluene	0.05 ug/g dry	<0.05	-	<0.05	-
1,1,1-Trichloroethane	0.05 ug/g dry	<0.05	-	<0.05	-
1,1,2-Trichloroethane	0.05 ug/g dry	<0.05	-	<0.05	-
Trichloroethylene	0.05 ug/g dry	<0.05	-	<0.05	-
Trichlorofluoromethane	0.05 ug/g dry	<0.05	-	<0.05	-
Vinyl chloride	0.02 ug/g dry	<0.02	-	<0.02	-
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	-
4-Bromofluorobenzene	Surrogate	102%	-	99.1%	-
Dibromofluoromethane	Surrogate	107%	-	106%	-
Toluene-d8	Surrogate	123%	-	122%	-

Certificate of Analysis

Report Date: 19-Apr-2022

Client: **Paterson Group Consulting Engineers**

Order Date: 12-Apr-2022

Client PO: **33900**

Project Description: PE5571

	Client ID:	BH5-22-SS6	BH7-22-AU1	BH7-22-SS7	DUP1
	Sample Date:	04-Apr-22 09:00	05-Apr-22 09:00	05-Apr-22 09:00	05-Apr-22 09:00
	Sample ID:	2216251-05	2216251-06	2216251-07	2216251-08
	MDL/Units	Soil	Soil	Soil	Soil
Semi-Volatiles					
Acenaphthene	0.02 ug/g dry	-	<0.80 [1]	-	<0.80 [1]
Acenaphthylene	0.02 ug/g dry	-	<0.80 [1]	-	<0.80 [1]
Anthracene	0.02 ug/g dry	-	<0.80 [1]	-	<0.80 [1]
Benzo [a] anthracene	0.02 ug/g dry	-	<0.80 [1]	-	<0.80 [1]
Benzo [a] pyrene	0.02 ug/g dry	-	<0.80 [1]	-	<0.80 [1]
Benzo [b] fluoranthene	0.02 ug/g dry	-	<0.80 [1]	-	<0.80 [1]
Benzo [g,h,i] perylene	0.02 ug/g dry	-	<0.80 [1]	-	<0.80 [1]
Benzo [k] fluoranthene	0.02 ug/g dry	-	<0.80 [1]	-	<0.80 [1]
Chrysene	0.02 ug/g dry	-	<0.80 [1]	-	<0.80 [1]
Dibenzo [a,h] anthracene	0.02 ug/g dry	-	<0.80 [1]	-	<0.80 [1]
Fluoranthene	0.02 ug/g dry	-	<0.80 [1]	-	<0.80 [1]
Fluorene	0.02 ug/g dry	-	<0.80 [1]	-	<0.80 [1]
Indeno [1,2,3-cd] pyrene	0.02 ug/g dry	-	<0.80 [1]	-	<0.80 [1]
1-Methylnaphthalene	0.02 ug/g dry	-	<0.80 [1]	-	<0.80 [1]
2-Methylnaphthalene	0.02 ug/g dry	-	<0.80 [1]	-	<0.80 [1]
Methylnaphthalene (1&2)	0.04 ug/g dry	-	<1.60 [1]	-	<1.60 [1]
Naphthalene	0.01 ug/g dry	-	<0.40 [1]	-	<0.40 [1]
Phenanthrene	0.02 ug/g dry	-	<0.80 [1]	-	<0.80 [1]
Pyrene	0.02 ug/g dry	-	<0.80 [1]	-	<0.80 [1]
2-Fluorobiphenyl	Surrogate	-	113%	-	119%
Terphenyl-d14	Surrogate	-	115%	-	113%

Certificate of Analysis

Report Date: 19-Apr-2022

Client: Paterson Group Consulting Engineers

Order Date: 12-Apr-2022

Client PO: 33900

Project Description: PE5571

	Client ID:	DUP2	-	-	-
	Sample Date:	05-Apr-22 09:00	-	-	-
	Sample ID:	2216251-09	-	-	-
	MDL/Units	Soil	-	-	-
Physical Characteristics					
% Solids	0.1 % by Wt.	90.8	-	-	-
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	-	-	-
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	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	-	-	-

Certificate of Analysis

Report Date: 19-Apr-2022

Client: Paterson Group Consulting Engineers

Order Date: 12-Apr-2022

Client PO: 33900

Project Description: PE5571

	Client ID:	DUP2	-	-	-
	Sample Date:	05-Apr-22 09:00	-	-	-
	Sample ID:	2216251-09	-	-	-
	MDL/Units	Soil	-	-	-
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	99.7%	-	-	-
Dibromofluoromethane	Surrogate	107%	-	-	-
Toluene-d8	Surrogate	122%	-	-	-

Method Quality Control: Blank

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
General Inorganics									
Conductivity	ND	5	uS/cm						
Metals									
Antimony	ND	1.0	ug/g						
Arsenic	ND	1.0	ug/g						
Barium	ND	1.0	ug/g						
Beryllium	ND	0.5	ug/g						
Boron	ND	5.0	ug/g						
Cadmium	ND	0.5	ug/g						
Chromium	ND	5.0	ug/g						
Cobalt	ND	1.0	ug/g						
Copper	ND	5.0	ug/g						
Lead	ND	1.0	ug/g						
Molybdenum	ND	1.0	ug/g						
Nickel	ND	5.0	ug/g						
Selenium	ND	1.0	ug/g						
Silver	ND	0.3	ug/g						
Thallium	ND	1.0	ug/g						
Uranium	ND	1.0	ug/g						
Vanadium	ND	10.0	ug/g						
Zinc	ND	20.0	ug/g						
Semi-Volatiles									
Acenaphthene	ND	0.02	ug/g						
Acenaphthylene	ND	0.02	ug/g						
Anthracene	ND	0.02	ug/g						
Benzo [a] anthracene	ND	0.02	ug/g						
Benzo [a] pyrene	ND	0.02	ug/g						
Benzo [b] fluoranthene	ND	0.02	ug/g						
Benzo [g,h,i] perylene	ND	0.02	ug/g						
Benzo [k] fluoranthene	ND	0.02	ug/g						
Chrysene	ND	0.02	ug/g						
Dibenzo [a,h] anthracene	ND	0.02	ug/g						
Fluoranthene	ND	0.02	ug/g						
Fluorene	ND	0.02	ug/g						
Indeno [1,2,3-cd] pyrene	ND	0.02	ug/g						
1-Methylnaphthalene	ND	0.02	ug/g						
2-Methylnaphthalene	ND	0.02	ug/g						
Methylnaphthalene (1&2)	ND	0.04	ug/g						
Naphthalene	ND	0.01	ug/g						
Phenanthrene	ND	0.02	ug/g						
Pyrene	ND	0.02	ug/g						
Surrogate: 2-Fluorobiphenyl	*1.66*		*ug/g*		*125*	*50-140*			
Surrogate: Terphenyl-d14	*1.53*		*ug/g*		*115*	*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						
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						

Method Quality Control: Blank

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
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	*9.73*		*ug/g*		*122*	*50-140*			
Surrogate: Dibromofluoromethane	*7.67*		*ug/g*		*95.8*	*50-140*			
Surrogate: Toluene-d8	*9.57*		*ug/g*		*120*	*50-140*			

Method Quality Control: Duplicate

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
General Inorganics									
SAR	0.08	0.01	N/A	0.08			4.8	30	
Conductivity	172	5	uS/cm	171			0.6	5	
pH	7.63	0.05	pH Units	7.62			0.1	2.3	
Metals									
Antimony	ND	1.0	ug/g	1.2			NC	30	
Arsenic	4.6	1.0	ug/g	4.4			5.0	30	
Barium	42.3	1.0	ug/g	39.6			6.5	30	
Beryllium	ND	0.5	ug/g	ND			NC	30	
Boron	6.0	5.0	ug/g	6.5			7.3	30	
Cadmium	ND	0.5	ug/g	ND			NC	30	
Chromium	16.9	5.0	ug/g	16.0			6.0	30	
Cobalt	6.4	1.0	ug/g	6.2			3.6	30	
Copper	30.1	5.0	ug/g	28.5			5.3	30	
Lead	19.8	1.0	ug/g	20.2			2.2	30	
Molybdenum	ND	1.0	ug/g	ND			NC	30	
Nickel	16.5	5.0	ug/g	15.5			6.0	30	
Selenium	ND	1.0	ug/g	ND			NC	30	
Silver	ND	0.3	ug/g	ND			NC	30	
Thallium	ND	1.0	ug/g	ND			NC	30	
Uranium	ND	1.0	ug/g	ND			NC	30	
Vanadium	21.5	10.0	ug/g	20.7			3.8	30	
Zinc	109	20.0	ug/g	115			4.9	30	
Physical Characteristics									
% Solids	83.3	0.1	% by Wt.	83.5			0.2	25	
Semi-Volatiles									
Acenaphthene	ND	0.02	ug/g	ND			NC	40	
Acenaphthylene	ND	0.02	ug/g	ND			NC	40	
Anthracene	ND	0.02	ug/g	ND			NC	40	
Benzo [a] anthracene	0.048	0.02	ug/g	0.066			31.8	40	
Benzo [a] pyrene	0.060	0.02	ug/g	0.082			31.8	40	
Benzo [b] fluoranthene	0.072	0.02	ug/g	0.105			37.1	40	
Benzo [g,h,i] perylene	0.046	0.02	ug/g	0.060			27.4	40	
Benzo [k] fluoranthene	0.039	0.02	ug/g	0.051			27.1	40	
Chrysene	0.076	0.02	ug/g	0.086			12.7	40	
Dibenzo [a,h] anthracene	ND	0.02	ug/g	ND			NC	40	
Fluoranthene	0.115	0.02	ug/g	0.161			33.5	40	
Fluorene	ND	0.02	ug/g	ND			NC	40	
Indeno [1,2,3-cd] pyrene	0.039	0.02	ug/g	0.056			36.8	40	
1-Methylnaphthalene	ND	0.02	ug/g	ND			NC	40	
2-Methylnaphthalene	ND	0.02	ug/g	ND			NC	40	
Naphthalene	ND	0.01	ug/g	ND			NC	40	
Phenanthrene	0.041	0.02	ug/g	0.060			37.3	40	
Pyrene	0.096	0.02	ug/g	0.141			38.0	40	
Surrogate: 2-Fluorobiphenyl	*1.82*		*ug/g*		*115*	*50-140*			
Surrogate: Terphenyl-d14	*1.84*		*ug/g*		*117*	*50-140*			
Volatiles									
Acetone	ND	0.50	ug/g	ND			NC	50	
Benzene	ND	0.02	ug/g	ND			NC	50	
Bromodichloromethane	ND	0.05	ug/g	ND			NC	50	
Bromoform	ND	0.05	ug/g	ND			NC	50	
Bromomethane	ND	0.05	ug/g	ND			NC	50	
Carbon Tetrachloride	ND	0.05	ug/g	ND			NC	50	
Chlorobenzene	ND	0.05	ug/g	ND			NC	50	
Chloroform	ND	0.05	ug/g	ND			NC	50	
Dibromochloromethane	ND	0.05	ug/g	ND			NC	50	
Dichlorodifluoromethane	ND	0.05	ug/g	ND			NC	50	

Method Quality Control: Duplicate

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
1,2-Dichlorobenzene	ND	0.05	ug/g	ND			NC	50	
1,3-Dichlorobenzene	ND	0.05	ug/g	ND			NC	50	
1,4-Dichlorobenzene	ND	0.05	ug/g	ND			NC	50	
1,1-Dichloroethane	ND	0.05	ug/g	ND			NC	50	
1,2-Dichloroethane	ND	0.05	ug/g	ND			NC	50	
1,1-Dichloroethylene	ND	0.05	ug/g	ND			NC	50	
cis-1,2-Dichloroethylene	ND	0.05	ug/g	ND			NC	50	
trans-1,2-Dichloroethylene	ND	0.05	ug/g	ND			NC	50	
1,2-Dichloropropane	ND	0.05	ug/g	ND			NC	50	
cis-1,3-Dichloropropylene	ND	0.05	ug/g	ND			NC	50	
trans-1,3-Dichloropropylene	ND	0.05	ug/g	ND			NC	50	
Ethylbenzene	ND	0.05	ug/g	ND			NC	50	
Ethylene dibromide (dibromoethane, 1,2-	ND	0.05	ug/g	ND			NC	50	
Hexane	ND	0.05	ug/g	ND			NC	50	
Methyl Ethyl Ketone (2-Butanone)	ND	0.50	ug/g	ND			NC	50	
Methyl Isobutyl Ketone	ND	0.50	ug/g	ND			NC	50	
Methyl tert-butyl ether	ND	0.05	ug/g	ND			NC	50	
Methylene Chloride	ND	0.05	ug/g	ND			NC	50	
Styrene	ND	0.05	ug/g	ND			NC	50	
1,1,1,2-Tetrachloroethane	ND	0.05	ug/g	ND			NC	50	
1,1,2,2-Tetrachloroethane	ND	0.05	ug/g	ND			NC	50	
Tetrachloroethylene	ND	0.05	ug/g	ND			NC	50	
Toluene	ND	0.05	ug/g	ND			NC	50	
1,1,1-Trichloroethane	ND	0.05	ug/g	ND			NC	50	
1,1,2-Trichloroethane	ND	0.05	ug/g	ND			NC	50	
Trichloroethylene	ND	0.05	ug/g	ND			NC	50	
Trichlorofluoromethane	ND	0.05	ug/g	ND			NC	50	
Vinyl chloride	ND	0.02	ug/g	ND			NC	50	
m,p-Xylenes	ND	0.05	ug/g	ND			NC	50	
o-Xylene	ND	0.05	ug/g	ND			NC	50	
Surrogate: 4-Bromofluorobenzene	*8.54*		*ug/g*		*97.2*	*50-140*			
Surrogate: Dibromofluoromethane	*9.03*		*ug/g*		*103*	*50-140*			
Surrogate: Toluene-d8	*10.4*		*ug/g*		*119*	*50-140*			

Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Metals									
Antimony	38.7	1.0	ug/g	ND	77.3	70-130			
Arsenic	51.5	1.0	ug/g	1.8	99.5	70-130			
Barium	58.7	1.0	ug/g	15.8	85.8	70-130			
Beryllium	50.2	0.5	ug/g	ND	100	70-130			
Boron	46.8	5.0	ug/g	ND	88.4	70-130			
Cadmium	43.1	0.5	ug/g	ND	86.0	70-130			
Chromium	57.5	5.0	ug/g	6.4	102	70-130			
Cobalt	50.9	1.0	ug/g	2.5	96.9	70-130			
Copper	58.7	5.0	ug/g	11.4	94.5	70-130			
Lead	56.9	1.0	ug/g	8.1	97.6	70-130			
Molybdenum	47.7	1.0	ug/g	ND	94.6	70-130			
Nickel	54.3	5.0	ug/g	6.2	96.2	70-130			
Selenium	46.4	1.0	ug/g	ND	92.6	70-130			
Silver	38.1	0.3	ug/g	ND	76.2	70-130			
Thallium	43.4	1.0	ug/g	ND	86.7	70-130			
Uranium	54.6	1.0	ug/g	ND	109	70-130			
Vanadium	60.1	10.0	ug/g	ND	104	70-130			
Zinc	88.6	20.0	ug/g	46.0	85.1	70-130			
Semi-Volatiles									
Acenaphthene	0.224	0.02	ug/g	ND	114	50-140			
Acenaphthylene	0.204	0.02	ug/g	ND	104	50-140			
Anthracene	0.196	0.02	ug/g	ND	99.5	50-140			
Benzo [a] anthracene	0.222	0.02	ug/g	0.066	79.0	50-140			
Benzo [a] pyrene	0.249	0.02	ug/g	0.082	84.7	50-140			
Benzo [b] fluoranthene	0.275	0.02	ug/g	0.105	86.5	50-140			
Benzo [g,h,i] perylene	0.237	0.02	ug/g	0.060	89.8	50-140			
Benzo [k] fluoranthene	0.250	0.02	ug/g	0.051	101	50-140			
Chrysene	0.275	0.02	ug/g	0.086	96.0	50-140			
Dibenzo [a,h] anthracene	0.203	0.02	ug/g	ND	103	50-140			
Fluoranthene	0.319	0.02	ug/g	0.161	80.2	50-140			
Fluorene	0.216	0.02	ug/g	ND	110	50-140			
Indeno [1,2,3-cd] pyrene	0.238	0.02	ug/g	0.056	92.7	50-140			
1-Methylnaphthalene	0.220	0.02	ug/g	ND	112	50-140			
2-Methylnaphthalene	0.239	0.02	ug/g	ND	121	50-140			
Naphthalene	0.230	0.01	ug/g	ND	117	50-140			
Phenanthrene	0.231	0.02	ug/g	0.060	86.6	50-140			
Pyrene	0.299	0.02	ug/g	0.141	80.2	50-140			
Surrogate: 2-Fluorobiphenyl	*1.78*		*ug/g*		*113*	*50-140*			
Surrogate: Terphenyl-d14	*1.88*		*ug/g*		*119*	*50-140*			
Volatiles									
Acetone	7.63	0.50	ug/g	ND	76.3	50-140			
Benzene	3.37	0.02	ug/g	ND	84.4	60-130			
Bromodichloromethane	3.33	0.05	ug/g	ND	83.2	60-130			
Bromoform	2.77	0.05	ug/g	ND	69.3	60-130			
Bromomethane	2.77	0.05	ug/g	ND	69.3	50-140			
Carbon Tetrachloride	2.76	0.05	ug/g	ND	69.0	60-130			
Chlorobenzene	2.78	0.05	ug/g	ND	69.6	60-130			
Chloroform	2.69	0.05	ug/g	ND	67.4	60-130			

Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Dibromochloromethane	2.61	0.05	ug/g	ND	65.3	60-130			
Dichlorodifluoromethane	2.67	0.05	ug/g	ND	66.7	50-140			
1,2-Dichlorobenzene	3.45	0.05	ug/g	ND	86.3	60-130			
1,3-Dichlorobenzene	2.74	0.05	ug/g	ND	68.4	60-130			
1,4-Dichlorobenzene	2.96	0.05	ug/g	ND	73.9	60-130			
1,1-Dichloroethane	3.28	0.05	ug/g	ND	82.1	60-130			
1,2-Dichloroethane	2.68	0.05	ug/g	ND	67.0	60-130			
1,1-Dichloroethylene	4.21	0.05	ug/g	ND	105	60-130			
cis-1,2-Dichloroethylene	2.93	0.05	ug/g	ND	73.3	60-130			
trans-1,2-Dichloroethylene	3.48	0.05	ug/g	ND	87.0	60-130			
1,2-Dichloropropane	4.34	0.05	ug/g	ND	109	60-130			
cis-1,3-Dichloropropylene	2.72	0.05	ug/g	ND	67.9	60-130			
trans-1,3-Dichloropropylene	4.35	0.05	ug/g	ND	109	60-130			
Ethylbenzene	2.67	0.05	ug/g	ND	66.8	60-130			
Ethylene dibromide (dibromoethane, 1,2	2.67	0.05	ug/g	ND	66.8	60-130			
Hexane	3.78	0.05	ug/g	ND	94.6	60-130			
Methyl Ethyl Ketone (2-Butanone)	7.92	0.50	ug/g	ND	79.2	50-140			
Methyl Isobutyl Ketone	8.64	0.50	ug/g	ND	86.4	50-140			
Methyl tert-butyl ether	8.04	0.05	ug/g	ND	80.4	50-140			
Methylene Chloride	2.95	0.05	ug/g	ND	73.8	60-130			
Styrene	2.95	0.05	ug/g	ND	73.8	60-130			
1,1,1,2-Tetrachloroethane	2.75	0.05	ug/g	ND	68.8	60-130			
1,1,2,2-Tetrachloroethane	2.93	0.05	ug/g	ND	73.3	60-130			
Tetrachloroethylene	3.02	0.05	ug/g	ND	75.5	60-130			
Toluene	2.99	0.05	ug/g	ND	74.8	60-130			
1,1,1-Trichloroethane	2.83	0.05	ug/g	ND	70.6	60-130			
1,1,2-Trichloroethane	4.23	0.05	ug/g	ND	106	60-130			
Trichloroethylene	4.21	0.05	ug/g	ND	105	60-130			
Trichlorofluoromethane	2.68	0.05	ug/g	ND	67.0	50-140			
Vinyl chloride	3.12	0.02	ug/g	ND	78.0	50-140			
m,p-Xylenes	5.45	0.05	ug/g	ND	68.1	60-130			
o-Xylene	2.78	0.05	ug/g	ND	69.5	60-130			
Surrogate: 4-Bromofluorobenzene	*8.10*		*ug/g*		*101*	*50-140*			
Surrogate: Dibromofluoromethane	*7.69*		*ug/g*		*96.1*	*50-140*			
Surrogate: Toluene-d8	*8.10*		*ug/g*		*101*	*50-140*			

Qualifier Notes:

Sample Qualifiers :

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

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.

PARACEL LABORATORIES LTD

Paracel ID: 2216251

Paracel Order Number (Lab Use Only)	Chain Of Custody (Lab Use Only)
2216251	№ 136983

Client Name: Paterson Group	Project Ref: PE5571	Page __ of __
Contact Name: Kayla Munch	Quote #:	Turnaround Time
Address: 154 Colonnade Rd	PO #: 33900	☐ 1 day ☐ 3 day
	E-mail: kmunch@patersongroup.ca	☐ 2 day ☒ Regular
Telephone:		Date Required:

☒ REG 153/04 ☐ REG 406/19	Other Regulation	Matrix Type: S (Soil/Sed.) GW (Ground Water) SW (Surface Water) SS (Storm/Sanitary Sewer) P (Paint) A (Air) O (Other)
☐ 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:	

	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)	ECISAR	pH			
1	BH3-22-SS2	S		1	April 4/2022				X	X				X				
2	BH3-22-SS7	↓		2	April 4/2022			X										
3	BH4-22-SS3			1	April 5/2022				X	X				X				
4	BH4-22-SS7			2	↓			X										
5	BH5-22-SS6			2	April 4/2022			X										
6	BH7-22-AU			1	April 5/2022				X	X				X	X			
7	BH7-22-SS7			2				X							X			
8	DUP1			1					X	X				X				
9	DUP 2	↓		2	↓			X										
10																		

Comments:

Method of Delivery: PARACEL COURIER

Relinquished By (Sign):	Received By Driver/Depot:	Received at Lab:	Verified By:
Relinquished By (Print): Kat Linscott	Date/Time: 12/04/22 3:20	Date/Time: APR 12, 2022 04:40	Date/Time: Apr 13 2022 5:00
Date/Time: April 12/2022	Temperature: °C PH	Temperature: 18.8 °C	pH Verified: ☐ By:

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Certificate of Analysis

Paterson Group Consulting Engineers

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

Client PO: 54434
Project: PE5571
Custody: 64393

Report Date: 4-May-2022
Order Date: 28-Apr-2022

Order #: 2218580

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

Paracel ID	Client ID
2218580-01	BH4-22-SS4B
2218580-02	BH7-22-SS3

Approved By:

Dale Robertson, BSc
Laboratory Director

Certificate of Analysis

Report Date: 04-May-2022

Client: Paterson Group Consulting Engineers

Order Date: 28-Apr-2022

Client PO: 54434

Project Description: PE5571

Analysis Summary Table

Analysis	Method Reference/Description	Extraction Date	Analysis Date
Boron, available	MOE (HWE), EPA 200.8 - ICP-MS	4-May-22	4-May-22
Chromium, hexavalent - soil	MOE E3056 - Extraction, colourimetric	2-May-22	3-May-22
Mercury by CVAA	EPA 7471B - CVAA, digestion	3-May-22	3-May-22
REG 153: Metals by ICP/MS, soil	EPA 6020 - Digestion - ICP-MS	3-May-22	3-May-22
REG 153: PAHs by GC-MS	EPA 8270 - GC-MS, extraction	29-Apr-22	4-May-22
Solids, %	Gravimetric, calculation	2-May-22	2-May-22

Certificate of Analysis

Report Date: 04-May-2022

Client: **Paterson Group Consulting Engineers**

Order Date: 28-Apr-2022

Client PO: **54434**

Project Description: PE5571

	Client ID:	BH4-22-SS4B	BH7-22-SS3	-	-
	Sample Date:	05-Apr-22 09:00	05-Apr-22 09:00	-	-
	Sample ID:	2218580-01	2218580-02	-	-
	MDL/Units	Soil	Soil	-	-
Physical Characteristics					
% Solids	0.1 % by Wt.	67.8	67.8	-	-
Metals					
Antimony	1.0 ug/g dry	<1.0	<1.0	-	-
Arsenic	1.0 ug/g dry	2.9	3.5	-	-
Barium	1.0 ug/g dry	309	373	-	-
Beryllium	0.5 ug/g dry	0.7	1.1	-	-
Boron	5.0 ug/g dry	5.3	<5.0	-	-
Boron, available	0.5 ug/g dry	0.8	<0.5	-	-
Cadmium	0.5 ug/g dry	<0.5	<0.5	-	-
Chromium	5.0 ug/g dry	98.6	118	-	-
Chromium (VI)	0.2 ug/g dry	0.7	0.4	-	-
Cobalt	1.0 ug/g dry	17.8	24.9	-	-
Copper	5.0 ug/g dry	44.3	42.9	-	-
Lead	1.0 ug/g dry	10.1	7.9	-	-
Mercury	0.1 ug/g dry	<0.1	<0.1	-	-
Molybdenum	1.0 ug/g dry	<1.0	<1.0	-	-
Nickel	5.0 ug/g dry	55.1	65.7	-	-
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	81.8	106	-	-
Zinc	20.0 ug/g dry	104	130	-	-
Semi-Volatiles					
Acenaphthene	0.02 ug/g dry	<0.02	<0.02	-	-
Acenaphthylene	0.02 ug/g dry	<0.02	<0.02	-	-
Anthracene	0.02 ug/g dry	<0.02	<0.02	-	-
Benzo [a] anthracene	0.02 ug/g dry	<0.02	<0.02	-	-
Benzo [a] pyrene	0.02 ug/g dry	<0.02	<0.02	-	-
Benzo [b] fluoranthene	0.02 ug/g dry	<0.02	<0.02	-	-
Benzo [g,h,i] perylene	0.02 ug/g dry	<0.02	<0.02	-	-
Benzo [k] fluoranthene	0.02 ug/g dry	<0.02	<0.02	-	-
Chrysene	0.02 ug/g dry	<0.02	<0.02	-	-
Dibenzo [a,h] anthracene	0.02 ug/g dry	<0.02	<0.02	-	-
Fluoranthene	0.02 ug/g dry	<0.02	<0.02	-	-

Certificate of Analysis

Report Date: 04-May-2022

Client: **Paterson Group Consulting Engineers**

Order Date: 28-Apr-2022

Client PO: **54434**

Project Description: PE5571

	Client ID:	BH4-22-SS4B	BH7-22-SS3	-	-
	Sample Date:	05-Apr-22 09:00	05-Apr-22 09:00	-	-
	Sample ID:	2218580-01	2218580-02	-	-
	MDL/Units	Soil	Soil	-	-
Fluorene	0.02 ug/g dry	<0.02	<0.02	-	-
Indeno [1,2,3-cd] pyrene	0.02 ug/g dry	<0.02	<0.02	-	-
1-Methylnaphthalene	0.02 ug/g dry	<0.02	<0.02	-	-
2-Methylnaphthalene	0.02 ug/g dry	<0.02	<0.02	-	-
Methylnaphthalene (1&2)	0.04 ug/g dry	<0.04	<0.04	-	-
Naphthalene	0.01 ug/g dry	<0.01	<0.01	-	-
Phenanthrene	0.02 ug/g dry	<0.02	<0.02	-	-
Pyrene	0.02 ug/g dry	<0.02	<0.02	-	-
2-Fluorobiphenyl	Surrogate	79.7%	78.8%	-	-
Terphenyl-d14	Surrogate	92.6%	92.9%	-	-

Method Quality Control: Blank

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Metals									
Antimony	ND	1.0	ug/g						
Arsenic	ND	1.0	ug/g						
Barium	ND	1.0	ug/g						
Beryllium	ND	0.5	ug/g						
Boron, available	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	*1.13*		*ug/g*		*84.9*	*50-140*			
Surrogate: Terphenyl-d14	*1.31*		*ug/g*		*98.5*	*50-140*			

Method Quality Control: Duplicate

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Metals									
Antimony	1.6	1.0	ug/g	ND			NC	30	
Arsenic	3.0	1.0	ug/g	2.9			4.8	30	
Barium	316	1.0	ug/g	309			2.2	30	
Beryllium	0.7	0.5	ug/g	0.7			2.0	30	
Boron, available	ND	0.5	ug/g	ND			NC	35	
Boron	5.8	5.0	ug/g	5.3			8.2	30	
Cadmium	ND	0.5	ug/g	ND			NC	30	
Chromium (VI)	ND	0.2	ug/g	0.3			NC	35	
Chromium	104	5.0	ug/g	98.6			5.4	30	
Cobalt	18.7	1.0	ug/g	17.8			5.0	30	
Copper	46.2	5.0	ug/g	44.3			4.3	30	
Lead	10.4	1.0	ug/g	10.1			2.7	30	
Mercury	0.120	0.1	ug/g	0.131			8.4	30	
Molybdenum	ND	1.0	ug/g	ND			NC	30	
Nickel	57.0	5.0	ug/g	55.1			3.4	30	
Selenium	ND	1.0	ug/g	ND			NC	30	
Silver	ND	0.3	ug/g	ND			NC	30	
Thallium	ND	1.0	ug/g	ND			NC	30	
Uranium	ND	1.0	ug/g	ND			NC	30	
Vanadium	85.5	10.0	ug/g	81.8			4.5	30	
Zinc	107	20.0	ug/g	104			2.6	30	
Physical Characteristics									
% Solids	98.4	0.1	% by Wt.	99.5			1.2	25	
Semi-Volatiles									
Acenaphthene	ND	0.02	ug/g	ND			NC	40	
Acenaphthylene	ND	0.02	ug/g	ND			NC	40	
Anthracene	ND	0.02	ug/g	ND			NC	40	
Benzo [a] anthracene	ND	0.02	ug/g	ND			NC	40	
Benzo [a] pyrene	ND	0.02	ug/g	ND			NC	40	
Benzo [b] fluoranthene	ND	0.02	ug/g	ND			NC	40	
Benzo [g,h,i] perylene	0.024	0.02	ug/g	ND			NC	40	
Benzo [k] fluoranthene	ND	0.02	ug/g	ND			NC	40	
Chrysene	ND	0.02	ug/g	ND			NC	40	
Dibenzo [a,h] anthracene	ND	0.02	ug/g	ND			NC	40	
Fluoranthene	ND	0.02	ug/g	ND			NC	40	
Fluorene	ND	0.02	ug/g	ND			NC	40	
Indeno [1,2,3-cd] pyrene	ND	0.02	ug/g	ND			NC	40	
1-Methylnaphthalene	ND	0.02	ug/g	ND			NC	40	
2-Methylnaphthalene	ND	0.02	ug/g	ND			NC	40	
Naphthalene	ND	0.01	ug/g	ND			NC	40	
Phenanthrene	ND	0.02	ug/g	ND			NC	40	
Pyrene	ND	0.02	ug/g	ND			NC	40	
Surrogate: 2-Fluorobiphenyl	*1.35*		*ug/g*		*101*	*50-140*			
Surrogate: Terphenyl-d14	*1.42*		*ug/g*		*106*	*50-140*			

Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Metals									
Antimony	35.2	1.0	ug/g	ND	70.1	70-130			
Arsenic	49.6	1.0	ug/g	1.2	97.0	70-130			
Barium	188	1.0	ug/g	124	128	70-130			
Beryllium	48.3	0.5	ug/g	ND	96.0	70-130			
Boron, available	3.64	0.5	ug/g	ND	72.9	70-122			
Boron	46.5	5.0	ug/g	ND	88.7	70-130			
Cadmium	44.0	0.5	ug/g	ND	87.9	70-130			
Chromium (VI)	0.2	0.2	ug/g	ND	71.5	70-130			
Chromium	95.3	5.0	ug/g	39.4	112	70-130			
Cobalt	56.5	1.0	ug/g	7.1	98.8	70-130			
Copper	65.6	5.0	ug/g	17.7	95.8	70-130			
Lead	47.4	1.0	ug/g	4.0	86.8	70-130			
Mercury	1.60	0.1	ug/g	0.131	97.7	70-130			
Molybdenum	47.6	1.0	ug/g	ND	94.8	70-130			
Nickel	71.7	5.0	ug/g	22.0	99.4	70-130			
Selenium	45.9	1.0	ug/g	ND	91.4	70-130			
Silver	37.5	0.3	ug/g	ND	75.0	70-130			
Thallium	46.4	1.0	ug/g	ND	92.5	70-130			
Uranium	48.0	1.0	ug/g	ND	95.6	70-130			
Vanadium	88.9	10.0	ug/g	32.7	112	70-130			
Zinc	90.1	20.0	ug/g	41.7	96.8	70-130			
Semi-Volatiles									
Acenaphthene	0.177	0.02	ug/g	ND	106	50-140			
Acenaphthylene	0.158	0.02	ug/g	ND	94.1	50-140			
Anthracene	0.162	0.02	ug/g	ND	96.7	50-140			
Benzo [a] anthracene	0.144	0.02	ug/g	ND	85.9	50-140			
Benzo [a] pyrene	0.146	0.02	ug/g	ND	87.1	50-140			
Benzo [b] fluoranthene	0.222	0.02	ug/g	ND	132	50-140			
Benzo [g,h,i] perylene	0.178	0.02	ug/g	ND	106	50-140			
Benzo [k] fluoranthene	0.197	0.02	ug/g	ND	118	50-140			
Chrysene	0.166	0.02	ug/g	ND	99.0	50-140			
Dibenzo [a,h] anthracene	0.160	0.02	ug/g	ND	95.7	50-140			
Fluoranthene	0.149	0.02	ug/g	ND	88.7	50-140			
Fluorene	0.158	0.02	ug/g	ND	94.4	50-140			
Indeno [1,2,3-cd] pyrene	0.159	0.02	ug/g	ND	95.3	50-140			
1-Methylnaphthalene	0.183	0.02	ug/g	ND	109	50-140			
2-Methylnaphthalene	0.196	0.02	ug/g	ND	117	50-140			
Naphthalene	0.187	0.01	ug/g	ND	112	50-140			
Phenanthrene	0.149	0.02	ug/g	ND	89.3	50-140			
Pyrene	0.146	0.02	ug/g	ND	87.1	50-140			
Surrogate: 2-Fluorobiphenyl	*1.41*		*ug/g*		*105*	*50-140*			
Surrogate: Terphenyl-d14	*1.49*		*ug/g*		*111*	*50-140*			

Qualifier Notes:

None

Sample Data Revisions

None

Work Order Revisions / Comments:

None

Other Report Notes:

n/a: not applicable
ND: Not Detected
MDL: Method Detection Limit
Source Result: Data used as source for matrix and duplicate samples
%REC: Percent recovery.
RPD: Relative percent difference.
NC: Not Calculated

Soil results are reported on a dry weight basis when the units are denoted with 'dry'.
Where %Solids is reported, moisture loss includes the loss of volatile hydrocarbons.

PARACEL LABORATORIES LTD

Paracel ID: 2218580

Paracel Order Number (Lab Use Only)	Chain Of Custody (Lab Use Only)
2218580	№ 64393

Client Name: Paterson	Project Ref: PE 5571	Page __ of __
Contact Name: Karyn Munch	Quote #:	**Turnaround Time**
Address: 154 Colonnade	PO #: ~~31637~~ 54434	☐ 1 day ☐ 3 day ☐ 2 day ☑ Regular
Telephone: 613 226 7381	E-mail: kmunch@patersongroup.ca	Date Required:

☒ REG 153/04 ☐ REG 406/19 — 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)

Required Analysis

	Sample ID/Location Name	Matrix	Air Volume	# of Containers	Sample Taken Date	Sample Taken Time	PAHs	Metals										
1	BH4-22-SS4B	S		1	APR 5 2022		✓	✓										
2	BH7-22-SS3	S		1	"		✓	✓										
3																		
4																		
5																		
6																		
7																		
8																		
9																		
10																		

Comments:

Method of Delivery: PARACEL COURIER

Relinquished By (Sign): GPat	Received By Driver/Depot: M. Teause	Received at Lab: [signature]	Verified By: [signature]
Relinquished By (Print): Grant Paterson	Date/Time: 28/04/22 4:00	Date/Time: APR 28, 2022 04.54	Date/Time: April 29, 22 10:49
Date/Time: APR 25 2022	Temperature: °C PH.	Temperature: 13.3 °C	pH Verified: ☐ By:

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Certificate of Analysis

Paterson Group Consulting Engineers

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

Client PO: 31832
Project: PE5571
Custody: 64392

Report Date: 29-Apr-2022
Order Date: 25-Apr-2022

Order #: 2218141

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

Paracel ID	Client ID
2218141-01	BH4-22-GW1 (2)
2218141-02	DUP1 (2)

Approved By:

Dale Robertson, BSc
Laboratory Director

Certificate of Analysis

Client: Paterson Group Consulting Engineers

Client PO: 31832

Report Date: 29-Apr-2022

Order Date: 25-Apr-2022

Project Description: PE5571

Analysis Summary Table

Analysis	Method Reference/Description	Extraction Date	Analysis Date
Metals, ICP-MS	EPA 200.8 - ICP-MS	26-Apr-22	26-Apr-22
PHC F1	CWS Tier 1 - P&T GC-FID	26-Apr-22	26-Apr-22
PHCs F2 to F4	CWS Tier 1 - GC-FID, extraction	28-Apr-22	29-Apr-22
REG 153: VOCs by P&T GC/MS	EPA 624 - P&T GC-MS	26-Apr-22	26-Apr-22

Certificate of Analysis

Report Date: 29-Apr-2022

Client: Paterson Group Consulting Engineers

Order Date: 25-Apr-2022

Client PO: 31832

Project Description: PE5571

	Client ID:	BH4-22-GW1 (2)	DUP1 (2)	-	-
	Sample Date:	22-Apr-22 09:00	22-Apr-22 09:00	-	-
	Sample ID:	2218141-01	2218141-02	-	-
	MDL/Units	Water	Water	-	-
Metals					
Antimony	0.5 ug/L	0.9	<0.5	-	-
Arsenic	1 ug/L	<1	<1	-	-
Barium	1 ug/L	177	194	-	-
Beryllium	0.5 ug/L	<0.5	<0.5	-	-
Boron	10 ug/L	53	55	-	-
Cadmium	0.1 ug/L	<0.1	<0.1	-	-
Chromium	1 ug/L	<1	<1	-	-
Cobalt	0.5 ug/L	1.6	1.8	-	-
Copper	0.5 ug/L	1.5	4.1	-	-
Lead	0.1 ug/L	0.2	0.4	-	-
Molybdenum	0.5 ug/L	2.6	2.7	-	-
Nickel	1 ug/L	7	7	-	-
Selenium	1 ug/L	3	3	-	-
Silver	0.1 ug/L	<0.1	<0.1	-	-
Sodium	200 ug/L	625000	628000	-	-
Thallium	0.1 ug/L	<0.1	<0.1	-	-
Uranium	0.1 ug/L	7.3	7.4	-	-
Vanadium	0.5 ug/L	0.9	1.4	-	-
Zinc	5 ug/L	<5	<5	-	-
Volatiles					
Acetone	5.0 ug/L	<5.0	-	-	-
Benzene	0.5 ug/L	<0.5	-	-	-
Bromodichloromethane	0.5 ug/L	<0.5	-	-	-
Bromoform	0.5 ug/L	<0.5	-	-	-
Bromomethane	0.5 ug/L	<0.5	-	-	-
Carbon Tetrachloride	0.2 ug/L	<0.2	-	-	-
Chlorobenzene	0.5 ug/L	<0.5	-	-	-
Chloroform	0.5 ug/L	<0.5	-	-	-
Dibromochloromethane	0.5 ug/L	<0.5	-	-	-
Dichlorodifluoromethane	1.0 ug/L	<1.0	-	-	-
1,2-Dichlorobenzene	0.5 ug/L	<0.5	-	-	-
1,3-Dichlorobenzene	0.5 ug/L	<0.5	-	-	-
1,4-Dichlorobenzene	0.5 ug/L	<0.5	-	-	-
1,1-Dichloroethane	0.5 ug/L	<0.5	-	-	-
1,2-Dichloroethane	0.5 ug/L	<0.5	-	-	-

Certificate of Analysis

Report Date: 29-Apr-2022

Client: Paterson Group Consulting Engineers

Order Date: 25-Apr-2022

Client PO: 31832

Project Description: PE5571

	Client ID:	BH4-22-GW1 (2)	DUP1 (2)	-	-
	Sample Date:	22-Apr-22 09:00	22-Apr-22 09:00	-	-
	Sample ID:	2218141-01	2218141-02	-	-
	MDL/Units	Water	Water	-	-
1,1-Dichloroethylene	0.5 ug/L	<0.5	-	-	-
cis-1,2-Dichloroethylene	0.5 ug/L	<0.5	-	-	-
trans-1,2-Dichloroethylene	0.5 ug/L	<0.5	-	-	-
1,2-Dichloropropane	0.5 ug/L	<0.5	-	-	-
cis-1,3-Dichloropropylene	0.5 ug/L	<0.5	-	-	-
trans-1,3-Dichloropropylene	0.5 ug/L	<0.5	-	-	-
1,3-Dichloropropene, total	0.5 ug/L	<0.5	-	-	-
Ethylbenzene	0.5 ug/L	<0.5	-	-	-
Ethylene dibromide (dibromoethane, 1,2-)	0.2 ug/L	<0.2	-	-	-
Hexane	1.0 ug/L	<1.0	-	-	-
Methyl Ethyl Ketone (2-Butanone)	5.0 ug/L	<5.0	-	-	-
Methyl Isobutyl Ketone	5.0 ug/L	<5.0	-	-	-
Methyl tert-butyl ether	2.0 ug/L	<2.0	-	-	-
Methylene Chloride	5.0 ug/L	<5.0	-	-	-
Styrene	0.5 ug/L	<0.5	-	-	-
1,1,1,2-Tetrachloroethane	0.5 ug/L	<0.5	-	-	-
1,1,2,2-Tetrachloroethane	0.5 ug/L	<0.5	-	-	-
Tetrachloroethylene	0.5 ug/L	<0.5	-	-	-
Toluene	0.5 ug/L	<0.5	-	-	-
1,1,1-Trichloroethane	0.5 ug/L	<0.5	-	-	-
1,1,2-Trichloroethane	0.5 ug/L	<0.5	-	-	-
Trichloroethylene	0.5 ug/L	<0.5	-	-	-
Trichlorofluoromethane	1.0 ug/L	<1.0	-	-	-
Vinyl chloride	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	-	-	-
4-Bromofluorobenzene	Surrogate	111%	-	-	-
Dibromofluoromethane	Surrogate	106%	-	-	-
Toluene-d8	Surrogate	110%	-	-	-
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	-	-	-

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									
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	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						
Volatiles									
Acetone	ND	5.0	ug/L						
Benzene	ND	0.5	ug/L						
Bromodichloromethane	ND	0.5	ug/L						
Bromoform	ND	0.5	ug/L						
Bromomethane	ND	0.5	ug/L						
Carbon Tetrachloride	ND	0.2	ug/L						
Chlorobenzene	ND	0.5	ug/L						
Chloroform	ND	0.5	ug/L						
Dibromochloromethane	ND	0.5	ug/L						
Dichlorodifluoromethane	ND	1.0	ug/L						
1,2-Dichlorobenzene	ND	0.5	ug/L						
1,3-Dichlorobenzene	ND	0.5	ug/L						
1,4-Dichlorobenzene	ND	0.5	ug/L						
1,1-Dichloroethane	ND	0.5	ug/L						
1,2-Dichloroethane	ND	0.5	ug/L						
1,1-Dichloroethylene	ND	0.5	ug/L						
cis-1,2-Dichloroethylene	ND	0.5	ug/L						
trans-1,2-Dichloroethylene	ND	0.5	ug/L						
1,2-Dichloropropane	ND	0.5	ug/L						
cis-1,3-Dichloropropylene	ND	0.5	ug/L						
trans-1,3-Dichloropropylene	ND	0.5	ug/L						
1,3-Dichloropropene, total	ND	0.5	ug/L						
Ethylbenzene	ND	0.5	ug/L						
Ethylene dibromide (dibromoethane, 1,2-	ND	0.2	ug/L						
Hexane	ND	1.0	ug/L						
Methyl Ethyl Ketone (2-Butanone)	ND	5.0	ug/L						
Methyl Isobutyl Ketone	ND	5.0	ug/L						
Methyl tert-butyl ether	ND	2.0	ug/L						
Methylene Chloride	ND	5.0	ug/L						
Styrene	ND	0.5	ug/L						
1,1,1,2-Tetrachloroethane	ND	0.5	ug/L						
1,1,2,2-Tetrachloroethane	ND	0.5	ug/L						
Tetrachloroethylene	ND	0.5	ug/L						
Toluene	ND	0.5	ug/L						

Certificate of Analysis

Report Date: 29-Apr-2022

Client: Paterson Group Consulting Engineers

Order Date: 25-Apr-2022

Client PO: 31832

Project Description: PE5571

Method Quality Control: Blank

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
1,1,1-Trichloroethane	ND	0.5	ug/L						
1,1,2-Trichloroethane	ND	0.5	ug/L						
Trichloroethylene	ND	0.5	ug/L						
Trichlorofluoromethane	ND	1.0	ug/L						
Vinyl chloride	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: 4-Bromofluorobenzene	*86.3*		*ug/L*		*108*	*50-140*			
Surrogate: Dibromofluoromethane	*87.3*		*ug/L*		*109*	*50-140*			
Surrogate: Toluene-d8	*88.4*		*ug/L*		*111*	*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									
Arsenic	ND	1	ug/L	ND			NC	20	
Barium	197	1	ug/L	177			10.4	20	
Beryllium	ND	0.5	ug/L	ND			NC	20	
Boron	54	10	ug/L	53			1.8	20	
Cadmium	0.11	0.1	ug/L	ND			NC	20	
Chromium	ND	1	ug/L	ND			NC	20	
Cobalt	1.71	0.5	ug/L	1.62			5.5	20	
Copper	1.58	0.5	ug/L	1.53			3.1	20	
Molybdenum	2.73	0.5	ug/L	2.64			3.4	20	
Nickel	7.2	1	ug/L	6.7			6.8	20	
Selenium	3.4	1	ug/L	3.1			9.0	20	
Silver	ND	0.1	ug/L	ND			NC	20	
Sodium	561000	200	ug/L	625000			10.9	20	
Thallium	ND	0.1	ug/L	ND			NC	20	
Uranium	7.6	0.1	ug/L	7.3			4.3	20	
Vanadium	0.97	0.5	ug/L	0.87			11.0	20	
Zinc	ND	5	ug/L	ND			NC	20	
Volatiles									
Acetone	ND	5.0	ug/L	ND			NC	30	
Benzene	ND	0.5	ug/L	ND			NC	30	
Bromodichloromethane	ND	0.5	ug/L	ND			NC	30	
Bromoform	ND	0.5	ug/L	ND			NC	30	
Bromomethane	ND	0.5	ug/L	ND			NC	30	
Carbon Tetrachloride	ND	0.2	ug/L	ND			NC	30	
Chlorobenzene	ND	0.5	ug/L	ND			NC	30	
Chloroform	ND	0.5	ug/L	ND			NC	30	
Dibromochloromethane	ND	0.5	ug/L	ND			NC	30	
Dichlorodifluoromethane	ND	1.0	ug/L	ND			NC	30	
1,2-Dichlorobenzene	ND	0.5	ug/L	ND			NC	30	
1,3-Dichlorobenzene	ND	0.5	ug/L	ND			NC	30	
1,4-Dichlorobenzene	ND	0.5	ug/L	ND			NC	30	
1,1-Dichloroethane	ND	0.5	ug/L	ND			NC	30	
1,2-Dichloroethane	ND	0.5	ug/L	ND			NC	30	
1,1-Dichloroethylene	ND	0.5	ug/L	ND			NC	30	
cis-1,2-Dichloroethylene	ND	0.5	ug/L	ND			NC	30	
trans-1,2-Dichloroethylene	ND	0.5	ug/L	ND			NC	30	
1,2-Dichloropropane	ND	0.5	ug/L	ND			NC	30	
cis-1,3-Dichloropropylene	ND	0.5	ug/L	ND			NC	30	
trans-1,3-Dichloropropylene	ND	0.5	ug/L	ND			NC	30	
Ethylbenzene	ND	0.5	ug/L	ND			NC	30	
Ethylene dibromide (dibromoethane, 1,2	ND	0.2	ug/L	ND			NC	30	
Hexane	ND	1.0	ug/L	ND			NC	30	
Methyl Ethyl Ketone (2-Butanone)	ND	5.0	ug/L	ND			NC	30	
Methyl Isobutyl Ketone	ND	5.0	ug/L	ND			NC	30	
Methyl tert-butyl ether	ND	2.0	ug/L	ND			NC	30	
Methylene Chloride	ND	5.0	ug/L	ND			NC	30	
Styrene	ND	0.5	ug/L	ND			NC	30	
1,1,1,2-Tetrachloroethane	ND	0.5	ug/L	ND			NC	30	
1,1,2,2-Tetrachloroethane	ND	0.5	ug/L	ND			NC	30	
Tetrachloroethylene	ND	0.5	ug/L	ND			NC	30	
Toluene	ND	0.5	ug/L	ND			NC	30	
1,1,1-Trichloroethane	ND	0.5	ug/L	ND			NC	30	
1,1,2-Trichloroethane	ND	0.5	ug/L	ND			NC	30	
Trichloroethylene	ND	0.5	ug/L	ND			NC	30	
Trichlorofluoromethane	ND	1.0	ug/L	ND			NC	30	

Certificate of Analysis

Report Date: 29-Apr-2022

Client: Paterson Group Consulting Engineers

Order Date: 25-Apr-2022

Client PO: 31832

Project Description: PE5571

Method Quality Control: Duplicate

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Vinyl chloride	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: 4-Bromofluorobenzene	*90.4*		*ug/L*		*113*	*50-140*			
Surrogate: Dibromofluoromethane	*76.6*		*ug/L*		*95.8*	*50-140*			
Surrogate: Toluene-d8	*87.5*		*ug/L*		*109*	*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)	1870	25	ug/L	ND	93.5	68-117			
F2 PHCs (C10-C16)	1480	100	ug/L	ND	92.5	60-140			
F3 PHCs (C16-C34)	3940	100	ug/L	ND	101	60-140			
F4 PHCs (C34-C50)	2880	100	ug/L	ND	116	60-140			
Metals									
Arsenic	48.1	1	ug/L	ND	95.7	80-120			
Barium	219	1	ug/L	177	82.6	80-120			
Beryllium	37.7	0.5	ug/L	ND	75.4	80-120			QM-07
Boron	45	10	ug/L	ND	89.5	80-120			
Cadmium	35.7	0.1	ug/L	ND	71.2	80-120			QM-07
Chromium	59.9	1	ug/L	ND	119	80-120			
Cobalt	52.4	0.5	ug/L	1.62	102	80-120			
Copper	45.9	0.5	ug/L	1.53	88.7	80-120			
Lead	43.3	0.1	ug/L	ND	86.7	80-120			
Molybdenum	48.9	0.5	ug/L	2.64	92.6	80-120			
Nickel	53.8	1	ug/L	6.7	94.1	80-120			
Selenium	43.8	1	ug/L	ND	87.6	80-120			
Silver	45.7	0.1	ug/L	ND	91.4	80-120			
Thallium	40.2	0.1	ug/L	ND	80.2	80-120			
Uranium	52.2	0.1	ug/L	7.3	89.9	80-120			
Vanadium	48.6	0.5	ug/L	ND	97.2	80-120			
Zinc	45	5	ug/L	ND	90.5	80-120			
Volatiles									
Acetone	117	5.0	ug/L	ND	117	50-140			
Benzene	44.0	0.5	ug/L	ND	110	60-130			
Bromodichloromethane	34.6	0.5	ug/L	ND	86.6	60-130			
Bromoform	34.0	0.5	ug/L	ND	85.1	60-130			
Bromomethane	31.0	0.5	ug/L	ND	77.6	50-140			
Carbon Tetrachloride	40.6	0.2	ug/L	ND	102	60-130			
Chlorobenzene	35.4	0.5	ug/L	ND	88.4	60-130			
Chloroform	32.2	0.5	ug/L	ND	80.6	60-130			
Dibromochloromethane	34.7	0.5	ug/L	ND	86.7	60-130			
Dichlorodifluoromethane	33.2	1.0	ug/L	ND	83.0	50-140			
1,2-Dichlorobenzene	33.4	0.5	ug/L	ND	83.5	60-130			
1,3-Dichlorobenzene	33.4	0.5	ug/L	ND	83.6	60-130			
1,4-Dichlorobenzene	35.2	0.5	ug/L	ND	88.0	60-130			
1,1-Dichloroethane	33.7	0.5	ug/L	ND	84.2	60-130			
1,2-Dichloroethane	38.0	0.5	ug/L	ND	95.1	60-130			
1,1-Dichloroethylene	30.0	0.5	ug/L	ND	75.0	60-130			
cis-1,2-Dichloroethylene	30.1	0.5	ug/L	ND	75.3	60-130			
trans-1,2-Dichloroethylene	29.2	0.5	ug/L	ND	73.1	60-130			
1,2-Dichloropropane	33.0	0.5	ug/L	ND	82.4	60-130			
cis-1,3-Dichloropropylene	36.8	0.5	ug/L	ND	92.0	60-130			
trans-1,3-Dichloropropylene	36.2	0.5	ug/L	ND	90.5	60-130			
Ethylbenzene	34.7	0.5	ug/L	ND	86.8	60-130			
Ethylene dibromide (dibromoethane, 1,2	32.0	0.2	ug/L	ND	80.0	60-130			
Hexane	29.2	1.0	ug/L	ND	72.9	60-130			
Methyl Ethyl Ketone (2-Butanone)	84.8	5.0	ug/L	ND	84.8	50-140			

Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Methyl Isobutyl Ketone	82.4	5.0	ug/L	ND	82.4	50-140			
Methyl tert-butyl ether	96.8	2.0	ug/L	ND	96.8	50-140			
Methylene Chloride	33.6	5.0	ug/L	ND	84.0	60-130			
Styrene	35.4	0.5	ug/L	ND	88.4	60-130			
1,1,1,2-Tetrachloroethane	37.3	0.5	ug/L	ND	93.4	60-130			
1,1,2,2-Tetrachloroethane	30.3	0.5	ug/L	ND	75.8	60-130			
Tetrachloroethylene	33.6	0.5	ug/L	ND	84.1	60-130			
Toluene	37.8	0.5	ug/L	ND	94.4	60-130			
1,1,1-Trichloroethane	30.1	0.5	ug/L	ND	75.3	60-130			
1,1,2-Trichloroethane	31.5	0.5	ug/L	ND	78.8	60-130			
Trichloroethylene	29.1	0.5	ug/L	ND	72.8	60-130			
Trichlorofluoromethane	32.5	1.0	ug/L	ND	81.2	60-130			
Vinyl chloride	42.4	0.5	ug/L	ND	106	50-140			
m,p-Xylenes	67.1	0.5	ug/L	ND	83.9	60-130			
o-Xylene	33.0	0.5	ug/L	ND	82.6	60-130			
Surrogate: 4-Bromofluorobenzene	*91.7*		*ug/L*		*115*	*50-140*			
Surrogate: Dibromofluoromethane	*88.8*		*ug/L*		*111*	*50-140*			
Surrogate: Toluene-d8	*85.8*		*ug/L*		*107*	*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: 2218141

Paracel Order Number (Lab Use Only)	Chain Of Custody (Lab Use Only)
2218141	№ 64392

Client Name: Paterson	Project Ref: PE 5571	Page _ of _
Contact Name: Karyn Munch	Quote #:	**Turnaround Time**
Address: 154 Colonnade	PO #: 31832	☐ 1 day ☐ 3 day
	E-mail: KMunch@Patersongroup.ca	☐ 2 day ☒ Regular
Telephone: 613 226 7381		Date Required:

☒ REG 153/04 ☐ REG 406/19

			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)

Required Analysis

	Sample ID/Location Name	Matrix	Air Volume	# of Containers	Sample Taken Date	Time	F1-F4 + VOCs	ICP Metals										
1	BH4-22-GW1 (2)	GW		4	Apr 22		✓	✓										
2	Dup 1 (62)	GW		1	Apr 22			✓										
3																		
4																		
5																		
6																		
7																		
8																		
9																		
10																		

Comments:

Method of Delivery: Paracel Courier

Relinquished By (Sign): Grab	Received By Driver/Depot: M. Scouie	Received at Lab: Smeeform Bhmai	Verified By: [signature]
Relinquished By (Print): Grant Paterson	Date/Time: 25/04/22 3:20	Date/Time: Apr 25, 2022 04.43	Date/Time: April 26, 22 9:37
Date/Time: Apr 25 2022	Temperature: °C	Temperature: 16.2 °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: 54723
Project: PE5571
Custody: 136617

Report Date: 25-May-2022
Order Date: 19-May-2022

Order #: 2221518

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

Paracel ID	Client ID
2221518-01	BH2-22-GW1
2221518-02	BH3-22-GW1

Approved By:

Dale Robertson, BSc
Laboratory Director

Certificate of Analysis

Client: Paterson Group Consulting Engineers

Client PO: 54723

Report Date: 25-May-2022

Order Date: 19-May-2022

Project Description: PE5571

Analysis Summary Table

Analysis	Method Reference/Description	Extraction Date	Analysis Date
REG 153: VOCs by P&T GC/MS	EPA 624 - P&T GC-MS	20-May-22	24-May-22

Certificate of Analysis

Report Date: 25-May-2022

Client: Paterson Group Consulting Engineers

Order Date: 19-May-2022

Client PO: 54723

Project Description: PE5571

	Client ID:	BH2-22-GW1	BH3-22-GW1	-	-
	Sample Date:	16-May-22 09:00	16-May-22 09:00	-	-
	Sample ID:	2221518-01	2221518-02	-	-
	MDL/Units	Water	Water	-	-
Volatiles					
Acetone	5.0 ug/L	<5.0	<5.0	-	-
Benzene	0.5 ug/L	<0.5	<0.5	-	-
Bromodichloromethane	0.5 ug/L	<0.5	<0.5	-	-
Bromoform	0.5 ug/L	<0.5	<0.5	-	-
Bromomethane	0.5 ug/L	<0.5	<0.5	-	-
Carbon Tetrachloride	0.2 ug/L	<0.2	<0.2	-	-
Chlorobenzene	0.5 ug/L	<0.5	<0.5	-	-
Chloroform	0.5 ug/L	0.8	0.8	-	-
Dibromochloromethane	0.5 ug/L	<0.5	<0.5	-	-
Dichlorodifluoromethane	1.0 ug/L	<1.0	<1.0	-	-
1,2-Dichlorobenzene	0.5 ug/L	<0.5	<0.5	-	-
1,3-Dichlorobenzene	0.5 ug/L	<0.5	<0.5	-	-
1,4-Dichlorobenzene	0.5 ug/L	<0.5	<0.5	-	-
1,1-Dichloroethane	0.5 ug/L	<0.5	<0.5	-	-
1,2-Dichloroethane	0.5 ug/L	<0.5	<0.5	-	-
1,1-Dichloroethylene	0.5 ug/L	<0.5	<0.5	-	-
cis-1,2-Dichloroethylene	0.5 ug/L	<0.5	<0.5	-	-
trans-1,2-Dichloroethylene	0.5 ug/L	<0.5	<0.5	-	-
1,2-Dichloropropane	0.5 ug/L	<0.5	<0.5	-	-
cis-1,3-Dichloropropylene	0.5 ug/L	<0.5	<0.5	-	-
trans-1,3-Dichloropropylene	0.5 ug/L	<0.5	<0.5	-	-
1,3-Dichloropropene, total	0.5 ug/L	<0.5	<0.5	-	-
Ethylbenzene	0.5 ug/L	<0.5	1.6	-	-
Ethylene dibromide (dibromoethane, 1,2-)	0.2 ug/L	<0.2	<0.2	-	-
Hexane	1.0 ug/L	<1.0	<1.0	-	-
Methyl Ethyl Ketone (2-Butanone)	5.0 ug/L	<5.0	<5.0	-	-
Methyl Isobutyl Ketone	5.0 ug/L	<5.0	<5.0	-	-
Methyl tert-butyl ether	2.0 ug/L	<2.0	<2.0	-	-
Methylene Chloride	5.0 ug/L	<5.0	<5.0	-	-
Styrene	0.5 ug/L	<0.5	<0.5	-	-
1,1,1,2-Tetrachloroethane	0.5 ug/L	<0.5	<0.5	-	-
1,1,2,2-Tetrachloroethane	0.5 ug/L	<0.5	<0.5	-	-
Tetrachloroethylene	0.5 ug/L	<0.5	<0.5	-	-
Toluene	0.5 ug/L	<0.5	1.7	-	-
1,1,1-Trichloroethane	0.5 ug/L	<0.5	<0.5	-	-

Certificate of Analysis

Report Date: 25-May-2022

Client: Paterson Group Consulting Engineers

Order Date: 19-May-2022

Client PO: 54723

Project Description: PE5571

	Client ID:	BH2-22-GW1	BH3-22-GW1	-	-
	Sample Date:	16-May-22 09:00	16-May-22 09:00	-	-
	Sample ID:	2221518-01	2221518-02	-	-
	MDL/Units	Water	Water	-	-
1,1,2-Trichloroethane	0.5 ug/L	<0.5	<0.5	-	-
Trichloroethylene	0.5 ug/L	<0.5	<0.5	-	-
Trichlorofluoromethane	1.0 ug/L	<1.0	<1.0	-	-
Vinyl chloride	0.5 ug/L	<0.5	<0.5	-	-
m,p-Xylenes	0.5 ug/L	<0.5	7.5	-	-
o-Xylene	0.5 ug/L	<0.5	4.7	-	-
Xylenes, total	0.5 ug/L	<0.5	12.2	-	-
4-Bromofluorobenzene	Surrogate	102%	87.9%	-	-
Dibromofluoromethane	Surrogate	108%	114%	-	-
Toluene-d8	Surrogate	116%	91.4%	-	-

Method Quality Control: Blank

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Volatiles									
Acetone	ND	5.0	ug/L						
Benzene	ND	0.5	ug/L						
Bromodichloromethane	ND	0.5	ug/L						
Bromoform	ND	0.5	ug/L						
Bromomethane	ND	0.5	ug/L						
Carbon Tetrachloride	ND	0.2	ug/L						
Chlorobenzene	ND	0.5	ug/L						
Chloroform	ND	0.5	ug/L						
Dibromochloromethane	ND	0.5	ug/L						
Dichlorodifluoromethane	ND	1.0	ug/L						
1,2-Dichlorobenzene	ND	0.5	ug/L						
1,3-Dichlorobenzene	ND	0.5	ug/L						
1,4-Dichlorobenzene	ND	0.5	ug/L						
1,1-Dichloroethane	ND	0.5	ug/L						
1,2-Dichloroethane	ND	0.5	ug/L						
1,1-Dichloroethylene	ND	0.5	ug/L						
cis-1,2-Dichloroethylene	ND	0.5	ug/L						
trans-1,2-Dichloroethylene	ND	0.5	ug/L						
1,2-Dichloropropane	ND	0.5	ug/L						
cis-1,3-Dichloropropylene	ND	0.5	ug/L						
trans-1,3-Dichloropropylene	ND	0.5	ug/L						
1,3-Dichloropropene, total	ND	0.5	ug/L						
Ethylbenzene	ND	0.5	ug/L						
Ethylene dibromide (dibromoethane, 1,2	ND	0.2	ug/L						
Hexane	ND	1.0	ug/L						
Methyl Ethyl Ketone (2-Butanone)	ND	5.0	ug/L						
Methyl Isobutyl Ketone	ND	5.0	ug/L						
Methyl tert-butyl ether	ND	2.0	ug/L						
Methylene Chloride	ND	5.0	ug/L						
Styrene	ND	0.5	ug/L						
1,1,1,2-Tetrachloroethane	ND	0.5	ug/L						
1,1,2,2-Tetrachloroethane	ND	0.5	ug/L						
Tetrachloroethylene	ND	0.5	ug/L						
Toluene	ND	0.5	ug/L						
1,1,1-Trichloroethane	ND	0.5	ug/L						
1,1,2-Trichloroethane	ND	0.5	ug/L						
Trichloroethylene	ND	0.5	ug/L						
Trichlorofluoromethane	ND	1.0	ug/L						
Vinyl chloride	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: 4-Bromofluorobenzene	*77.6*		*ug/L*		*97.0*	*50-140*			
Surrogate: Dibromofluoromethane	*80.9*		*ug/L*		*101*	*50-140*			
Surrogate: Toluene-d8	*83.5*		*ug/L*		*104*	*50-140*			

Method Quality Control: Duplicate

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Volatiles									
Acetone	ND	5.0	ug/L	ND			NC	30	
Benzene	ND	0.5	ug/L	ND			NC	30	
Bromodichloromethane	ND	0.5	ug/L	ND			NC	30	
Bromoform	ND	0.5	ug/L	ND			NC	30	
Bromomethane	ND	0.5	ug/L	ND			NC	30	
Carbon Tetrachloride	ND	0.2	ug/L	ND			NC	30	
Chlorobenzene	ND	0.5	ug/L	ND			NC	30	
Chloroform	ND	0.5	ug/L	ND			NC	30	
Dibromochloromethane	ND	0.5	ug/L	ND			NC	30	
Dichlorodifluoromethane	ND	1.0	ug/L	ND			NC	30	
1,2-Dichlorobenzene	ND	0.5	ug/L	ND			NC	30	
1,3-Dichlorobenzene	ND	0.5	ug/L	ND			NC	30	
1,4-Dichlorobenzene	ND	0.5	ug/L	ND			NC	30	
1,1-Dichloroethane	ND	0.5	ug/L	ND			NC	30	
1,2-Dichloroethane	ND	0.5	ug/L	ND			NC	30	
1,1-Dichloroethylene	ND	0.5	ug/L	ND			NC	30	
cis-1,2-Dichloroethylene	ND	0.5	ug/L	ND			NC	30	
trans-1,2-Dichloroethylene	ND	0.5	ug/L	ND			NC	30	
1,2-Dichloropropane	ND	0.5	ug/L	ND			NC	30	
cis-1,3-Dichloropropylene	ND	0.5	ug/L	ND			NC	30	
trans-1,3-Dichloropropylene	ND	0.5	ug/L	ND			NC	30	
Ethylbenzene	ND	0.5	ug/L	ND			NC	30	
Ethylene dibromide (dibromoethane, 1,2	ND	0.2	ug/L	ND			NC	30	
Hexane	ND	1.0	ug/L	ND			NC	30	
Methyl Ethyl Ketone (2-Butanone)	ND	5.0	ug/L	ND			NC	30	
Methyl Isobutyl Ketone	ND	5.0	ug/L	ND			NC	30	
Methyl tert-butyl ether	ND	2.0	ug/L	ND			NC	30	
Methylene Chloride	ND	5.0	ug/L	ND			NC	30	
Styrene	ND	0.5	ug/L	ND			NC	30	
1,1,1,2-Tetrachloroethane	ND	0.5	ug/L	ND			NC	30	
1,1,2,2-Tetrachloroethane	ND	0.5	ug/L	ND			NC	30	
Tetrachloroethylene	ND	0.5	ug/L	ND			NC	30	
Toluene	ND	0.5	ug/L	ND			NC	30	
1,1,1-Trichloroethane	ND	0.5	ug/L	ND			NC	30	
1,1,2-Trichloroethane	ND	0.5	ug/L	ND			NC	30	
Trichloroethylene	ND	0.5	ug/L	ND			NC	30	
Trichlorofluoromethane	ND	1.0	ug/L	ND			NC	30	
Vinyl chloride	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: 4-Bromofluorobenzene	*78.7*		*ug/L*		*98.4*	*50-140*			
Surrogate: Dibromofluoromethane	*72.2*		*ug/L*		*90.2*	*50-140*			
Surrogate: Toluene-d8	*82.5*		*ug/L*		*103*	*50-140*			

Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Volatiles									
Acetone	85.8	5.0	ug/L	ND	85.8	50-140			
Benzene	36.3	0.5	ug/L	ND	90.6	60-130			
Bromodichloromethane	32.6	0.5	ug/L	ND	81.4	60-130			
Bromoform	42.6	0.5	ug/L	ND	106	60-130			
Bromomethane	40.8	0.5	ug/L	ND	102	50-140			
Carbon Tetrachloride	32.0	0.2	ug/L	ND	80.1	60-130			
Chlorobenzene	37.8	0.5	ug/L	ND	94.6	60-130			
Chloroform	38.8	0.5	ug/L	ND	96.9	60-130			
Dibromochloromethane	34.4	0.5	ug/L	ND	86.1	60-130			
Dichlorodifluoromethane	42.4	1.0	ug/L	ND	106	50-140			
1,2-Dichlorobenzene	35.7	0.5	ug/L	ND	89.3	60-130			
1,3-Dichlorobenzene	34.0	0.5	ug/L	ND	84.9	60-130			
1,4-Dichlorobenzene	35.1	0.5	ug/L	ND	87.8	60-130			
1,1-Dichloroethane	38.1	0.5	ug/L	ND	95.3	60-130			
1,2-Dichloroethane	38.7	0.5	ug/L	ND	96.6	60-130			
1,1-Dichloroethylene	38.6	0.5	ug/L	ND	96.5	60-130			
cis-1,2-Dichloroethylene	38.4	0.5	ug/L	ND	95.9	60-130			
trans-1,2-Dichloroethylene	38.1	0.5	ug/L	ND	95.3	60-130			
1,2-Dichloropropane	36.4	0.5	ug/L	ND	91.0	60-130			
cis-1,3-Dichloropropylene	29.2	0.5	ug/L	ND	73.0	60-130			
trans-1,3-Dichloropropylene	31.9	0.5	ug/L	ND	79.7	60-130			
Ethylbenzene	37.1	0.5	ug/L	ND	92.6	60-130			
Ethylene dibromide (dibromoethane, 1,2	37.5	0.2	ug/L	ND	93.7	60-130			
Hexane	36.8	1.0	ug/L	ND	91.9	60-130			
Methyl Ethyl Ketone (2-Butanone)	96.6	5.0	ug/L	ND	96.6	50-140			
Methyl Isobutyl Ketone	115	5.0	ug/L	ND	115	50-140			
Methyl tert-butyl ether	115	2.0	ug/L	ND	115	50-140			
Methylene Chloride	40.3	5.0	ug/L	ND	101	60-130			
Styrene	34.0	0.5	ug/L	ND	84.9	60-130			
1,1,1,2-Tetrachloroethane	32.0	0.5	ug/L	ND	80.0	60-130			
1,1,2,2-Tetrachloroethane	30.2	0.5	ug/L	ND	75.6	60-130			
Tetrachloroethylene	36.8	0.5	ug/L	ND	92.0	60-130			
Toluene	37.8	0.5	ug/L	ND	94.5	60-130			
1,1,1-Trichloroethane	34.5	0.5	ug/L	ND	86.2	60-130			
1,1,2-Trichloroethane	39.3	0.5	ug/L	ND	98.2	60-130			
Trichloroethylene	43.6	0.5	ug/L	ND	109	60-130			
Trichlorofluoromethane	37.9	1.0	ug/L	ND	94.8	60-130			
Vinyl chloride	30.6	0.5	ug/L	ND	76.5	50-140			
m,p-Xylenes	74.1	0.5	ug/L	ND	92.6	60-130			
o-Xylene	37.9	0.5	ug/L	ND	94.7	60-130			

Qualifier Notes:

None

Sample Data Revisions

None

Work Order Revisions / Comments:

None

Other Report Notes:

n/a: not applicable
ND: Not Detected
MDL: Method Detection Limit
Source Result: Data used as source for matrix and duplicate samples
%REC: Percent recovery.
RPD: Relative percent difference.
NC: Not Calculated

Paracel ID: 2221518

PARACEL LABORATORIES

...Laurent Blvd.
...rio K1G 4J8
...1947
...aracellabs.com
...abs.com

Paracel Order Number (Lab Use Only): 2221518

Chain Of Custody (Lab Use Only)

№ 136617

Client Name: Karyn Munch
Contact Name: Paterson Group
Address: 154 Colonnade Road
Telephone:

Project Ref: PE5571
Quote #:
PO #:
E-mail: kmunch@patersongroup.ca, jcamposarcone@patersongroup.ca

Page 1 of 1

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

☐ REG 153/04 ☐ REG 406/19
☐ 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)

Required Analysis

	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	BH2-22-GW1	GW		2	5/16/2022			✓										
2	BH3-22-GW1	"		"	"			✓										
3																		
4																		
5																		
6																		
7																		
8																		
9																		
10																		

Comments:

Method of Delivery: Paracel Courier

Relinquished By (Sign):
Relinquished By (Print): Jeremy Camposarcone
Date/Time: 5/19/2022

Received By Driver/Depot: M. Trouse
Date/Time: 19/05/22 2:19 PM
Temperature: °C

Received at Lab: Sunegpwm Dhmai
Date/Time: May 19, 2022 04.35
Temperature: 12.9 °C

Verified By:
Date/Time: May 20 2022
pH Verified: ☐ By: