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Phase II Environmental Site Assessment

50 The Driveway
Ottawa, Ontario

Prepared For

Main and Main

July 16, 2021

Report: PE5340-2

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EXECUTIVE SUMMARY

Assessment

A Phase II ESA was conducted for the property addressed 50 The Driveway, in the 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 ESA Property.

The subsurface investigation consisted of drilling five (5) boreholes, three (3) of which were instrumented with groundwater monitoring wells. Two (2) test pits were completed as part of the investigation. The general soil profile encountered during the field program consisted of asphaltic concrete structure, overlying a granular fill material, followed by fill material consisting of silty clay, some sand, traces of organics, wood, concrete and/or bricks, overlying silty clay. Practical refusal by means of a DCPT test was encountered at depths ranging from 20.57 to 22.10 mbgs, where bedrock was inferred.

Eight (8) soil samples were submitted for laboratory analysis of benzene, toluene, ethylbenzene and xylenes (BTEX), petroleum hydrocarbons (PHCs, Fractions F_1-F_4), polycyclic aromatic hydrocarbons (PAHs) and/or metals, including hydride forming compounds: arsenic (As), Antimony (Sb) and Selenium (Se), as well as electrical conductivity (EC) and sodium adsorption ratio (SAR).

No BTEX or PHC concentrations were identified in any of the soil samples analysed. Concentrations of lead and PAH parameters, above the site standards, were identified in soil sample TP1-21-G2, while all other soil results comply with MECP Table 3 Residential Standards.

Groundwater samples from monitoring wells BH4-21 and BH5-21 were collected during the July 6, 2021 sampling event. Groundwater monitoring well BH1-21 was dry and as such, no sample could be retrieved from it. No free product or petroleum hydrocarbon sheen was noted on the purge water during the groundwater sampling events.

Groundwater samples were analyzed for VOCs (including BTEX parameters) and PHCs. A toluene concentration was identified in one groundwater sample below the site standard. All of the groundwater results comply with the MECP Table 3 Standards.

Recommendations

It is our understanding that the Phase II Property will be redeveloped for residential land use and as such, the Phase II Property will require a Record of Site Condition (RSC).

Based on the findings of the Phase II ESA, it is recommended that a soil remediation be carried out to support the filing of an RSC. Given the depth of lead and PAH impacted soil, it is recommended that the soil remediation be carried out in conjunction with the construction excavation. A representative sample of impacted soil must be submitted for a leachate analysis in accordance with O.Reg. 347/558 prior to disposal at an approved landfill site.

Any excess soil that meets site standards and requires removal for construction purposes must be handled in accordance with O. Reg. 406/19, On-Site and Excess Soil Management. Additional information regarding O.Reg. 406/19 can be provided upon request.

Monitoring Wells

It is recommended that the monitoring wells installed on the Phase II Property be maintained for possible future monitoring events. Prior to site redevelopment, the monitoring wells must be decommissioned in accordance with O.Reg. 903

1.0 INTRODUCTION

At the request of Main and Main, Paterson Group (Paterson) conducted a Phase II Environmental Site Assessment at 50 The Driveway (the Phase II ESA Property), 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 ESA Property, during the Phase I ESA conducted by Paterson in June of 2021.

1.1 Site Description

Address:	50 The Driveway, Ottawa, Ontario
Legal Description:	Lots 1 and 2 and Lot e, and Part 1 of Plan 5R-8677, Concession D of Rideau Front, Nepean, now in the City of Ottawa.
Location:	The site is located on the southeast corner of Lewis Street at The Driveway, in the City of Ottawa, Ontario. Refer to Figure 1 - Key Plan in the Figures section following the text.
PIN:	04117-0258
Latitude and Longitude:	45° 25’ 7.60" N, 75° 40' 57.52" W

Site Description:

Configuration:	Irregular
Area:	2,958 m^2 (approximately)
Zoning:	R4U – Forth Density Residential Zone.

1.2 Property Ownership

Paterson was engaged to conduct this Phase II-ESA by Ms. Emily Roukhkai, of Main and Main. The head office is located at 109 Atlantic Avenue, Toronto, Ontario. Ms. Roukhkain can be reached by telephone at (416) 986-2119.

1.3 Current and Proposed Future Uses

The Phase II ESA Property is currently occupied by a 2-storey office building constructed circa 1965 with a southern additional built in 1987, situated on the eastern portion of the site while the western portion exists as an asphaltic concrete paved parking lot.

It is our understanding that the Phase II ESA Property will be redeveloped with a 9-storey residential building consisting of 2 levels of underground parking. Due to the change in land use to a more sensitive land use (commercial to residential), a record of site condition (RSC) will be required as per O.Reg 154/03.

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 ESA Property in that the property does not rely upon potable groundwater.

Section 41 of O.Reg. 153/04 does not apply to the Phase II ESA 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 ESA Property in that the property is not a Shallow Soil property.

The intended use of the Phase II ESA 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 ESA Property is situated in a predominately residential urban area with some commercial offices.

The Phase II ESA Property is currently occupied by a 2-storey commercial office building constructed circa 1965 with a southern additional built in 1987, situated on the eastern portion of the site with an asphaltic concrete paved parking lot on the western portion of the site.

Site drainage consists primarily of sheetflow to catch basins along Lewis Street with some infiltration occurring on the landscaped areas.

The site topography slopes to down in a southeasterly direction, while the regional topography slopes gently down in a north-westerly direction.

2.2 Past Investigations

Paterson completed a Phase I ESA in June of 2021 for the Phase II ESA Property. Based on the findings of the Phase I ESA, two (2) potentially contaminating activities (PCAs) were determined to result in areas of potential environmental concern (APECs) on the Phase II ESA Property:

- APEC 1 – "Importation of Fill Material of Unknown Quality" associated with the infill of Neville's Creek on the southern portion of the Phase I ESA Property in 1912 as well as former demolition of the residential dwelling on the western portion circa 1956 (PCA 30).
- APEC 2 – "Former Industrial Site," associated with the bottling facility circa 1895 and workshop from 1928 to 1956 on the Phase I ESA Property (PCA Other).

The rationale for identifying the above APECs is based on a review of fire insurance plans, aerial photographs, 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 June 30 to July 5, 2021. The field program consisted of drilling five (5) boreholes and excavating two (2) test pits to address the APECs identified on the Phase II ESA Property. Three (3) of the five (5) boreholes were completed as groundwater monitoring wells, BH1-21, BH4-21 and BH5-21. Practical refusal during the DCPT test was encountered at depths ranging from 20.57 to 22.10 mbgs, where bedrock was inferred. The tests pits were excavated to a maximum depth of 4.70 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 this media is based on the Contaminants of Potential Concern identified in the Phase I ESA.

Contaminants of potential concern (CPCs) on the Phase II ESA Property include benzene, toluene, ethylbenzene and xylenes (BTEX), and petroleum hydrocarbons (PHCs, F1-F4), polycyclic aromatic hydrocarbons (PAHs) and metals (including arsenic (As), antimony (Sb) and selenium (Se)), as well as electrical conductivity (EC) and sodium adsorption ratio (SAR). These CPCs may be present in the soil and/or groundwater beneath the Phase II ESA Property.

3.3 Phase I Conceptual Site Model

According to the Geological Survey of Canada website, the bedrock in the area of the Phase I ESA Property is reported to consist of shale of the Carlsbad Formation. The overburden is reported to consist of off-shore marine sediments of erosional terraces with depths ranging from 15 to 25 m over the entire site.

Fill Placement

Based on the historical use of the Phase I ESA Property, fill material of unknown quality is likely present on the southern portion of the Phase I ESA Property, resulting from the infill of Neville's Creek circa 1912.

Existing Buildings and Structures

The Phase I ESA Property is occupied by a 2-storey commercial office building constructed circa 1965 with a southern additional built in 1987.

The exterior is finished in red brick with a flat tar and gravel style roof. The building is heated by natural gas fried boilers and cooled by a roof mounted HVAC unit.

Subsurface Structures and Utilities

The Phase I ESA Property is situated in a municipally serviced area. Underground utilities and/or structures include municipal water and sewer, electricity and natural gas.

Areas of Natural Significance and Water Bodies

No areas of natural significance were identified in the Phase I Study Area. No natural water bodies were identified in the Phase I Study Area.

Drinking Water Wells

No potable water wells on the Phase I ESA Property, nor are they expected to be present as the subject land is situated in a municipally serviced area.

Neighbouring Land Use

Neighbouring land use in the Phase I Study Area consists of residential, with some commercial (offices) properties.

Potentially Contaminating Activities and Areas of Potential Environmental Concern

As per Section 7.1 of the Phase I ESA report, two (2) PCAs, resulting in an APECs are summarized in Table 1, along with their respective location and contaminants of potential concern (CPCs).

Table 1: Potentially Contaminating Activities and Areas of Potential Environmental Concern

Area of Potential Environmental Concern	Location of Area of Potential Environmental Concern	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: Resulting from infill of Neville's Creek and demolition of former buildings	Southern and western portions of the Phase I ESA Property	PCA 30 – Importation of Fill Material of Unknown Quality	On-site	PAHs Metals As, Sb, Se	Soil and/or groundwater
APEC 2: Resulting from the former industrial use of the site (bottling facility) and former workshop	Eastern half and southern portion of the Phase I ESA Property, around the former and current building footprints	PCA Other – Former industrial use of the site	On-site	BTEX PHCs (F_1-F_4) Metals As, Sb, Se	Soil and/or groundwater

Contaminants of Potential Concern

The contaminants of potential concern (CPCs) in soil and/or groundwater include benzene, toluene, ethylbenzene and xylenes (BTEX), and petroleum hydrocarbons (PHCs, F1-F4), polycyclic aromatic hydrocarbons (PAHs) and metals (including arsenic (As), antimony (Sb) and selenium (Se)), as well as electrical conductivity (EC) and sodium adsorption ratio (SAR).

Assessment of Uncertainty and/or Absence of Information

The information available for review as part of the preparation of the Phase I-ESA is considered to be sufficient to conclude that there are on-site PCAs that have resulted in APECs on the Phase I ESA Property.

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

There were no deviations from the Sampling and Analysis Plan which is included in Appendix 1 of this report.

3.5 Impediments

No physical impediments were encountered during the Phase II ESA field program, with the exception that one groundwater sample could not be retrieved from monitoring well, BH1-21, as the well had not recovered a the time of sampling.

4.0 INVESTIGATION METHOD

4.1 Subsurface Investigation

The subsurface investigation conducted for this Phase II ESA consisted of drilling five (5) (BH1-21 through BH5-21) across the Phase II ESA Property, plus excavating two (2) test pits (TP1 and TP2) along the eastern portion of the site. The boreholes were drilled to a maximum depth of 15.7m below ground surface (mbgs). Three (3) of the five (5) boreholes were completed as groundwater monitoring wells, BH1-21, BH4-21 and BH5-21.

Practical refusal during the DCPT test was encountered at depths ranging from 20.57 to 22.10 mbgs, where bedrock was inferred. The tests pits were excavated to a maximum depth of 4.70 mbgs.

The boreholes were drilled using a low clearance track mounted drill rig operated by George Downing Estate Drilling of Hawkesbury, Ontario, under full-time supervision of Paterson personnel. The borehole locations are indicated on the attached Drawing PE5340-3 - Test Hole Location Plan.

4.2 Soil Sampling

A total of 47 soil samples were obtained from the boreholes and 13 soil samples from the test pits by means of grab sampling from auger flights/auger samples and split spoon sampling. Split spoon samples were taken at approximate 0.76 m intervals.

The depths at which grab samples and split spoon were obtained from the boreholes are shown as "**AU**" and "**SS**", respectively on the Soil Profile and Test Data Sheets.

The borehole profiles generally consisted of asphaltic concrete, underlain by a granular fill material, followed by fill material consisting of silty clay, some sand, traces of organics, wood, concrete and/or bricks, overlying by silty clay. Bedrock was not confirmed during the field program; however, it was inferred by during the DCPT tests.

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.

Vapour readings are noted on the Soil Profile and Test Data Sheets in Appendix 1. The results of the vapour survey are presented on the Soil Profile and Test Data sheets.

4.4 Groundwater Monitoring Well Installation

Three (3) groundwater monitoring wells were installed on the Phase II ESA Property as part of the subsurface investigation. The monitoring wells consisted of 50 mm diameter, Schedule 40 threaded PVC risers and screens. Monitoring well construction details are listed below 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
BH1-21	68.36	6.10	3.10-6.10	2.74-6.10	0.15-2.74	Flushmount
BH4-21	66.60	6.70	3.70-6.70	2.74-6.70	0.15-2.74	Flushmount
BH5-21	66.18	6.10	3.10-6.10	2.13-6.10	0.15-2.13	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: Soil Samples Submitted and Analyzed Parameters

Sample ID	Sample Depth / Stratigraphic Unit	Parameters Analyzed					Rationale
		BTEX	PHCs (F1-F4)	PAHs	Metals	EC/SAR	
June 30 to July 5, 2021							
BH1-21-AU1	0.076-0.3m Fill			X	X	X	Assess the quality of the fill material.
BH1-21-SS5	3.81-4.42m Fill	X	X				Assess the potential impact in soil due to the former use of the site.
BH2-21-SS8	5.33-5.94m Silty Clay			X	X		Assess the quality of the fill material.
BH3-21-SS3	1.52-2.13m Fill					X	Assess the quality of the fill material.
BH4-21-SS8	5.33-5.94m Silty Clay	X	X				Assess the potential impact in soil due to the former use of the site.
BH5-21-SS5	3.0-3.67m Fill			X	X		Assess the quality of the fill material.
BH5-21-SS7	4.57-5.18m Silty Clay	X	X				Assess the potential impact in soil due to the former use of the site.
TP1-21-G2	0.15-0.18m Fill			X	X		Assess the quality of the fill material.

TABLE 4: Groundwater Samples Submitted and Analyzed Parameters

Sample ID	Screened Interval	Parameters Analyzed			Rationale
		BTEX	PHCs (F1-F4)	VOCs	
July 6, 2021					
BH4-21-GW1	3.70-6.70m	X	X	X	Assess potential groundwater impacts due to the former use of the subject site.
BH5-21-GW1	3.10-6.10m	X	X	X	

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

Boreholes were surveyed at geodetic elevations by Paterson personnel.

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

Site soils generally consisted of asphaltic concrete, underlain by a granular fill material, followed by fill material consisting of silty clay, some sand, traces of organics, wood, concrete and/or bricks, overlying by silty clay. Bedrock was not confirmed during the field program; however, it was inferred by during the DCPT test at depths ranging from 20.57 to 22.10 mbgs.

Groundwater was encountered within the overburden at depths ranging from approximately 3.82 to 4.03 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 July 6 of 2021 using an electronic water level meter. Groundwater levels are summarized below 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**
BH1-21	68.36	dry	NA	July 6, 2021
BH4-21	66.60	4.03	62.57	July 6, 2021
BH5-21	66.18	3.82	62.36	July 6, 2021

Based on the groundwater elevations measured during the sampling events, a groundwater contour map was not possible.

5.3 Fine-Coarse Soil Texture

Grain-size analysis was not completed for the Phase II ESA Property. As such, the more stringent, coarse-grained soil standards were used.

5.4 Soil: Field Screening

Field screening of the soil samples collected during drilling resulted in vapour readings ranging from 0 to 448.2 ppm. 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

Eight (8) soil samples were submitted for BTEX, PHCs (F1-F4), PAHs and/or metals analysis as well as electrical conductivity (EC) and sodium adsorption ratio (SAR). The results of the analytical testing are presented below in Table 6 through Table 9. The laboratory certificate of analysis is provided in Appendix 1.

TABLE 6: Analytical Test Results – Soil BTEX and PHCs F_1-F_4					
Parameter	**MDL (µg/g)**	**Soil Samples (µg/g) June 30, July 2 and July 5, 2021**			**MECP Table 3 Residential Standards (µg/g)**
		BH1-21-SS5	**BH4-21-SS8**	**BH5-21-SS7**	
Benzene	0.02	nd	nd	nd	0.21
Toluene	0.05	nd	nd	nd	2.3
Ethylbenzene	0.05	nd	nd	nd	2
Xylenes	0.05	nd	nd	nd	3.1
PHC F_1	7	nd	nd	nd	55
PHC F_2	4	nd	nd	nd	98
PHC F_3	8	nd	nd	nd	300
PHC F_4	6	nd	nd	nd	2800

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

No detectable BTEX or PHC parameters were identified in any of the soil samples analyzed. All test results comply with the MECP Table 3 Residential Standards.

TABLE 7: Analytical Test Results – Soil
Metals

Parameter	MDL (µg/g)	Soil Samples (µg/g) June 30, July 2 and July 5, 2021				MECP Table 3 Residential Standards (µg/g)
		BH1-21-AU1	BH2-21-SS8	BH5-21-SS5	TP1-21-G2	
Antimony	1.0	1.3	1.1	1.3	1.3	7.5
Arsenic	1.0	4.5	2.7	2.5	5.9	18
Barium	1.0	129	264	251	235	390
Beryllium	0.5	nd	0.7	0.6	0.7	4
Boron	5.0	11.9	nd	nd	nd	120
Cadmium	0.5	nd	nd	nd	nd	1.2
Chromium	5.0	13.3	86.4	76.3	74.7	160
Cobalt	1.0	6.7	18.5	15.8	14.9	22
Copper	5.0	10.1	34.0	37.5	41.0	140
Lead	1.0	25.9	53.8	85.8	**140**	120
Molybdenum	1.0	2.6	1.2	nd	nd	6.9
Nickel	5.0	14.3	44.6	40.9	39.4	100
Selenium	1.0	nd	nd	nd	nd	2.4
Silver	0.3	nd	nd	nd	nd	20
Thallium	1.0	nd	nd	nd	nd	1
Uranium	1.0	nd	nd	nd	nd	23
Vanadium	10.0	20.0	81.9	67.2	69.6	86
Zinc	20.0	26.6	173	119	141	340

Notes:
- MDL – Method Detection Limit
- nd – not detected above the MDL
- **Bold and Underline** – Parameter exceeds the selected standard

Metal parameter concentrations were detected in all of the soil samples analyzed. With the exception of lead in soil sample TP1-21-G2, all other metal concentrations comply with the selected MECP Table 3 Residential Standards.

TABLE 8: Analytical Test Results – Soil
PAHs

Parameter	MDL (µg/g)	Soil Samples (µg/g) June 30, July 2 and July 5, 2021				MECP Table 3 Residential Standards (µg/g)
		BH1-21-AU1	BH2-21-SS8	BH5-21-SS5	TP1-21-G2	
Acenaphthene	0.02	nd	nd	0.02	0.04	7.9
Acenaphthylene	0.02	nd	nd	nd	**0.20**	0.15
Anthracene	0.02	nd	nd	0.07	0.22	0.67
Benzo[a]anthracene	0.02	0.06	nd	0.03	**0.51**	0.5
Benzo[a]pyrene	0.02	0.07	nd	0.02	**0.54**	0.3
Benzo[b]fluoranthene	0.02	0.11	nd	nd	0.60	0.78
Benzo[g,h,i]perylene	0.02	0.08	nd	nd	0.31	6.6
Benzo[k]fluoranthene	0.02	nd	nd	nd	0.33	0.78
Chrysene	0.02	0.10	nd	0.03	0.51	7
Dibenzo[a,h]anthracene	0.02	nd	nd	nd	0.09	0.1
Fluoranthene	0.02	0.08	0.06	0.11	**1.09**	0.69
Fluorene	0.02	nd	nd	0.03	0.04	62
Indeno [1,2,3-cd] pyrene	0.02	nd	nd	nd	0.29	0.38
1-Methylnaphthalene	0.02	nd	nd	nd	nd	0.99
2-Methylnaphthalene	0.02	nd	nd	nd	0.02	0.99
Methylnaphthalene (1&2)	0.04	nd	nd	nd	nd	0.99
Naphthalene	0.01	nd	nd	0.01	0.02	0.6
Phenanthrene	0.02	0.09	0.04	0.20	0.55	6.2
Pyrene	0.02	0.10	0.05	0.08	0.94	78

Notes:
- MDL – Method Detection Limit
- nd – not detected above the MDL
- **Bold and Underline** – Parameter exceeds the selected standard

PAH parameter concentrations were detected in all of the soil samples analyzed. With the exception of four (4) PAH concentrations in soil sample TP1-21-G2, all other PAH concentrations comply with the selected MECP Table 3 Residential Standards.

TABLE 9: Analytical Test Results – Soil
pH, EC and SAR

Parameter	MDL	Soil Samples June 30, July 2 and July 5, 2021			MECP Table 3 Residential Standards
		BH1-21-AU1	BH3-21-SS3	BH4-21-SS8	
pH	0.05	8.01	NA	8.19	NA
EC (uS/cm)	5	**2410**	**1300**	NA	700
SAR	0.01	0.69	**5.31**	NA	5

Notes:
- MDL – Method Detection Limit
- NA – parameter not analyzed
- **Bold and Underline** – Parameter exceeds the selected standard

The EC and SAR test results are in excess of the selected standards. The elevated results are due to the use of road salt for pedestrian and vehicular safety and as such, EC and SAR are exempted as contaminants of potential environmental concern on the Phase II ESA Property.

The analytical results for BTEX, PHCs, PAHs and Metals tested in soil are shown on Drawings PE5340-4 through PE5340-6 - Analytical Testing Plan – Soil.

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

TABLE 10: Maximum Concentrations – Soil

Parameter	Maximum Concentration (µg/g)	Borehole	Depth Interval (m BGS)
Antimony	1.3	BH1-21, BH5-21, and TP1-21	0.0796 to 5.33-5.94m
Arsenic	5.9	TP1-21-G2	0.15-0.18m
Barium	264	BH2-21-SS8	5.33-5.94m
Beryllium	0.7	BH2-21-SS8, TP1-21-G2	0.15 to 5.33-5.94m
Boron	11.9	BH1-21-AU1	0.076-0.30m
Chromium	86.4	BH2-21-SS8	
Cobalt	18.5		
Copper	41.0	TP1-21-G2	0.15-0.18m
Lead	**140**		
Molybdenum	2.6	BH1-21-AU1	0.076-0.30m
Nickel	44.6	BH2-21-SS8	5.33-5.94m
Vanadium	81.9		
Zinc	173		
Acenaphthene	0.04	TP1-21-G2	0.15-0.18m
Acenaphthylene	**0.20**		
Anthracene	0.22		
Benzo[a]anthracene	**0.51**		
Benzo[a]pyrene	**0.54**		
Benzo[b]fluoranthene	0.60		
Benzo[g,h,i]perylene	0.31		
Benzo[k]fluoranthene	0.33		
Chrysene	0.51		
Dibenzo[a,h]anthracene	0.09		
Fluoranthene	**1.09**		
Fluorene	0.04		
Indeno [1,2,3-cd] pyrene	0.29		
1-Methylnaphthalene	nd		
2-Methylnaphthalene	0.02		
Methylnaphthalene (1&2)	nd		
Naphthalene	0.02		
Phenanthrene	0.55		
Pyrene	0.94		

Note:
- **Bold and Underline** – Parameter exceeds the selected standard

No other parameters were identified above the laboratory method detection limits.

5.6 Groundwater Quality

Groundwater samples were recovered from monitoring wells installed in BH4-21 and BH5-21, however, a groundwater sample from BH1-21 was not possible due to a dry well at the time of sampling. Groundwater samples from BH4-21 and BH5-21 were submitted for laboratory analysis of BTEX, PHC (fractions, F1-F4) and VOC analysis. The groundwater samples were obtained from the screened intervals noted in Table 2. The results of the analytical testing are presented in Table 11 and Table 12. The laboratory certificates of analysis are provided in Appendix 1.

TABLE 11: Analytical Test Results – Groundwater
BTEX and PHCs

Parameter	MDL (µg/L)	Groundwater Samples (µg/L) July 6, 2021		MECP Table 3 Standards (µg/L)
		BH4-21-GW1	BH5-21-GW1	
Benzene	0.5	nd	nd	44
Toluene	0.5	nd	0.9	18000
Ethylbenzene	0.5	nd	nd	2300
Xylenes	0.5	nd	nd	4200
PHC F_1	25	nd	nd	750
PHC F_2	100	nd	nd	150
PHC F_3	100	nd	nd	500
PHC F_4	100	nd	nd	500

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

All of the groundwater results comply with the MECP Table 3 Standards.

TABLE 12: Analytical Test Results – Groundwater
VOCs

Parameter	MDL (µg/L)	Groundwater Samples (µg/L) July 6, 2021		MECP Table 3 Standards (µg/L)
		BH4-21-GW1	BH5-21-GW1	
Acetone	5.0	nd	nd	130000
Benzene	0.5	nd	nd	44
Bromodichloromethane	0.5	nd	nd	85000
Bromoform	0.5	nd	nd	380
Bromomethane	0.5	nd	nd	5.6
Carbon Tetrachloride	0.2	nd	nd	0.79
Chlorobenzene	0.5	nd	nd	630
Chloroform	0.5	nd	nd	2.4
Dibromochloromethane	0.5	nd	nd	82000
Dichlorodifluoromethane	1.0	nd	nd	4400
1,2-Dichlorobenzene	0.5	nd	nd	4600
1,3-Dichlorobenzene	0.5	nd	nd	9600
1,4-Dichlorobenzene	0.5	nd	nd	8
1,1-Dichloroethane	0.5	nd	nd	320
1,2-Dichloroethane	0.5	nd	nd	1.6
1,1-Dichloroethylene	0.5	nd	nd	1.6
cis-1,2-Dichloroethylene	0.5	nd	nd	1.6
trans-1,2-Dichloroethylene	0.5	nd	nd	1.6
1,2-Dichloropropane	0.5	nd	nd	16
1,3-Dichloropropene, total	0.5	nd	nd	5.2
Ethylbenzene	0.5	nd	nd	2300
Ethylene dibromide (dibromoethane, 1,2-)	0.2	nd	nd	0.25
Hexane	1.0	nd	nd	51
Methyl Ethyl Ketone (2-Butanone)	5.0	nd	nd	470000
Methyl Isobutyl Ketone	5.0	nd	nd	140000
Methyl tert-butyl ether	2.0	nd	nd	190
Methylene Chloride	5.0	nd	nd	610
Styrene	0.5	nd	nd	1300
1,1,1,2-Tetrachloroethane	0.5	nd	nd	3.3
1,1,2,2-Tetrachloroethane	0.5	nd	nd	3.2
Tetrachloroethylene	0.5	nd	nd	1.6
Toluene	0.5	nd	0.9	18000
1,1,1-Trichloroethane	0.5	nd	nd	640
1,1,2-Trichloroethane	0.5	nd	nd	4.7
Trichloroethylene	0.5	nd	nd	1.6
Trichlorofluoromethane	1.0	nd	nd	2500
Vinyl Chloride	0.5	nd	nd	0.5
Xylenes, total	0.5	nd	nd	4200

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

With the exception of toluene, no detectable VOC concentrations were identified in the groundwater samples analyzed. All of the groundwater results comply with the MECP Table 3 Standards.

The analytical results for BTEX, PHCs and VOCs tested in groundwater are shown on Drawing PE5340-7–Analytical Testing Plan – Groundwater.

The maximum concentrations of analyzed parameters in the groundwater at the site are summarized below in Table 13.

TABLE 13: Maximum Concentrations – Groundwater

Parameter	Maximum Concentration (µg/g)	Borehole	Screened Interval (m BGS)
Toluene	0.9	BH5-21-GW1	3.10-6.10m

Remaining parameters analysed were not identified above the laboratory method detection limits.

5.7 Quality Assurance and Quality Control Results

All samples submitted as part of the June and July 2021 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.

Based on the analytical laboratory results, it is our opinion that the overall quality of the field data collected during this Phase II-ESA 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 site, two (2) PCAs and the resultant APECs are summarized in Table1 in Section 3.3, along with their respective locations and contaminants of potential concern (CPCs).

Contaminants of Potential Concern

As per Section 3.3, the contaminants of potential concern (CPCs) in soil and/or groundwater include benzene, toluene, ethylbenzene and xylenes (BTEX), and petroleum hydrocarbons (PHCs, F1-F4), polycyclic aromatic hydrocarbons (PAHs) and metals (including arsenic (As), antimony (Sb) and selenium (Se)), as well as electrical conductivity (EC) and sodium adsorption ratio (SAR).

Subsurface Structures and Utilities

The Phase II ESA Property is situated in a municipally serviced area. Underground utilities and/or structures include municipal water and sewer, electricity and natural gas.

Based on the findings of the Phase II ESA, any underground utilities were are not expected to affect contaminant distribution and transport.

Physical Setting

Site Stratigraphy

The site stratigraphy, from ground surface to the deepest aquifer or aquitard investigated, is illustrated on Drawings PE5340-4A, 4B, 5A, 5B, 6A, and 6B. The stratigraphy consists of:

- An asphaltic concrete layer of approximately 0.08 m thick, overlying a granular fill material consisting of silty sand and crushed stone in BH1-21, BH2-21 and BH3-21, extending to depths ranging from 0.30 to 0.46 mbgs.

- Fill material consisting of silty clay with some sand, gravel, organics, wood, brick and/or concrete fragments was identified in BH2-21, BH3-21, BH4-21 and BH5-21, and in TP1-21 and TP2-21. This fill layer extended to depths ranging from 2.59 to 6.78 mbgs. Groundwater was encountered in this layer at BH5-21.

- Silty clay was encountered in all of the boreholes, extending to depths of approximately 6.70 to 15.70 mbgs. Groundwater was encountered in this layer at BH4-21.

Hydrogeological Characteristics

Groundwater at the Phase II ESA Property was encountered in the overburden at depths ranging from 3.82 to 4.03 mbgs. The groundwater flow was not measured at this time due to unestablished groundwater levels.

Approximate Depth to Bedrock

Bedrock was not confirmed during the field program; however, it was inferred by during the DCPT test at depths ranging from 20.57 to 22.10 mbgs.

Approximate Depth to Water Table

The depth to the water table at the subject site varies between approximately 3.82 to 4.03 m below existing grade.

Sections 41 and 43.1 of the Regulation

Section 41 of the Regulation does not apply to the Phase II ESA Property, in that the subject property is not within 30m of an environmentally sensitive area.

Section 43.1 of the Regulation does not apply to the Phase II ESA Property as bedrock is located more than 2 m below ground surface.

Fill Placement

The fill material consisted of silty sand, crushed stone, traces of organics and clay with some demolition debris (brick, wood and concrete fragments), which was identified in the majority of the boreholes and extended to depths of 2.59 to 6.78 mbgs.

Existing Buildings and Structures

The Phase II ESA Property is occupied by a 2-storey commercial office building constructed circa 1965 with a southern additional built in 1987. The exterior is finished in red brick with a flat tar and gravel style roof. The building is heated by natural gas fried boilers and cooled by a roof mounted HVAC unit.

Proposed Buildings and Other Structures

The proposed site development for the Phase II ESA Property will include a 9-storey residential building with 2 levels of underground parking.

Areas of Natural Significance

There are no areas of natural significance in the Phase I Study Area.

Water Bodies

There are no natural water bodies in the Phase I Study Area.

Environmental Condition

Areas Where Contaminants are Present

Based on the analytical results, lead and PAH concentrations in excess of the selected standards are present in the fill material on the eastern portion of the Phase II Property.

Based on the analytical groundwater results, there are no groundwater contaminants present beneath the Phase II ESA Property.

Types of Contaminants

Based on the analytical results, lead, acenaphthylene, benzo(a)anthracene, benzo(a)pyrene, and fluoranthene is present in the fill material on the eastern portion of the Phase II ESA Property.

There are no groundwater contaminants of concern beneath the Phase II ESA Property.

Contaminated Media

Based on the analytical results, the fill material on the eastern portion of the Phase II ESA Property is impacted with lead and PAH concentrations.

No groundwater is impacted beneath the Phase II ESA Property.

What Is Known About Areas Where Contaminants Are Present

Based on the findings of the Phase II ESA, the fill material on the eastern portion of the Phase II Property is impacted with metal (lead) and PAHs. It is expected that the impacted fill material is associated with the demolition of the former building on site prior to 1965.

There are no contaminants present in the groundwater.

Distribution and Migration of Contaminants

Based on the findings of the Phase II ESA, distribution and migration of contaminants is not considered to have occurred on the Phase II ESA Property as the groundwater results comply with the selected MECP Table 3 Standards.

Discharge of Contaminants

Based on the findings of the Phase II ESA, discharge of contaminants is considered to be a result of the former use of the site (i.e. demolition of the former buildings).

Climatic and Meteorological Conditions

In general, climatic and meteorological conditions have the potential to affect contaminant distribution. Two (2) 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 analytical results contaminant distribution is not considered to have occurred on the Phase II ESA Property.

Potential for Vapour Intrusion

Based on low vapour pressure of the contaminates, the potential for vapor intrusion is considered negligible on the Phase II ESA Property.

6.0 CONCLUSIONS

Assessment

A Phase II ESA was conducted for the property addressed 50 The Driveway, in the 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 ESA Property.

The subsurface investigation consisted of drilling five (5) boreholes, three (3) of which were instrumented with groundwater monitoring wells. Two (2) test pits were completed as part of the investigation. The general soil profile encountered during the field program consisted of asphaltic concrete structure, overlying a granular fill material, followed by fill material consisting of silty clay, some sand, traces of organics, wood, concrete and/or bricks, overlying silty clay. Practical refusal by means of a DCPT test was encountered at depths ranging from 20.57 to 22.10 mbgs, where bedrock was inferred.

Eight (8) soil samples were submitted for laboratory analysis of benzene, toluene, ethylbenzene and xylenes (BTEX), petroleum hydrocarbons (PHCs, Fractions F_1-F_4), polycyclic aromatic hydrocarbons (PAHs) and/or metals, including hydride forming compounds: arsenic (As), Antimony (Sb) and Selenium (Se), as well as electrical conductivity (EC) and sodium adsorption ratio (SAR).

No BTEX or PHC concentrations were identified in any of the soil samples analysed. Concentrations of lead and PAH parameters, above the site standards, were identified in soil sample TP1-21-G2, while all other soil results comply with MECP Table 3 Residential Standards.

Groundwater samples from monitoring wells BH4-21 and BH5-21 were collected during the July 6, 2021 sampling event. Groundwater monitoring well BH1-21 was dry and as such, no sample could be retrieved from it. No free product or petroleum hydrocarbon sheen was noted on the purge water during the groundwater sampling events.

Groundwater samples were analyzed for VOCs (including BTEX parameters) and PHCs. A toluene concentration was identified in one groundwater sample below the site standard. All of the groundwater results comply with the MECP Table 3 Standards.

Recommendations

It is our understanding that the Phase II Property will be redeveloped for residential land use and as such, the Phase II Property will require a Record of Site Condition (RSC).

Based on the findings of the Phase II ESA, it is recommended that a soil remediation be carried out to support the filing of an RSC. Given the depth of lead and PAH impacted soil, it is recommended that the soil remediation be carried out in conjunction with the construction excavation. A representative sample of impacted soil must be submitted for a leachate analysis in accordance with O.Reg. 347/558 prior to disposal at an approved landfill site.

Any excess soil that meets site standards and requires removal for construction purposes must be handled in accordance with O. Reg. 406/19, On-Site and Excess Soil Management. Additional information regarding O.Reg. 406/19 can be provided upon request.

Monitoring Wells

It is recommended that the monitoring wells installed on the Phase II Property be maintained for possible future monitoring events. 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. 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.

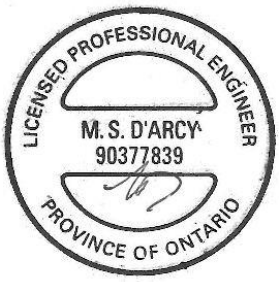
Should any conditions be encountered at the subject site and/or historical information that differ from our findings, we request that we be notified immediately in order to allow for a reassessment.

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

Paterson Group Inc.

Mandy Witteman, B.Eng., M.A.Sc.

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



Report Distribution:

- Main and Main
- Paterson Group

FIGURES

Figure 1 - Key Plan

Drawing PE5340-3 – Test Hole Location Plan

Drawing PE5340-4 – Analytical Testing Plan – Soil (Metals)

Drawing PE5340-4A – Cross-section A – A' – Soil (Metals)

Drawing PE5340-4B – Cross-section B – B' – Soil (Metals)

Drawing PE5340-5 – Analytical Testing Plan – Soil (PAHs)

Drawing PE5340-5A – Cross-section A – A' – Soil (PAHs)

Drawing PE5340-5B – Cross-section B – B' – Soil (PAHs)

FIGURES

Drawing PE5340-6 – Analytical Testing Plan – Soil (BTEX, PHCs)

Drawing PE5340-6A – Cross-section A – A' – Soil (BTEX, PHCs)

Drawing PE5340-6B – Cross-section B – B' – Soil (BTEX, PHCs)

Drawing PE5340-7 – Analytical Testing Plan – Groundwater (BTEX, PHCs, VOCs)

Drawing PE5340-7A – Cross-section A – A' – Groundwater (BTEX, PHCs, VOCs)

Drawing PE5340-7B – Cross-section B – B' – Groundwater (BTEX, PHCs, VOCs)

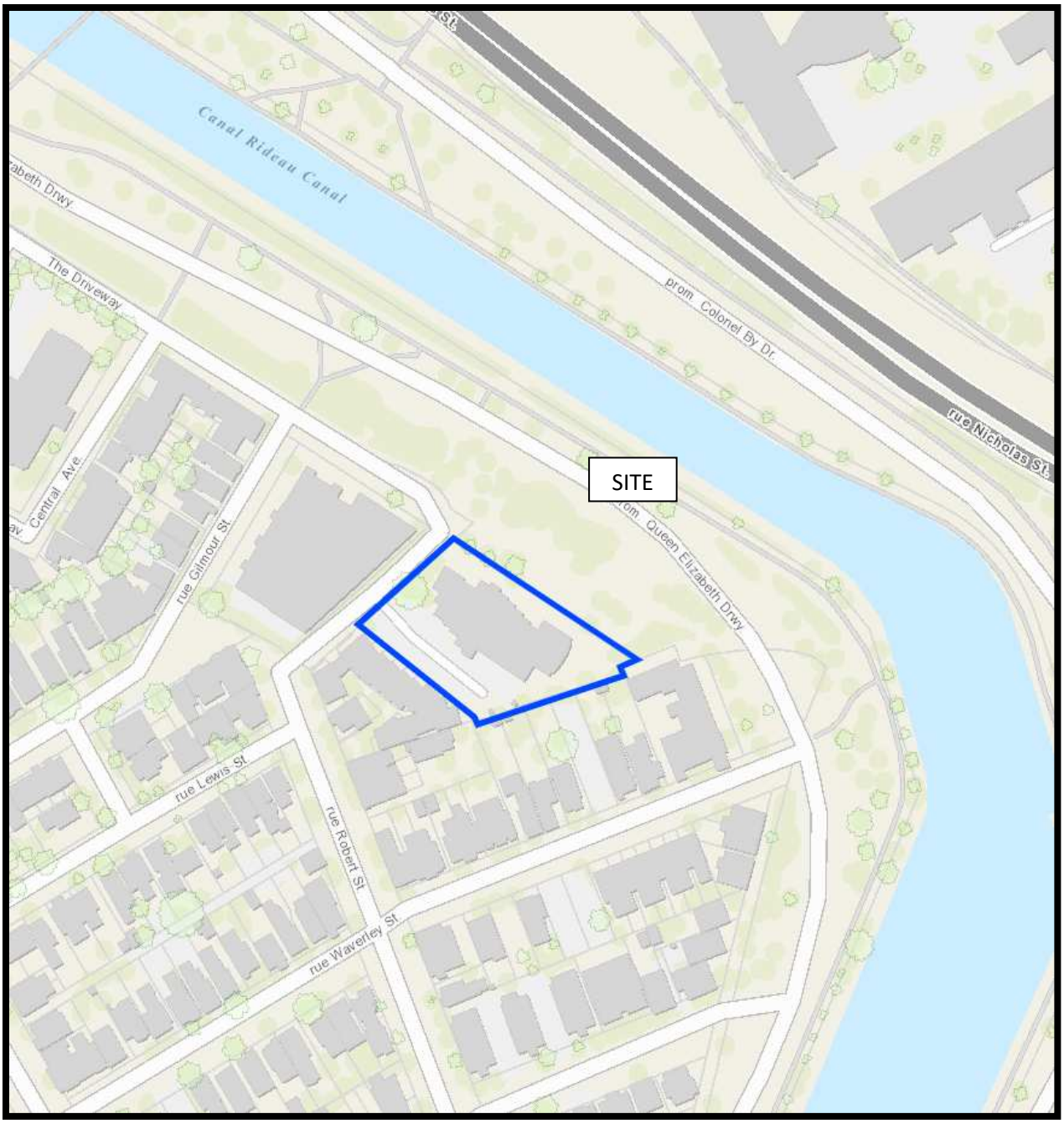
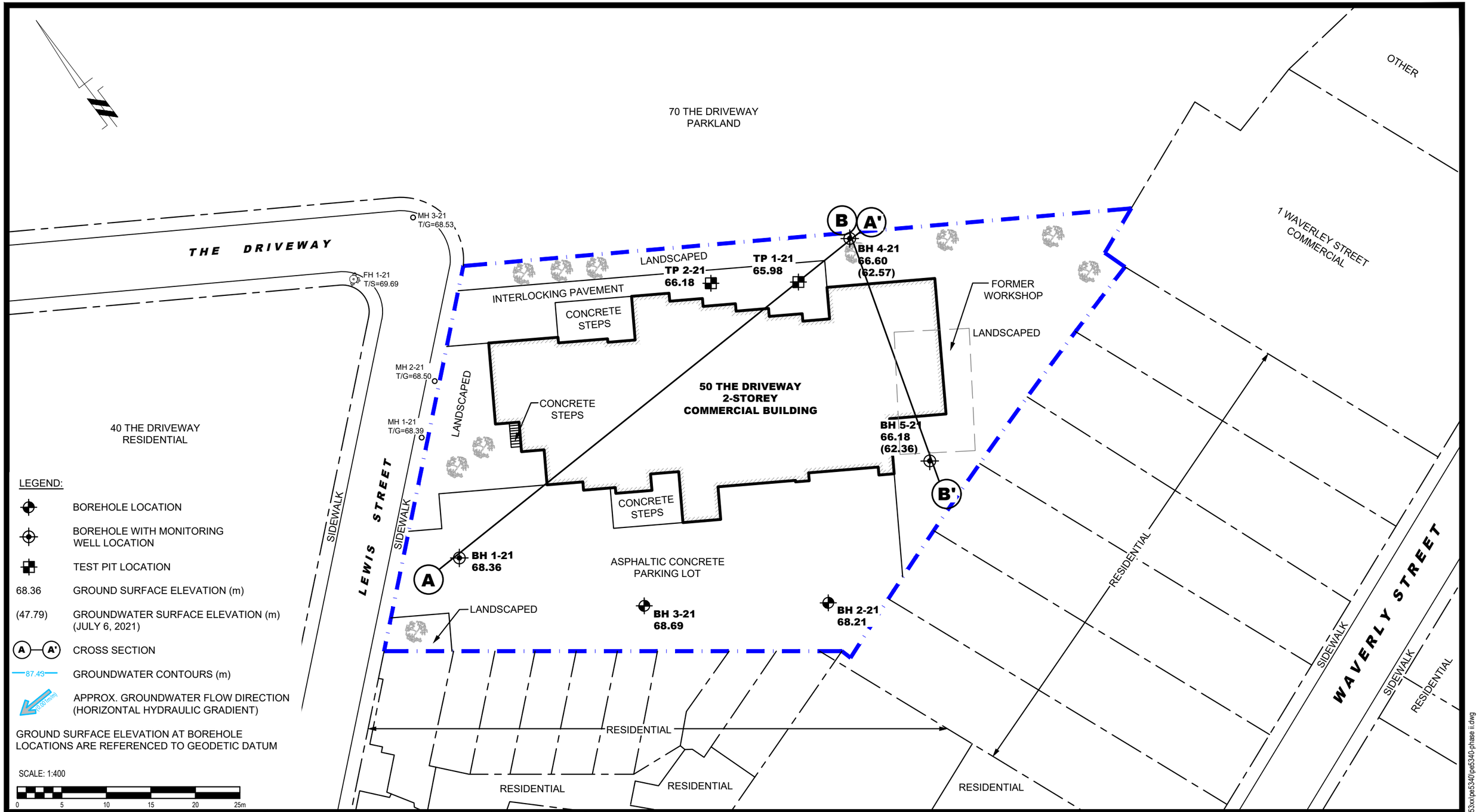


FIGURE 1

KEY PLAN



LEGEND:

- BOREHOLE LOCATION
- BOREHOLE WITH MONITORING WELL LOCATION
- TEST PIT LOCATION
- 68.36 GROUND SURFACE ELEVATION (m)
- (47.79) GROUNDWATER SURFACE ELEVATION (m) (JULY 6, 2021)
- A — A' CROSS SECTION
- 87.43 GROUNDWATER CONTOURS (m)
- APPROX. GROUNDWATER FLOW DIRECTION (HORIZONTAL HYDRAULIC GRADIENT)

GROUND SURFACE ELEVATION AT BOREHOLE LOCATIONS ARE REFERENCED TO GEODETIC DATUM

SCALE: 1:400

0 5 10 15 20 25m

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PHASE II - ENVIRONMENTAL SITE ASSESSMENT
50 THE DRIVEWAY

OTTAWA, ONTARIO

Title:

TEST HOLE LOCATION PLAN

Scale: 1:400	Date: 07/2021
Drawn by: JM	Report No.: PE5340-2
Checked by: MW	Dwg. No.: PE5340-3
Approved by: MSD	Revision No.:

11x17

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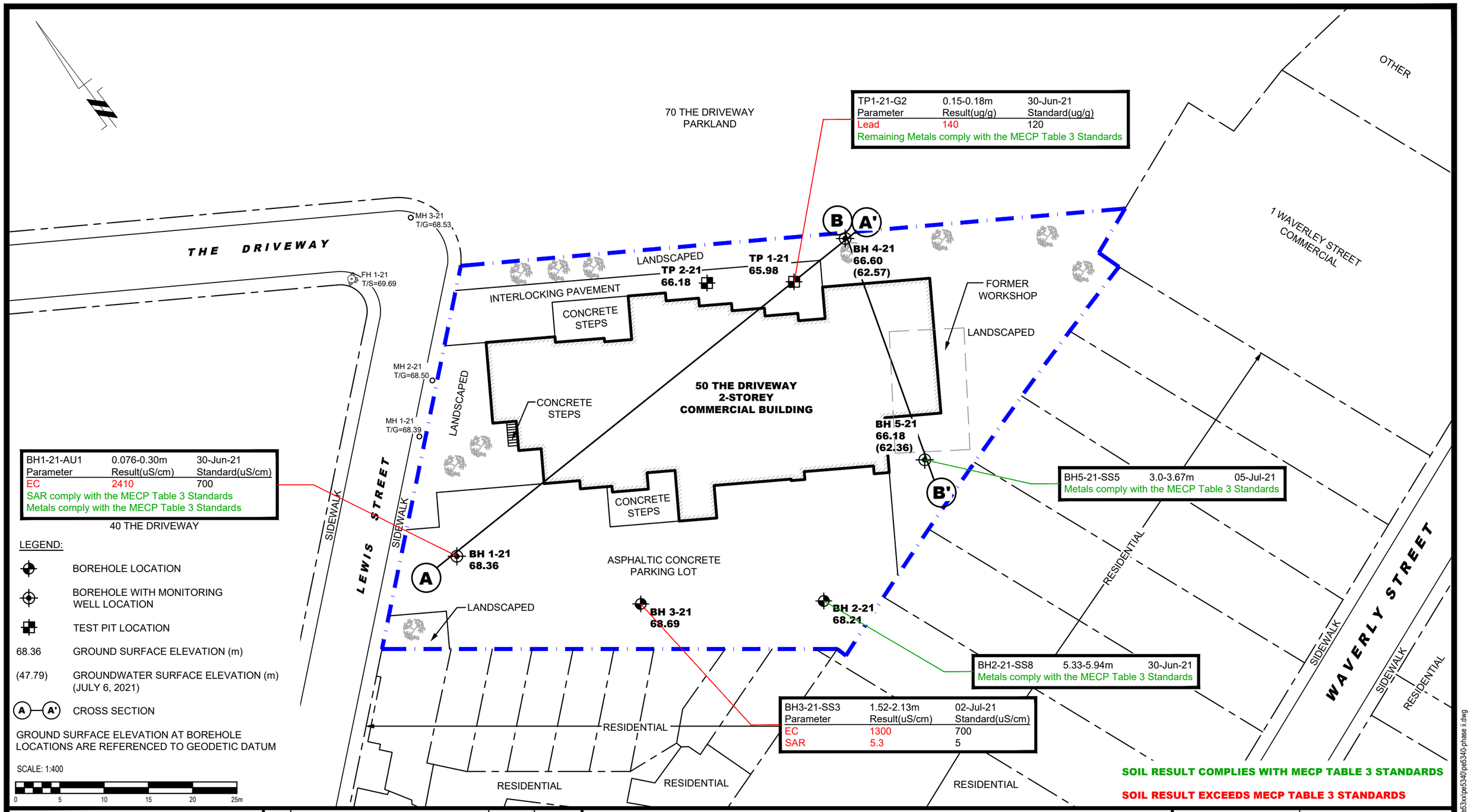

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PHASE II - ENVIRONMENTAL SITE ASSESSMENT
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OTTAWA, ONTARIO

Title:
ANALYTICAL TESTING PLAN - SOIL (METALS)

Scale: 1:400	Date: 07/2021
Drawn by: JM	Report No.: PE5340-2
Checked by: MW	Dwg. No.: PE5340-4
Approved by: MSD	Revision No.:

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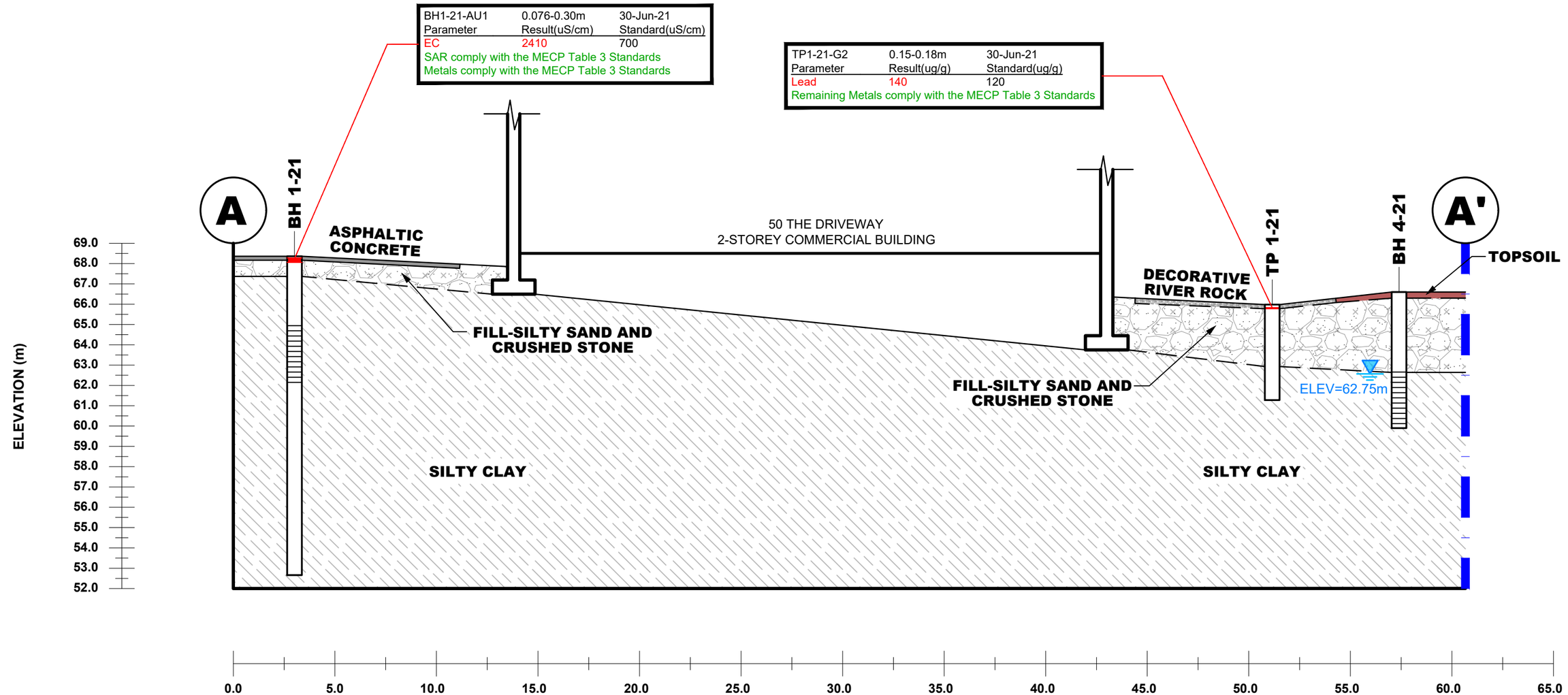
11x17

BH1-21-AU1	0.076-0.30m	30-Jun-21
Parameter	Result(uS/cm)	Standard(uS/cm)
EC	2410	700

SAR comply with the MECP Table 3 Standards
Metals comply with the MECP Table 3 Standards

TP1-21-G2	0.15-0.18m	30-Jun-21
Parameter	Result(ug/g)	Standard(ug/g)
Lead	140	120

Remaining Metals comply with the MECP Table 3 Standards



SOIL RESULT COMPLIES WITH MECP TABLE 3 STANDARDS

SOIL RESULT EXCEEDS MECP TABLE 3 STANDARDS

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OTTAWA, ONTARIO

Title:
CROSS SECTION A-A' - SOIL (METALS)

Scale: AS SHOWN	Date: 07/2021
Drawn by: YA	Report No.: PE5340-2
Checked by: MW	Dwg. No.: PE5340-4A
Approved by: MSD	Revision No.:

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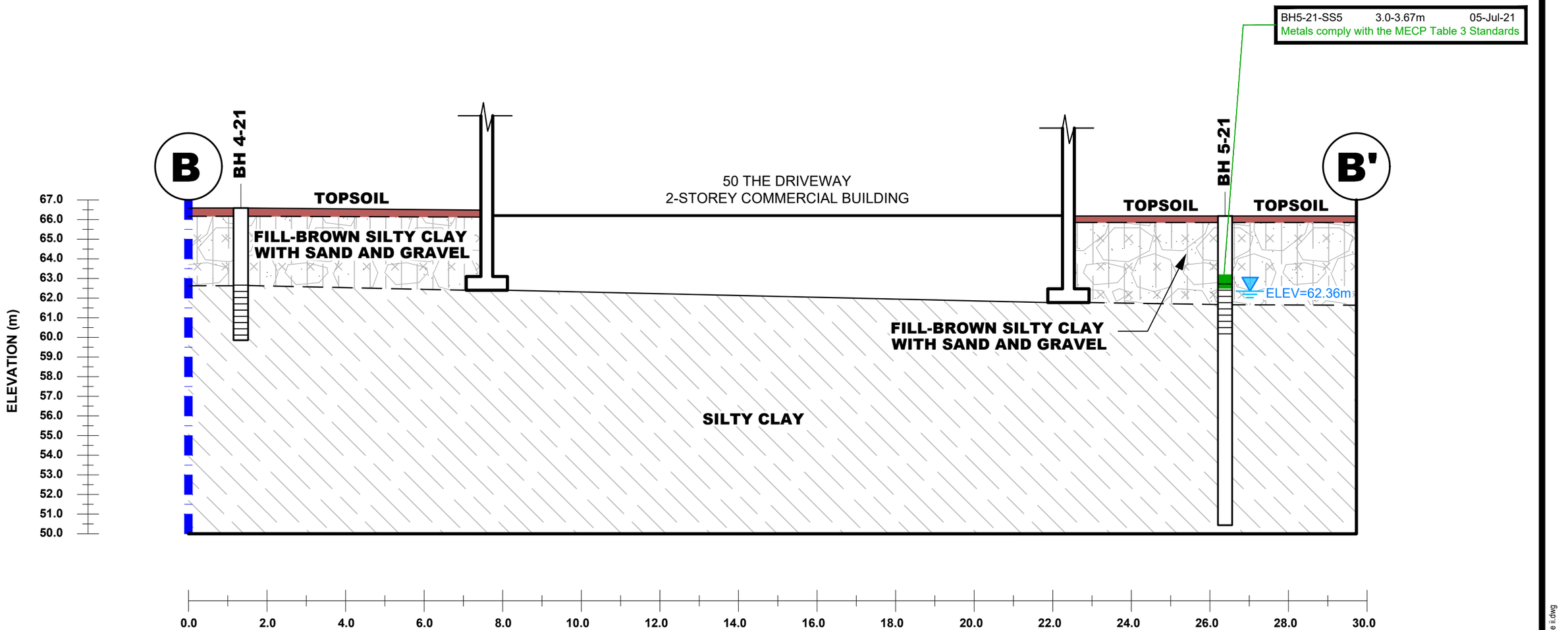

SOIL RESULT COMPLIES WITH MECP TABLE 3 STANDARDS

SOIL RESULT EXCEEDS MECP TABLE 3 STANDARDS

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PHASE II - ENVIRONMENTAL SITE ASSESSMENT
50 THE DRIVEWAY

OTTAWA, ONTARIO

Title:

CROSS SECTION B-B' - SOIL (METALS)

Scale: AS SHOWN	Date: 07/2021
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Checked by: MW	Dwg. No.: PE5340-4B
Approved by: MSD	Revision No.:

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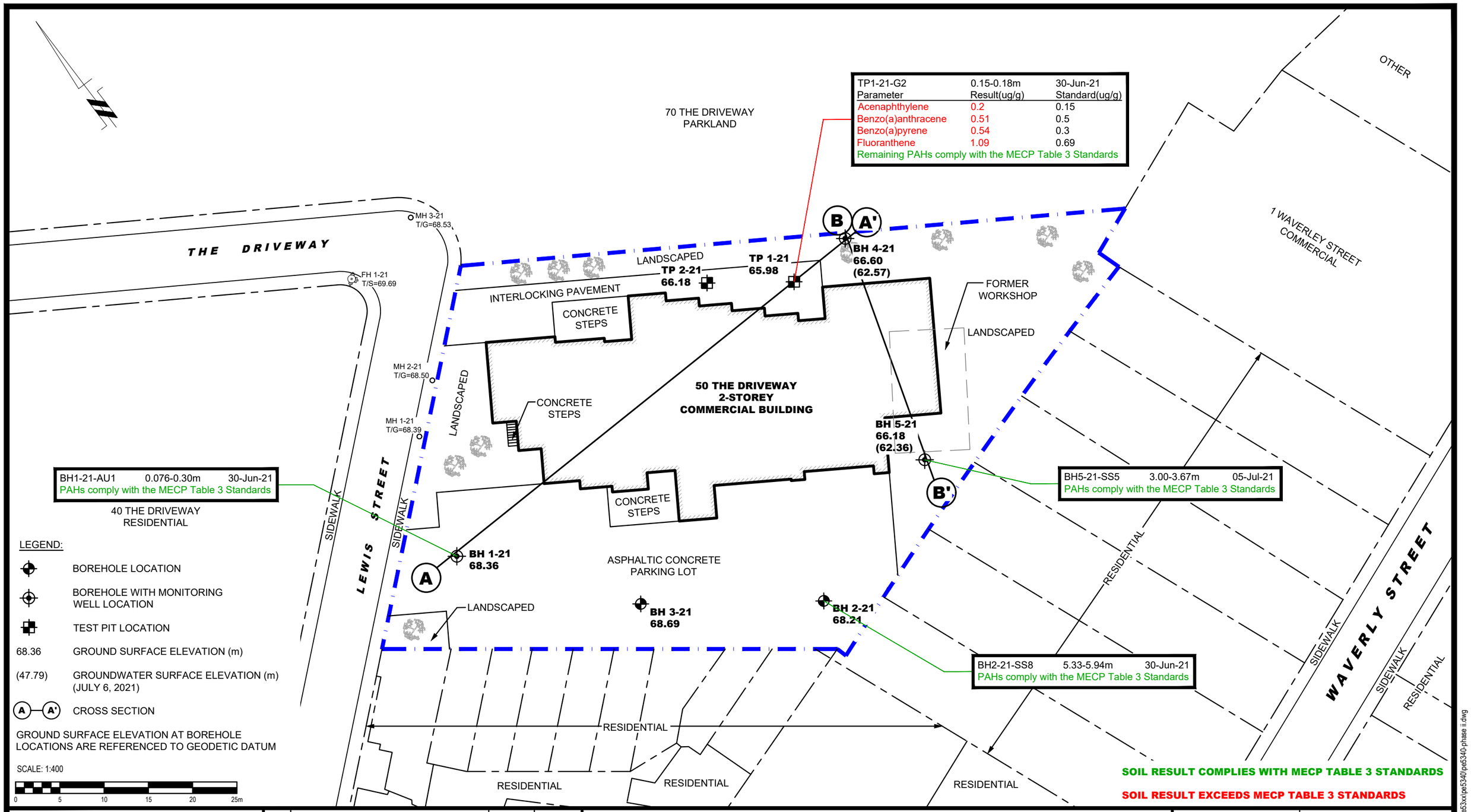

TP1-21-G2	0.15-0.18m	30-Jun-21
Parameter	Result(ug/g)	Standard(ug/g)
Acenaphthylene	0.2	0.15
Benzo(a)anthracene	0.51	0.5
Benzo(a)pyrene	0.54	0.3
Fluoranthene	1.09	0.69
Remaining PAHs comply with the MECP Table 3 Standards		

LEGEND:

- BOREHOLE LOCATION
- BOREHOLE WITH MONITORING WELL LOCATION
- TEST PIT LOCATION
- 68.36 GROUND SURFACE ELEVATION (m)
- (47.79) GROUNDWATER SURFACE ELEVATION (m) (JULY 6, 2021)
- A — A' CROSS SECTION

GROUND SURFACE ELEVATION AT BOREHOLE LOCATIONS ARE REFERENCED TO GEODETIC DATUM

SCALE: 1:400

0 5 10 15 20 25m

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PHASE II - ENVIRONMENTAL SITE ASSESSMENT
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OTTAWA, ONTARIO

Title:

ANALYTICAL TESTING PLAN - SOIL (PAHs)

Scale: 1:400	Date: 07/2021
Drawn by: JM	Report No.: PE5340-2
Checked by: MW	Dwg. No.: PE5340-5
Approved by: MSD	Revision No.:

11x17

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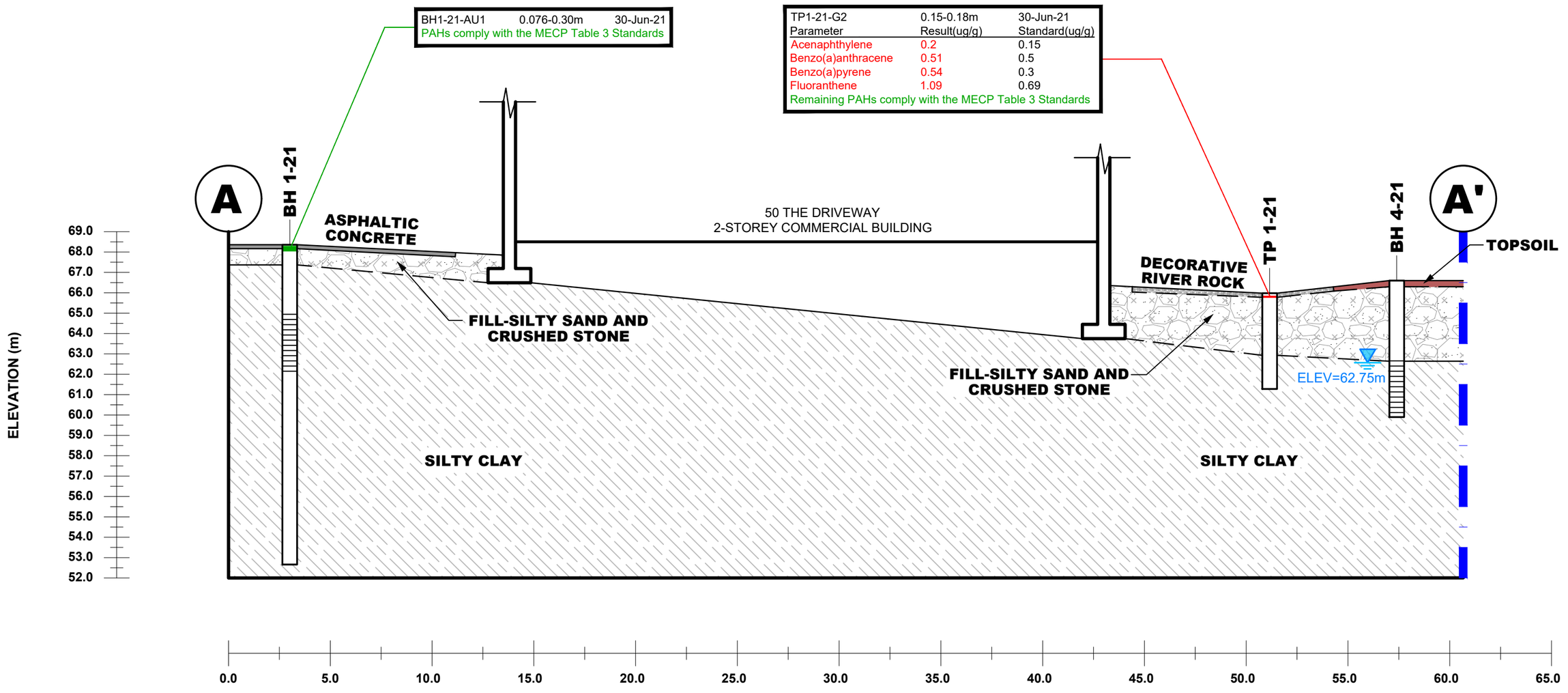
BH1-21-AU1	0.076-0.30m	30-Jun-21
PAHs comply with the MECP Table 3 Standards		

TP1-21-G2	0.15-0.18m	30-Jun-21
Parameter	Result(ug/g)	Standard(ug/g)
Acenaphthylene	0.2	0.15
Benzo(a)anthracene	0.51	0.5
Benzo(a)pyrene	0.54	0.3
Fluoranthene	1.09	0.69
Remaining PAHs comply with the MECP Table 3 Standards		



SOIL RESULT COMPLIES WITH MECP TABLE 3 STANDARDS

SOIL RESULT EXCEEDS MECP TABLE 3 STANDARDS

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50 THE DRIVEWAY

OTTAWA, ONTARIO

Title:

CROSS SECTION A-A' - SOIL (PAHs)

Scale: AS SHOWN	Date: 07/2021
Drawn by: YA	Report No.: PE5340-2
Checked by: MW	Dwg. No.: PE5340-5A
Approved by: MSD	Revision No.:

11x17

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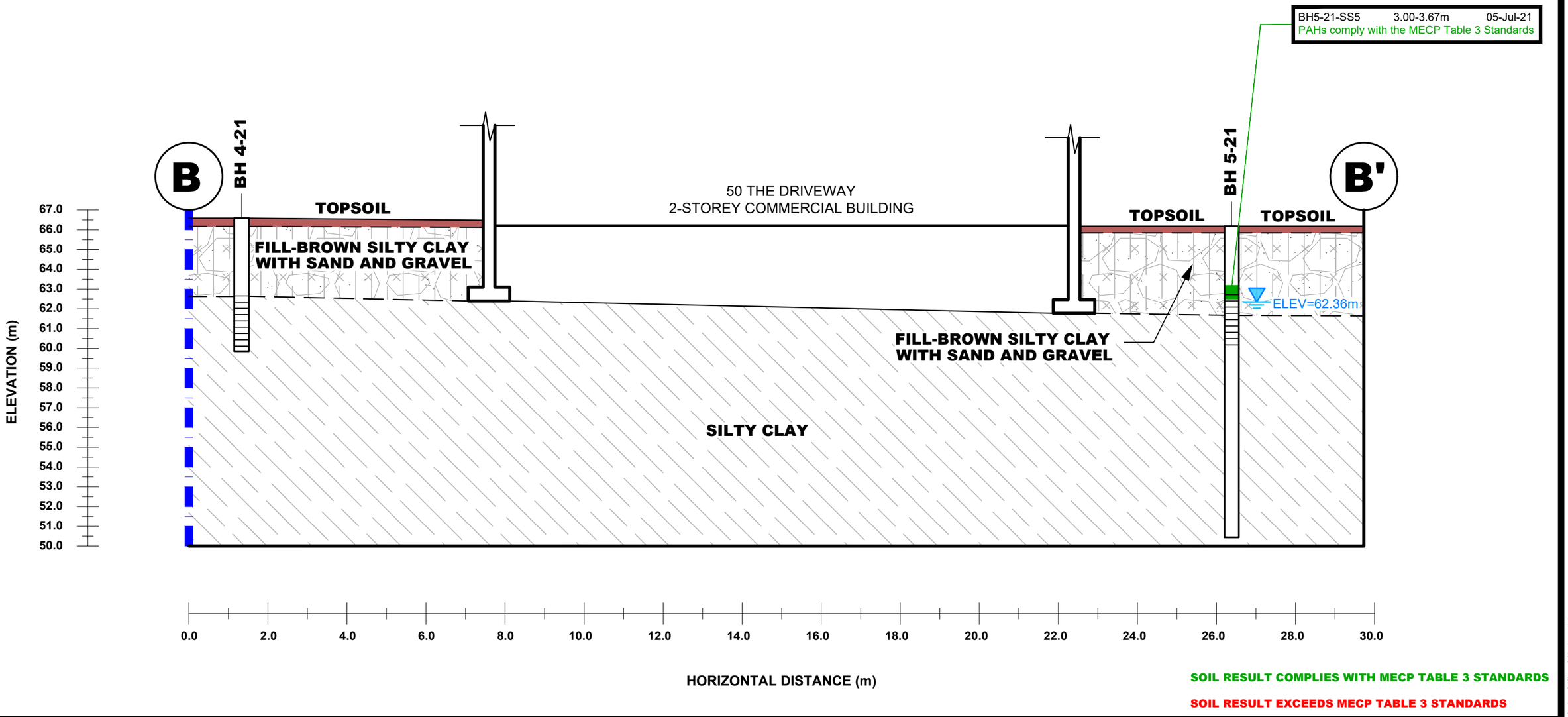

SOIL RESULT COMPLIES WITH MECP TABLE 3 STANDARDS

SOIL RESULT EXCEEDS MECP TABLE 3 STANDARDS

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OTTAWA, ONTARIO

Title:

CROSS SECTION B-B' - SOIL (PAHs)

Scale: AS SHOWN	Date: 07/2021
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Checked by: MW	Dwg. No.: PE5340-5B
Approved by: MSD	Revision No.:

11x17

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70 THE DRIVEWAY
PARKLAND

OTHER

1 WAVERLEY STREET
COMMERCIAL

THE DRIVEWAY

MH 3-21
T/G=68.53

FH 1-21
T/S=69.69

MH 2-21
T/G=68.50

MH 1-21
T/G=68.39

LANDSCAPED

INTERLOCKING PAVEMENT

CONCRETE STEPS

LANDSCAPED

TP 2-21
66.18

TP 1-21
65.98

BH 4-21
66.60
(62.57)

B

A'

FORMER WORKSHOP

LANDSCAPED

50 THE DRIVEWAY
2-STOREY
COMMERCIAL BUILDING

CONCRETE STEPS

BH 5-21
66.18
(62.36)

B'

CONCRETE STEPS

BH4-21-SS8 5.33-5.94m 02-Jul-21
BTEX comply with the MECP Table 3 Standards
PHCs comply with the MECP Table 3 Standards

BH5-21-SS7 4.57-5.18m 05-Jul-21
BTEX comply with the MECP Table 3 Standards
PHCs comply with the MECP Table 3 Standards

BH1-21-SS5 3.81-4.42m 30-Jun-21
BTEX comply with the MECP Table 3 Standards
PHCs comply with the MECP Table 3 Standards

40 THE DRIVEWAY
RESIDENTIAL

SIDEWALK

LEWIS STREET

SIDEWALK

BH 1-21
68.36

A

ASPHALTIC CONCRETE
PARKING LOT

BH 3-21
68.69

BH 2-21
68.21

LANDSCAPED

RESIDENTIAL

RESIDENTIAL

RESIDENTIAL

RESIDENTIAL

SIDEWALK

WAVERLY STREET

SIDEWALK

RESIDENTIAL

LEGEND:

- BOREHOLE LOCATION
- BOREHOLE WITH MONITORING WELL LOCATION
- TEST PIT LOCATION
- 68.36 GROUND SURFACE ELEVATION (m)
- (47.79) GROUNDWATER SURFACE ELEVATION (m) (JULY 6, 2021)
- A — A' CROSS SECTION

GROUND SURFACE ELEVATION AT BOREHOLE LOCATIONS ARE REFERENCED TO GEODETIC DATUM

SCALE: 1:400

0 5 10 15 20 25m

SOIL RESULT COMPLIES WITH MECP TABLE 3 STANDARDS

SOIL RESULT EXCEEDS MECP TABLE 3 STANDARDS

patersongroup
consulting engineers

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

NO.	REVISIONS	DATE	INITIAL

MAIN AND MAIN

PHASE II - ENVIRONMENTAL SITE ASSESSMENT
50 THE DRIVEWAY

OTTAWA, ONTARIO

Title:

ANALYTICAL TESTING PLAN - SOIL (BTEX, PHCs)

Scale: 1:400	Date: 07/2021
Drawn by: JM	Report No.: PE5340-2
Checked by: MW	Dwg. No.: PE5340-6
Approved by: MSD	Revision No.:

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11x17

BH1-21-SS5 3.81-4.42m 30-Jun-21
BTEX comply with the MECP Table 3 Standards
PHCs comply with the MECP Table 3 Standards

BH4-21-SS8 5.33-5.94m 02-Jul-21
BTEX comply with the MECP Table 3 Standards
PHCs comply with the MECP Table 3 Standards

A

BH 1-21

ASPHALTIC CONCRETE

50 THE DRIVEWAY
2-STOREY COMMERCIAL BUILDING

FILL-SILTY SAND AND CRUSHED STONE

DECORATIVE RIVER ROCK

TP 1-21

BH 4-21

A'

TOPSOIL

FILL-SILTY SAND AND CRUSHED STONE

ELEV=62.75m

SILTY CLAY

SILTY CLAY

ELEVATION (m)

69.0
68.0
67.0
66.0
65.0
64.0
63.0
62.0
61.0
60.0
59.0
58.0
57.0
56.0
55.0
54.0
53.0
52.0

0.0 5.0 10.0 15.0 20.0 25.0 30.0 35.0 40.0 45.0 50.0 55.0 60.0 65.0

HORIZONTAL DISTANCE (m)

SOIL RESULT COMPLIES WITH MECP TABLE 3 STANDARDS

SOIL RESULT EXCEEDS MECP TABLE 3 STANDARDS

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consulting engineers

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NO.	REVISIONS	DATE	INITIAL

MAIN AND MAIN
PHASE II - ENVIRONMENTAL SITE ASSESSMENT
50 THE DRIVEWAY
OTTAWA, ONTARIO

Title:
CROSS SECTION A-A' - SOIL (BTEX, PHCs)

Scale: AS SHOWN	Date: 07/2021
Drawn by: YA	Report No.: PE5340-2
Checked by: MW	Dwg. No.: PE5340-6A
Approved by: MSD	Revision No.:

11x17

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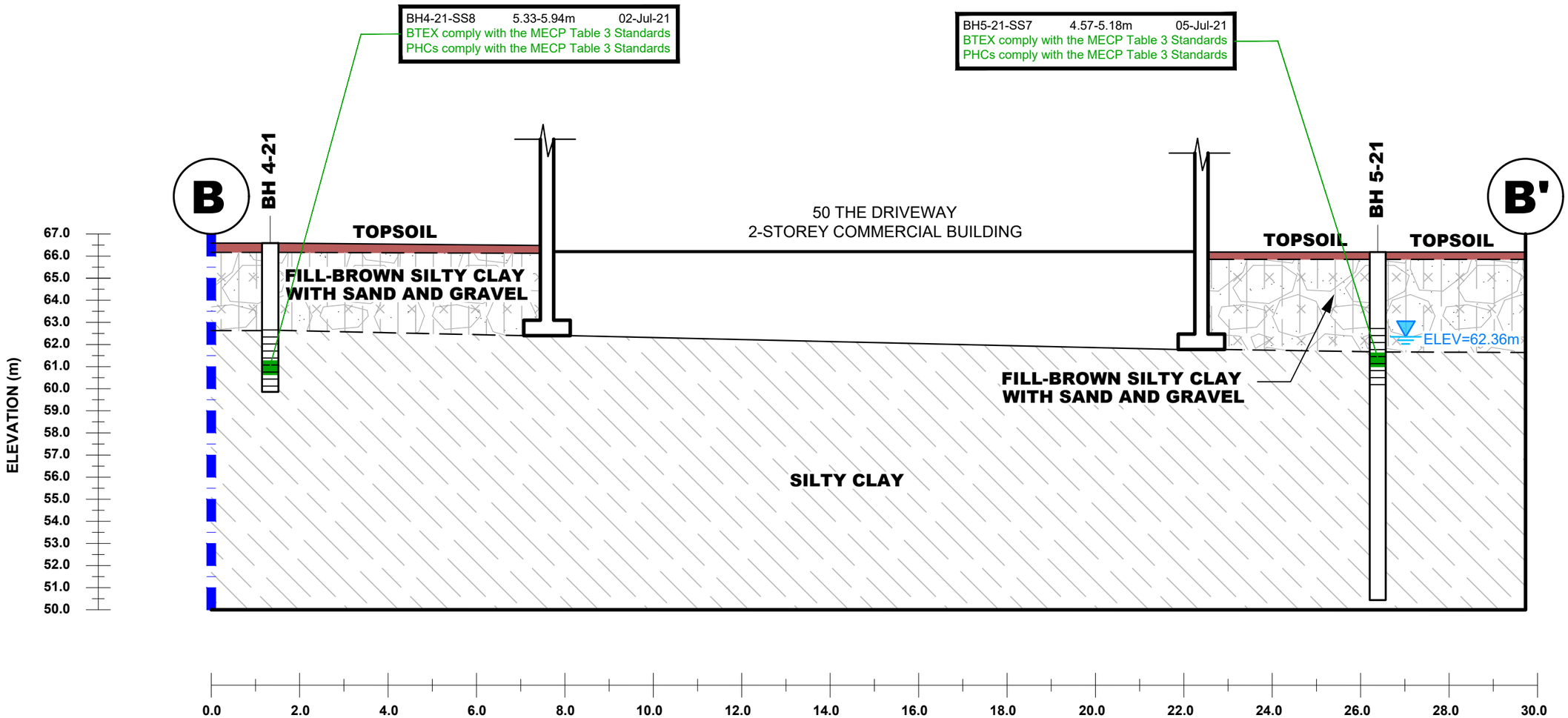

SOIL RESULT COMPLIES WITH MECP TABLE 3 STANDARDS

SOIL RESULT EXCEEDS MECP TABLE 3 STANDARDS

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NO.	REVISIONS	DATE	INITIAL

MAIN AND MAIN

PHASE II - ENVIRONMENTAL SITE ASSESSMENT
50 THE DRIVEWAY

OTTAWA, ONTARIO

Title:

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

Scale: AS SHOWN	Date: 07/2021
Drawn by: YA	Report No.: PE5340-2
Checked by: MW	Dwg. No.: PE5340-6B
Approved by: MSD	Revision No.:

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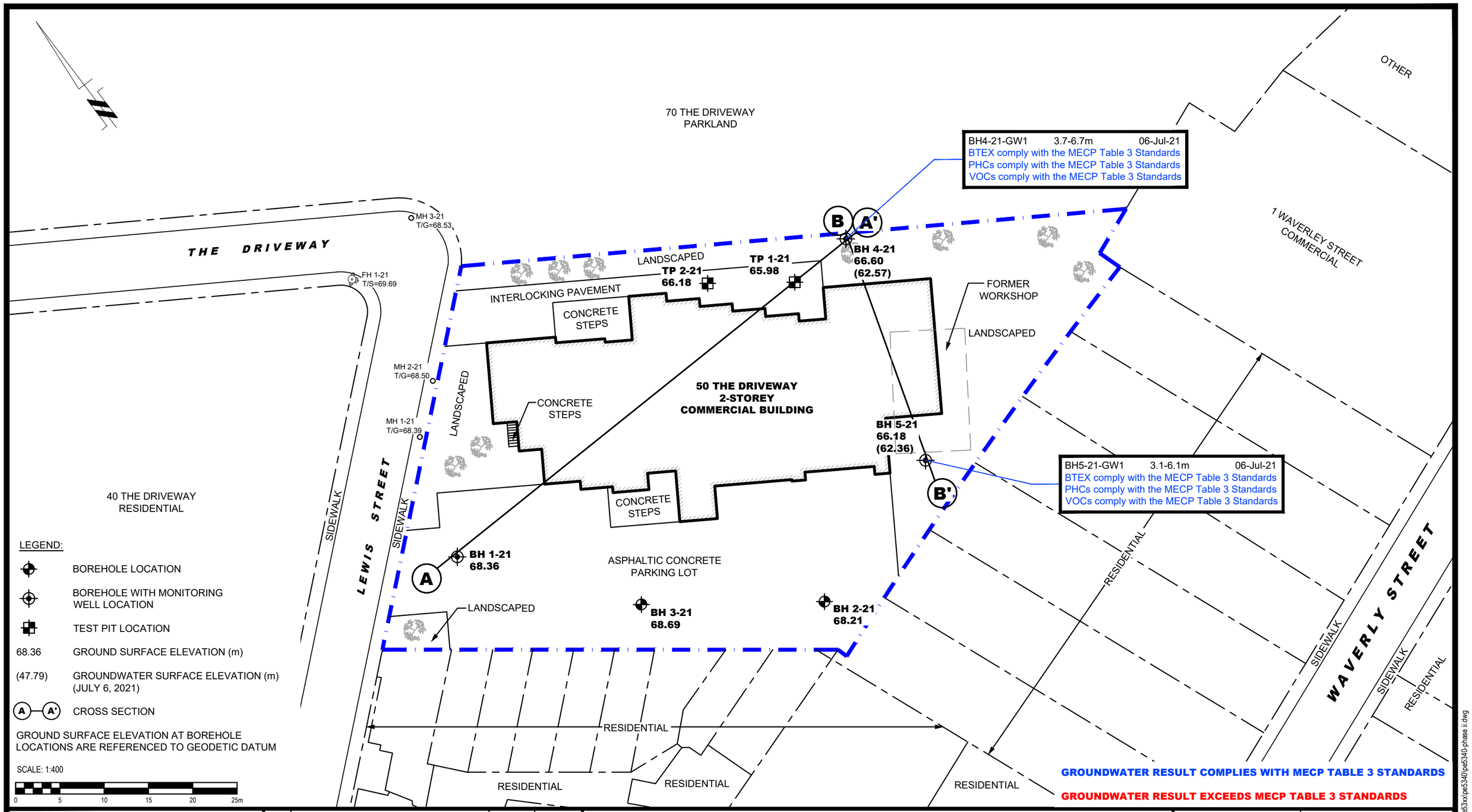

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NO.	REVISIONS	DATE	INITIAL

MAIN AND MAIN

PHASE II - ENVIRONMENTAL SITE ASSESSMENT
50 THE DRIVEWAY

OTTAWA, ONTARIO

Title:

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

Scale: 1:400	Date: 07/2021
Drawn by: JM	Report No.: PE5340-2
Checked by: MW	Dwg. No.: PE5340-7
Approved by: MSD	Revision No.:

11x17

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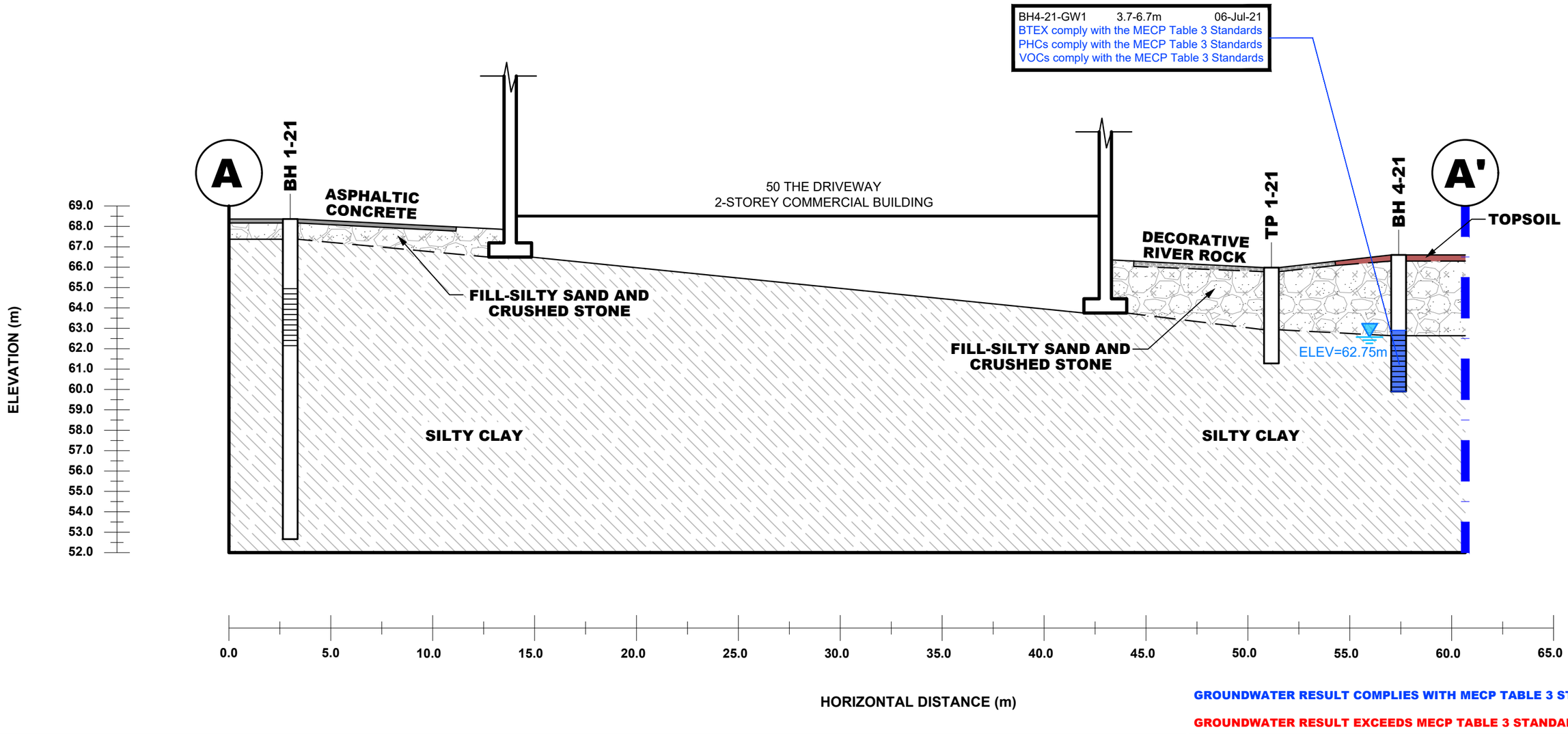

GROUNDWATER RESULT COMPLIES WITH MECP TABLE 3 STANDARDS

GROUNDWATER RESULT EXCEEDS MECP TABLE 3 STANDARDS

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NO.	REVISIONS	DATE	INITIAL

MAIN AND MAIN

PHASE II - ENVIRONMENTAL SITE ASSESSMENT
50 THE DRIVEWAY

OTTAWA, ONTARIO

Title:

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

Scale: AS SHOWN	Date: 07/2021
Drawn by: YA	Report No.: PE5340-2
Checked by: MW	Dwg. No.: PE5340-7A
Approved by: MSD	Revision No.:

11x17

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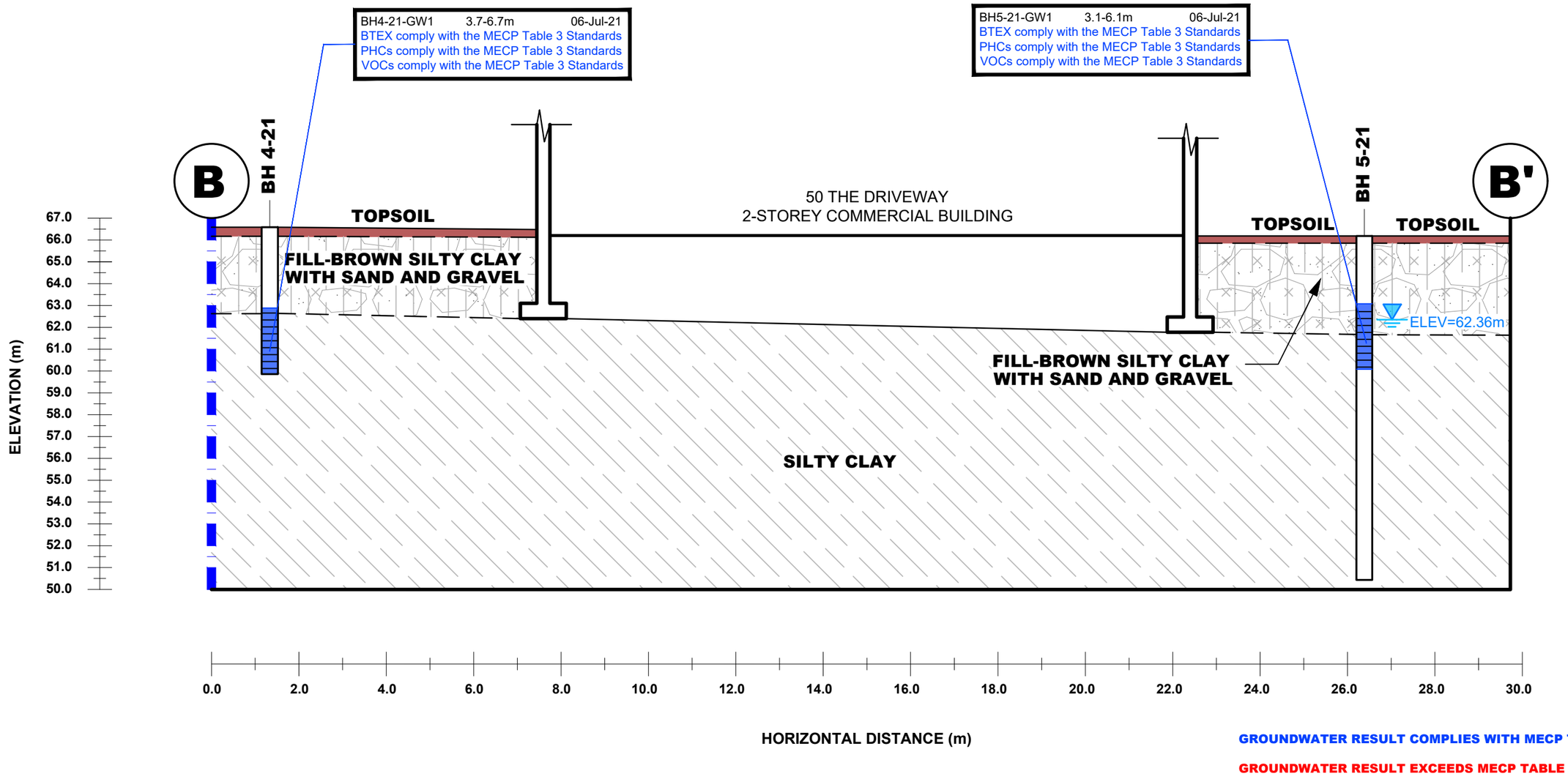

GROUNDWATER RESULT COMPLIES WITH MECP TABLE 3 STANDARDS

GROUNDWATER RESULT EXCEEDS MECP TABLE 3 STANDARDS

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Title:
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Checked by: MW	Dwg. No.: PE5340-7B
Approved by: MSD	Revision No.:

11x17

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APPENDIX 1

SAMPLING AND ANALYSIS PLAN

SOIL PROFILE AND TEST DATA SHEETS

SYMBOLS AND TERMS

LABORATORY CERTIFICATES OF ANALYSIS

Geotechnical Engineering

Environmental Engineering

Hydrogeology

Geological Engineering

Materials Testing

Building Science

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Consulting Engineers
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patersongroup

Sampling & Analysis Plan

Phase II Environmental Site Assessment
50 The Driveway
Ottawa, Ontario

Prepared For

Main and Main

June 2021

Report: PE5340-SAP

TABLE OF CONTENTS

1.0 SAMPLING PROGRAM

Paterson Group Inc. (Paterson) was commissioned by Ms. Emily Roukhkain, of Main and Main to conduct a Phase II Environmental Site Assessment (ESA) for the Phase II ESA Property addressed 50 The Driveway, Ottawa, Ontario.

The Phase II ESA was carried out to address the APECs identified in the Paterson Phase I ESA, dated June 2021. The following subsurface investigation program was developed to identify and delineate potential environmental concerns.

Borehole	Location & Rationale	Proposed Depth & Rationale
BH1-21	Assess soil and/or groundwater conditions on and beneath the Phase I Property due to APECs 1 and 2.	Borehole to be advanced to approximately 6.70 mbgs to intercept water table to install groundwater monitoring well.
BH2-21	Assess soil condition on the Phase I Property due to APEC 1.	Borehole to be advanced to approximately 7.9 mbgs.
BH3-21	Assess soil condition on the Phase I Property due to APEC 1.	Borehole to be advanced to approximately 6.10 mbgs.
BH4-21	Assess soil and/or groundwater conditions on and beneath the Phase I Property due to APEC 2.	Borehole to be advanced to approximately 6.70 mbgs to intercept water table to install groundwater monitoring well.
BH5-21	Assess soil and/or groundwater conditions on and beneath the Phase I Property due to APECs 1 and 2.	Borehole to be advanced to approximately 6.10 mbgs to intercept water table to install groundwater monitoring well.
TP1-21	Assess soil condition on the Phase I Property due to APEC 1.	Test pit to be advanced to approximately 4.0 mbgs.
TP2-21	Assess soil condition on the Phase I Property due to APEC 1.	Test pit to be advanced to approximately 4.0 mbgs.

At each borehole, split-spoon samples of overburden soils will be obtained at 0.76 m (2'6") intervals until groundwater was intercepted. 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's 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 borehole locations must be provided. Distances should be measured using a measuring tape or wheel rather than paced off. Elevations were surveyed at geodetic elevations by Paterson personnel.

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 MOE 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
50 The Driveway
Ottawa, Ontario

DATUM Geodetic

FILE NO. PE5340

REMARKS

HOLE NO. BH 1-21

BORINGS BY CME-55 Low Clearance Drill **DATE** June 30, 2021

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)
GROUND SURFACE						0	68.36
Asphaltic concrete 0.08		AU	1				
FILL: Brown silty sand with crushed stone 0.36 / 0.76		SS	2	100	15	1	67.36
FILL: Brown silty clay, some sand and crushed stone		SS	3	100	12	2	66.36
		SS	4	100	4	3	65.36
Very stiff to stiff, brown **SILTY CLAY**		SS	5	100	P		
- grey by 3.8m depth						4	64.36
- silt content increasing with depth						5	63.36
		SS	6	100	1	6	62.36
						7	61.36
						8	60.36
						9	59.36
						10	58.36
- trace sand by 11.4m depth						11	57.36
		SS	7	100	1	12	56.36
						13	55.36
						14	54.36
						15	53.36
15.70							
Dynamic Cone Penetration Test commenced at 15.70m depth. Practical refusal to DCPT at 20.57m depth, borehole terminated.							
(BH dry - July 6, 2021)							

Photo Ionization Detector
● Volatile Organic Rdg. (ppm)

○ **Lower Explosive Limit %**

20 40 60 80

162.8

Monitoring Well Construction

100 200 300 400 500

RKI Eagle Rdg. (ppm)

▲ Full Gas Resp. △ Methane Elim.

patersongroup Consulting Engineers

154 Colonnade Road South, Ottawa, Ontario K2E 7J5

SOIL PROFILE AND TEST DATA

Phase II - Environmental Site Assessment
50 The Driveway
Ottawa, Ontario

DATUM Geodetic

FILE NO. PE5340

REMARKS

HOLE NO. BH 2-21

BORINGS BY CME-55 Low Clearance Drill **DATE** June 30, 2021

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	68.21
FILL: Brown silty sand with crushed stone 0.46		SS	2	100	32	1	67.21
FILL: Brown silty sand with gravel, trace clay and topsoil, occasional cobbles		SS	3	75	40	2	66.21
		SS	4	0	50+		
3.50		SS	5	27	50+	3	65.21
		SS	6	12	3	4	64.21
FILL: Grey silty clay with sand, trace gravel, organics and wood		SS	7	17	4	5	63.21
		SS	8	75	4	6	62.21
6.78		SS	9	50	8		
Stiff, grey **SILTY CLAY**		SS	10	100	2	7	61.21
7.92							
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.

Monitoring Well Construction

patersongroup Consulting Engineers

154 Colonnade Road South, Ottawa, Ontario K2E 7J5

SOIL PROFILE AND TEST DATA

Phase II - Environmental Site Assessment
50 The Driveway
Ottawa, Ontario

DATUM Geodetic

FILE NO. PE5340

REMARKS

HOLE NO. BH 3-21

BORINGS BY CME-55 Low Clearance Drill **DATE** July 2, 2021

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	68.69
FILL: Brown silty sand with crushed stone 0.46		SS	2	100	10	1	67.69
FILL: Brown silty clay with sand and gravel, trace topsoil - trace coal by 2.3m depth		SS	3	100	10	2	66.69
2.59		SS	4	75	6	3	65.69
		SS	5	83	11		
Hard to very stiff, brown **SILTY CLAY**		SS	6	100	P	4	64.69
		SS	7	83	5	5	63.69
- stiff and grey by 5.6m depth		SS	8	4	12	6	62.69
		SS	9	100	1	7	61.69
						8	60.69
						9	59.69
		SS	10	100	P	10	58.69
- trace sand by 11.4m depth						11	57.69
						12	56.69
						13	55.69
						14	54.69
						15	53.69
15.70							
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.

Monitoring Well Construction

patersongroup Consulting Engineers

154 Colonnade Road South, Ottawa, Ontario K2E 7J5

SOIL PROFILE AND TEST DATA

Phase II - Environmental Site Assessment
50 The Driveway
Ottawa, Ontario

DATUM Geodetic

FILE NO. PE5340

REMARKS

HOLE NO. BH 4-21

BORINGS BY CME-55 Low Clearance Drill **DATE** July 2, 2021

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)
GROUND SURFACE						0	66.60
TOPSOIL 0.30		AU	1				
		SS	2	100	50+	1	65.60
FILL: Brown silty clay with sand and gravel, some cobbles, concrete, trace wood		SS	3	4	4	2	64.60
		SS	4	50	11		
		SS	5	67	4	3	63.60
3.96							
		SS	6	67	4	4	62.60
Stiff, brown **SILTY CLAY**		SS	7	100	P	5	61.60
		SS	8	100	1		
- grey by 5.3m depth						6	60.60
6.70		SS	9	100	P		
End of Borehole							
(GWL @ 4.03m - July 6, 2021)							

Photo Ionization Detector

● Volatile Organic Rdg. (ppm)

○ **Lower Explosive Limit %**

20 40 60 80

100 200 300 400 500

RKI Eagle Rdg. (ppm)

▲ Full Gas Resp. △ Methane Elim.

Monitoring Well Construction

patersongroup Consulting Engineers

154 Colonnade Road South, Ottawa, Ontario K2E 7J5

SOIL PROFILE AND TEST DATA

Phase II - Environmental Site Assessment
50 The Driveway
Ottawa, Ontario

DATUM Geodetic

FILE NO. PE5340

REMARKS

HOLE NO. BH 5-21

BORINGS BY CME-55 Low Clearance Drill **DATE** July 5, 2021

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)
GROUND SURFACE						0	66.18
TOPSOIL 0.18							
FILL: Brown silty sand with clay 0.90		AU	1				
FILL: Brown silty clay with sand and gravel, trace topsoil 1.52		SS	2	17	12	1	65.18
FILL: Brown silty sand, trace gravel 2.29		SS	3	42	10	2	64.18
		SS	4	75	9		
FILL: Grey silty clay with sand, trace organics, brick and gravel		SS	5	75	4	3	63.18
		SS	6	17	9	4	62.18
4.50		SS	7	83	3	5	61.18
		SS	8	83	P	6	60.18
Very stiff to stiff, grey **SILTY CLAY**		SS	9	83	P	7	59.18
		SS	10	83	P	8	58.18
- silt content increasing with depth		SS	11	83	1	9	57.18
						10	56.18
						11	55.18
						12	54.18
		SS	12	83	P	13	53.18
						14	52.18
						15	51.18
15.70							

Dynamic Cone Penetration Test commenced at 15.70m depth. Practical DCPT refusal at 22.10m depth, borehole terminated.

(GWL @ 3.82m - July 6, 2021)

Photo Ionization Detector
● Volatile Organic Rdg. (ppm)

○ **Lower Explosive Limit %**

20 40 60 80

141.8
134.2
383.2
156.3
416.4
115.6
548.3
320.7
443.2
409.2
125.6

Monitoring Well Construction

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
50 The Driveway
Ottawa, Ontario

DATUM Geodetic

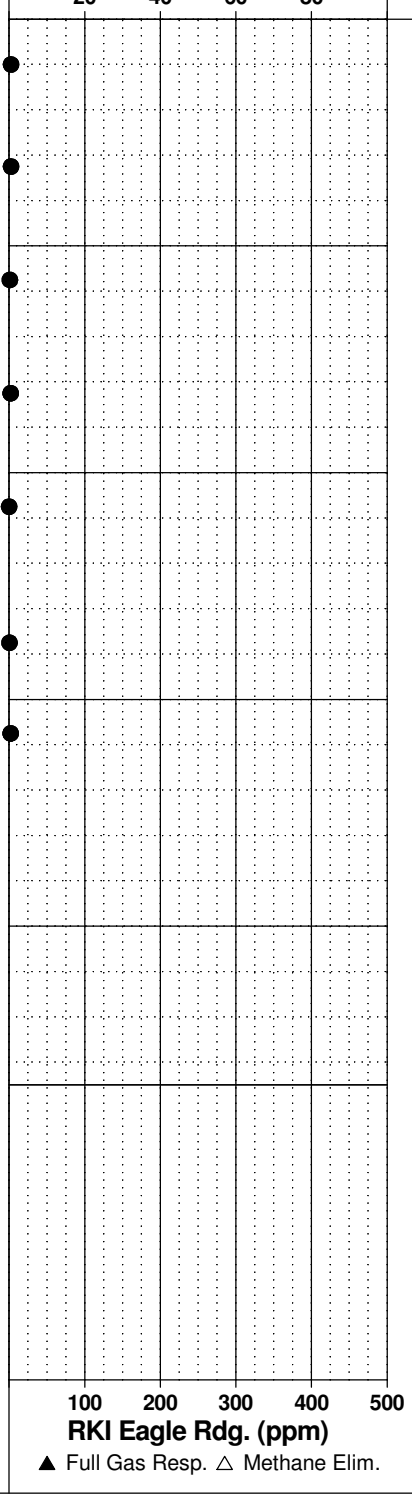
FILE NO. PE5340

REMARKS

HOLE NO. TP 1-21

BORINGS BY Backhoe/Hand Auger **DATE** June 30, 2021

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)	Photo Ionization Detector: Volatile Organic Rdg. (ppm) / Lower Explosive Limit %	Monitoring Well Construction
GROUND SURFACE									
Decorative river rock 0.10						0	65.98		
FILL: Brown silty sand with crushed stone, trace clay 0.30		G	1						
		G	2			1	64.98		
FILL: Brown silty sand with clay, gravel, crushed stone, trace concrete and brick		G	3						
		G	4						
		G	5			2	63.98		
		G	6						
2.95									
FILL: Crushed stone 3.05		G	7			3	62.98		
- underside of footing at 2.95m depth									
Stiff, grey **SILTY CLAY**									
						4	61.98		
4.70									
End of Test Pit									
310mm deep footing encountered at 2.64m below existing ground surface, extending 230mm from foundation wall.									



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154 Colonnade Road South, Ottawa, Ontario K2E 7J5

SOIL PROFILE AND TEST DATA

Phase II - Environmental Site Assessment
50 The Driveway
Ottawa, Ontario

DATUM Geodetic

FILE NO. PE5340

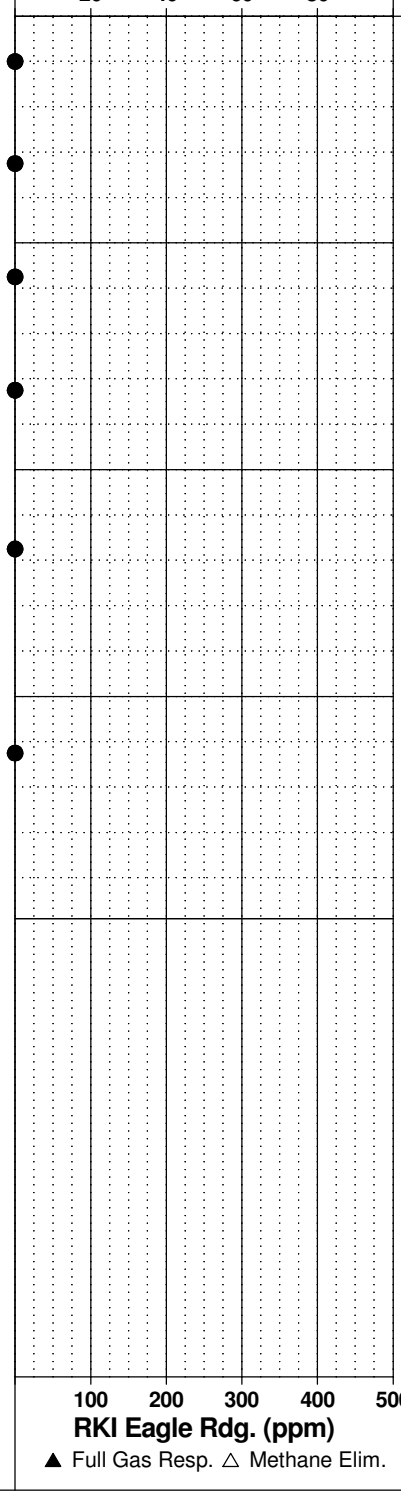
REMARKS

HOLE NO. TP 2-21

BORINGS BY Backhoe/Hand Auger **DATE** June 30, 2021

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)
GROUND SURFACE							
Decorative river rock 0.10							
FILL: Brown silty sand with gravel and crushed stone 0.30		G	1			0	66.18
		G	2				
		G	3			1	65.18
FILL: Brown silty sand with clay, gravel and crushed stone, trace brick, concrete and organics		G	4				
		G	5			2	64.18
3.05							
		G	6			3	63.18
FILL: Brown silty sand to sandy silt							
3.98							
End of Test Pit							
Inferred top of footing encountered at 3.98m below existing ground surface.							

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



Monitoring Well Construction

SYMBOLS AND TERMS

SOIL DESCRIPTION

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

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

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

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

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

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

SYMBOLS AND TERMS (continued)

SOIL DESCRIPTION (continued)

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

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

ROCK DESCRIPTION

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

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

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

SAMPLE TYPES

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

SYMBOLS AND TERMS (continued)

PLASTICITY LIMITS AND GRAIN SIZE DISTRIBUTION

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

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

CONSOLIDATION TEST

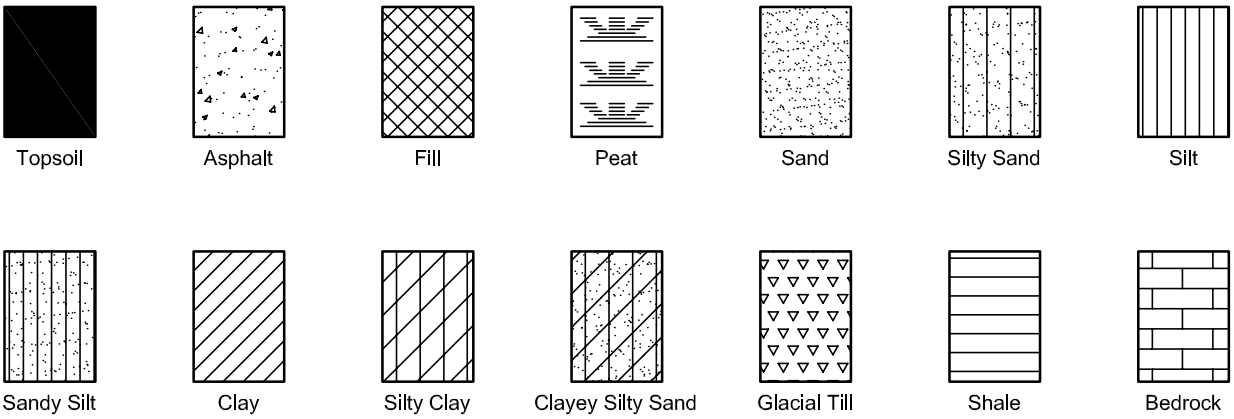
p'_o	-	Present effective overburden pressure at sample depth
p'_c	-	Preconsolidation pressure of (maximum past pressure on) sample
Ccr	-	Recompression index (in effect at pressures below p'_c)
Cc	-	Compression index (in effect at pressures above p'_c)
OC Ratio		Overconsolidaton ratio = p'_c / p'_o
Void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

PERMEABILITY TEST

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

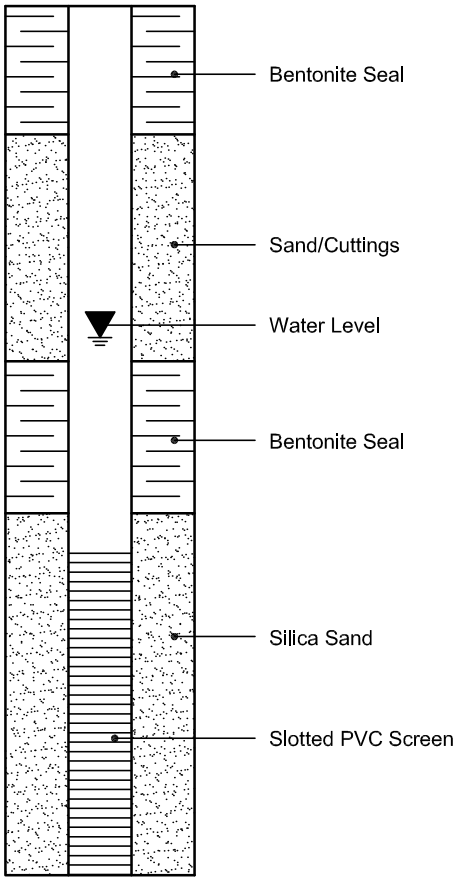
SYMBOLS AND TERMS (continued)

STRATA PLOT

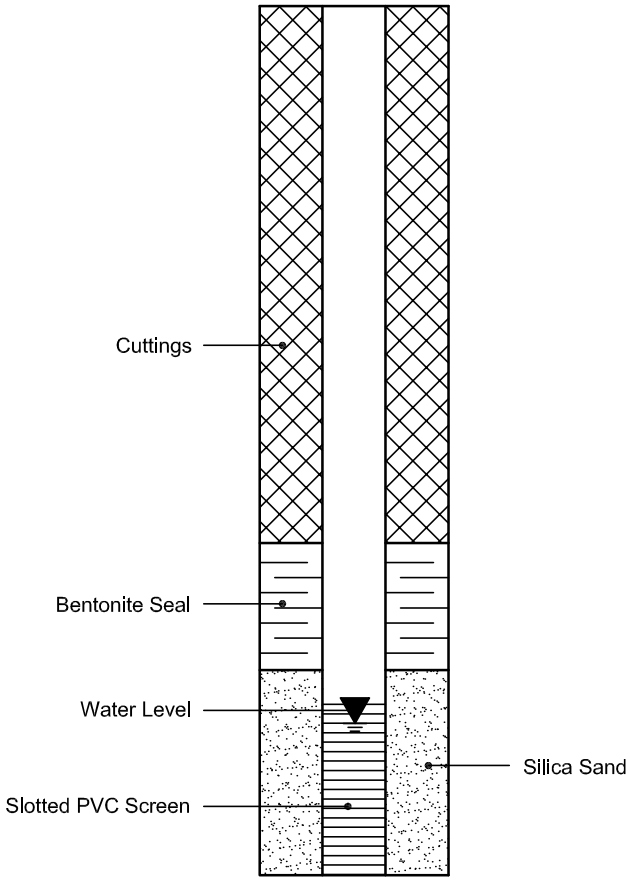


MONITORING WELL AND PIEZOMETER CONSTRUCTION

MONITORING WELL CONSTRUCTION



PIEZOMETER CONSTRUCTION



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Certificate of Analysis

Paterson Group Consulting Engineers

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

Client PO: 32394
Project: PE5340
Custody:

Report Date: 8-Jul-2021
Order Date: 7-Jul-2021

Order #: 2128332

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

Paracel ID	Client ID
2128332-01	BH4-21-GW1
2128332-02	BH5-21-GW1

Approved By:

Dale Robertson, BSc
Laboratory Director

Certificate of Analysis

Report Date: 08-Jul-2021

Client: Paterson Group Consulting Engineers

Order Date: 7-Jul-2021

Client PO: 32394

Project Description: PE5340

Analysis Summary Table

Analysis	Method Reference/Description	Extraction Date	Analysis Date
PHC F1	CWS Tier 1 - P&T GC-FID	6-Jul-21	7-Jul-21
PHCs F2 to F4	CWS Tier 1 - GC-FID, extraction	7-Jul-21	8-Jul-21
REG 153: VOCs by P&T GC/MS	EPA 624 - P&T GC-MS	6-Jul-21	7-Jul-21

Certificate of Analysis

Report Date: 08-Jul-2021

Client: **Paterson Group Consulting Engineers**

Order Date: 7-Jul-2021

Client PO: **32394**

Project Description: PE5340

	Client ID:	BH4-21-GW1	BH5-21-GW1	-	-
	Sample Date:	06-Jul-21 09:00	06-Jul-21 09:00	-	-
	Sample ID:	2128332-01	2128332-02	-	-
	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	<0.5	<0.5	-	-
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	<0.5	-	-
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	0.9	-	-
1,1,1-Trichloroethane	0.5 ug/L	<0.5	<0.5	-	-

Certificate of Analysis

Report Date: 08-Jul-2021

Client: Paterson Group Consulting Engineers

Order Date: 7-Jul-2021

Client PO: 32394

Project Description: PE5340

	Client ID:	BH4-21-GW1	BH5-21-GW1	-	-
	Sample Date:	06-Jul-21 09:00	06-Jul-21 09:00	-	-
	Sample ID:	2128332-01	2128332-02	-	-
	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	<0.5	-	-
o-Xylene	0.5 ug/L	<0.5	<0.5	-	-
Xylenes, total	0.5 ug/L	<0.5	<0.5	-	-
4-Bromofluorobenzene	Surrogate	105%	106%	-	-
Dibromofluoromethane	Surrogate	103%	104%	-	-
Toluene-d8	Surrogate	107%	106%	-	-
Hydrocarbons					
F1 PHCs (C6-C10)	25 ug/L	<25	<25	-	-
F2 PHCs (C10-C16)	100 ug/L	<100	<100	-	-
F3 PHCs (C16-C34)	100 ug/L	<100	<100	-	-
F4 PHCs (C34-C50)	100 ug/L	<100	<100	-	-

Certificate of Analysis

Report Date: 08-Jul-2021

Client: Paterson Group Consulting Engineers

Order Date: 7-Jul-2021

Client PO: 32394

Project Description: PE5340

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						
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	*84.8*		*ug/L*		*106*	*50-140*			
Surrogate: Dibromofluoromethane	*79.1*		*ug/L*		*98.9*	*50-140*			
Surrogate: Toluene-d8	*83.2*		*ug/L*		*104*	*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	
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	*83.1*		*ug/L*		*104*	*50-140*			
Surrogate: Dibromofluoromethane	*71.0*		*ug/L*		*88.8*	*50-140*			
Surrogate: Toluene-d8	*84.4*		*ug/L*		*106*	*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)	2160	25	ug/L	ND	108	68-117			
F2 PHCs (C10-C16)	1340	100	ug/L	ND	83.8	60-140			
F3 PHCs (C16-C34)	3980	100	ug/L	ND	102	60-140			
F4 PHCs (C34-C50)	2700	100	ug/L	ND	109	60-140			
Volatiles									
Acetone	118	5.0	ug/L	ND	118	50-140			
Benzene	40.0	0.5	ug/L	ND	100	60-130			
Bromodichloromethane	37.1	0.5	ug/L	ND	92.8	60-130			
Bromoform	33.5	0.5	ug/L	ND	83.8	60-130			
Bromomethane	31.3	0.5	ug/L	ND	78.3	50-140			
Carbon Tetrachloride	28.9	0.2	ug/L	ND	72.2	60-130			
Chlorobenzene	39.1	0.5	ug/L	ND	97.8	60-130			
Chloroform	39.6	0.5	ug/L	ND	99.0	60-130			
Dibromochloromethane	32.0	0.5	ug/L	ND	80.1	60-130			
Dichlorodifluoromethane	44.3	1.0	ug/L	ND	111	50-140			
1,2-Dichlorobenzene	34.6	0.5	ug/L	ND	86.4	60-130			
1,3-Dichlorobenzene	35.6	0.5	ug/L	ND	88.9	60-130			
1,4-Dichlorobenzene	34.9	0.5	ug/L	ND	87.2	60-130			
1,1-Dichloroethane	40.4	0.5	ug/L	ND	101	60-130			
1,2-Dichloroethane	41.4	0.5	ug/L	ND	103	60-130			
1,1-Dichloroethylene	36.1	0.5	ug/L	ND	90.2	60-130			
cis-1,2-Dichloroethylene	38.1	0.5	ug/L	ND	95.4	60-130			
trans-1,2-Dichloroethylene	39.0	0.5	ug/L	ND	97.6	60-130			
1,2-Dichloropropane	38.9	0.5	ug/L	ND	97.2	60-130			
cis-1,3-Dichloropropylene	40.3	0.5	ug/L	ND	101	60-130			
trans-1,3-Dichloropropylene	35.3	0.5	ug/L	ND	88.2	60-130			
Ethylbenzene	36.9	0.5	ug/L	ND	92.2	60-130			
Ethylene dibromide (dibromoethane, 1,2-	35.6	0.2	ug/L	ND	88.9	60-130			
Hexane	47.8	1.0	ug/L	ND	119	60-130			
Methyl Ethyl Ketone (2-Butanone)	101	5.0	ug/L	ND	101	50-140			
Methyl Isobutyl Ketone	101	5.0	ug/L	ND	101	50-140			
Methyl tert-butyl ether	108	2.0	ug/L	ND	108	50-140			
Methylene Chloride	34.6	5.0	ug/L	ND	86.6	60-130			
Styrene	39.8	0.5	ug/L	ND	99.6	60-130			
1,1,1,2-Tetrachloroethane	29.0	0.5	ug/L	ND	72.5	60-130			
1,1,2,2-Tetrachloroethane	33.9	0.5	ug/L	ND	84.7	60-130			
Tetrachloroethylene	36.0	0.5	ug/L	ND	89.9	60-130			
Toluene	39.9	0.5	ug/L	ND	99.8	60-130			
1,1,1-Trichloroethane	35.3	0.5	ug/L	ND	88.2	60-130			
1,1,2-Trichloroethane	39.4	0.5	ug/L	ND	98.6	60-130			
Trichloroethylene	38.7	0.5	ug/L	ND	96.7	60-130			
Trichlorofluoromethane	33.0	1.0	ug/L	ND	82.5	60-130			
Vinyl chloride	36.5	0.5	ug/L	ND	91.3	50-140			
m,p-Xylenes	74.4	0.5	ug/L	ND	93.0	60-130			
o-Xylene	38.6	0.5	ug/L	ND	96.4	60-130			
Surrogate: 4-Bromofluorobenzene	*88.3*		*ug/L*		*110*	*50-140*			
Surrogate: Dibromofluoromethane	*91.5*		*ug/L*		*114*	*50-140*			
Surrogate: Toluene-d8	*82.1*		*ug/L*		*103*	*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

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

Paracel ID: 2128332

Head Office
300-2319 St. Laurent Blvd
Ottawa, Ontario K1G 4J8
1-800-749-1947
paracelaparacellabs.com
www.paracellabs.com

Paracel Order Number (Lab Use Only): 2128332

Chain Of Custody (Lab Use Only)

Client Name: Paterson Group
Contact Name: Mark D'Arcy
Address: 154 Colonade Rd
Telephone:

Project Ref: PE5340
Quote #:
PO #: 32394
E-mail: mdarcy@patersongroup.ca

Page __ of __

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)

	Sample ID/Location Name	Matrix	Air Volume	# of Containers	Sample Taken: Date	Sample Taken: Time	PHCs F1-F4+BTEX	VOCs	PAHs	Metals by ICP	Hg	CrVI	B (HWS)						
							Required Analysis												
1	BH4-21-GW1	GW		3	July 6/2021	am	X	X											
2	BH5-21-GW1	GW		3	"	"	X	X											
3																			
4																			
5																			
6																			
7																			
8																			
9																			
10																			

Comments:

Method of Delivery: PARACEL COURIER

Relinquished By (Sign): Kat Linscott
Relinquished By (Print): Kat Linscott
Date/Time: July 7/2021
Chain of Custody (Blue Label)

Received By Driver/Depot: T. TESSIER
Date/Time: 07/07/21 11:00
Temperature: °C AM

Received at Lab: Shreeram Dhruvi
Date/Time: Jul 07, 2021 11:56
Temperature: 12.1

Verified By:
Date/Time: July 6 2021
pH Verified: ☐ By: NH

Revision 4.0

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Certificate of Analysis

Paterson Group Consulting Engineers

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

Client PO: 30390
Project: PE5340
Custody:

Report Date: 8-Jul-2021
Order Date: 6-Jul-2021

Order #: 2128230

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

Paracel ID	Client ID
2128230-01	BH1-21-AU1
2128230-02	BH1-21-SS5
2128230-03	BH2-21-SS8
2128230-04	BH3-21-SS3
2128230-05	BH4-21-SS8
2128230-06	BH5-21-SS5
2128230-07	BH5-21-SS7
2128230-08	TP1-21-G2

Approved By:

Mark Foto

Mark Foto, M.Sc.
Lab Supervisor

Certificate of Analysis

Report Date: 08-Jul-2021

Client: Paterson Group Consulting Engineers

Order Date: 6-Jul-2021

Client PO: 30390

Project Description: PE5340

Analysis Summary Table

Analysis	Method Reference/Description	Extraction Date	Analysis Date
BTEX by P&T GC-MS	EPA 8260 - P&T GC-MS	6-Jul-21	7-Jul-21
Conductivity	MOE E3138 - probe @25 °C, water ext	8-Jul-21	8-Jul-21
pH, soil	EPA 150.1 - pH probe @ 25 °C, CaCl buffered ext.	7-Jul-21	7-Jul-21
PHC F1	CWS Tier 1 - P&T GC-FID	6-Jul-21	7-Jul-21
PHCs F2 to F4	CWS Tier 1 - GC-FID, extraction	6-Jul-21	7-Jul-21
REG 153: Metals by ICP/MS, soil	EPA 6020 - Digestion - ICP-MS	8-Jul-21	8-Jul-21
REG 153: PAHs by GC-MS	EPA 8270 - GC-MS, extraction	7-Jul-21	8-Jul-21
SAR	Calculated	7-Jul-21	8-Jul-21
Solids, %	Gravimetric, calculation	7-Jul-21	7-Jul-21

Certificate of Analysis

Report Date: 08-Jul-2021

Client: Paterson Group Consulting Engineers

Order Date: 6-Jul-2021

Client PO: 30390

Project Description: PE5340

	Client ID:	BH1-21-AU1	BH1-21-SS5	BH2-21-SS8	BH3-21-SS3
	Sample Date:	30-Jun-21 09:00	30-Jun-21 10:00	30-Jun-21 14:00	02-Jul-21 09:00
	Sample ID:	2128230-01	2128230-02	2128230-03	2128230-04
	MDL/Units	Soil	Soil	Soil	Soil
Physical Characteristics					
% Solids	0.1 % by Wt.	96.4	57.7	68.0	76.5
General Inorganics					
SAR	0.01 N/A	0.69	-	-	5.31
Conductivity	5 uS/cm	2410	-	-	1300
pH	0.05 pH Units	8.01	-	-	-
Metals					
Antimony	1.0 ug/g dry	1.3	-	1.1	-
Arsenic	1.0 ug/g dry	4.5	-	2.7	-
Barium	1.0 ug/g dry	129	-	264	-
Beryllium	0.5 ug/g dry	<0.5	-	0.7	-
Boron	5.0 ug/g dry	11.9	-	<5.0	-
Cadmium	0.5 ug/g dry	<0.5	-	<0.5	-
Chromium	5.0 ug/g dry	13.3	-	86.4	-
Cobalt	1.0 ug/g dry	6.7	-	18.5	-
Copper	5.0 ug/g dry	10.1	-	34.0	-
Lead	1.0 ug/g dry	25.9	-	53.8	-
Molybdenum	1.0 ug/g dry	2.6	-	1.2	-
Nickel	5.0 ug/g dry	14.3	-	44.6	-
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	20.0	-	81.9	-
Zinc	20.0 ug/g dry	26.6	-	173	-
Volatiles					
Benzene	0.02 ug/g dry	-	<0.02	-	-
Ethylbenzene	0.05 ug/g dry	-	<0.05	-	-
Toluene	0.05 ug/g dry	-	<0.05	-	-
m,p-Xylenes	0.05 ug/g dry	-	<0.05	-	-
o-Xylene	0.05 ug/g dry	-	<0.05	-	-
Xylenes, total	0.05 ug/g dry	-	<0.05	-	-
Toluene-d8	Surrogate	-	127%	-	-
Hydrocarbons					
F1 PHCs (C6-C10)	7 ug/g dry	-	<7	-	-
F2 PHCs (C10-C16)	4 ug/g dry	-	<4	-	-

Certificate of Analysis

Report Date: 08-Jul-2021

Client: Paterson Group Consulting Engineers

Order Date: 6-Jul-2021

Client PO: 30390

Project Description: PE5340

	Client ID:	BH1-21-AU1	BH1-21-SS5	BH2-21-SS8	BH3-21-SS3
	Sample Date:	30-Jun-21 09:00	30-Jun-21 10:00	30-Jun-21 14:00	02-Jul-21 09:00
	Sample ID:	2128230-01	2128230-02	2128230-03	2128230-04
	MDL/Units	Soil	Soil	Soil	Soil
F3 PHCs (C16-C34)	8 ug/g dry	-	<8	-	-
F4 PHCs (C34-C50)	6 ug/g dry	-	<6	-	-
Semi-Volatiles					
Acenaphthene	0.02 ug/g dry	<0.04 [1]	-	<0.02	-
Acenaphthylene	0.02 ug/g dry	<0.04 [1]	-	<0.02	-
Anthracene	0.02 ug/g dry	<0.04 [1]	-	<0.02	-
Benzo [a] anthracene	0.02 ug/g dry	0.06	-	<0.02	-
Benzo [a] pyrene	0.02 ug/g dry	0.07	-	<0.02	-
Benzo [b] fluoranthene	0.02 ug/g dry	0.11	-	<0.02	-
Benzo [g,h,i] perylene	0.02 ug/g dry	0.08	-	<0.02	-
Benzo [k] fluoranthene	0.02 ug/g dry	<0.04 [1]	-	<0.02	-
Chrysene	0.02 ug/g dry	0.10	-	<0.02	-
Dibenzo [a,h] anthracene	0.02 ug/g dry	<0.04	-	<0.02	-
Fluoranthene	0.02 ug/g dry	0.08	-	0.06	-
Fluorene	0.02 ug/g dry	<0.04 [1]	-	<0.02	-
Indeno [1,2,3-cd] pyrene	0.02 ug/g dry	<0.04 [1]	-	<0.02	-
1-Methylnaphthalene	0.02 ug/g dry	<0.04 [1]	-	<0.02	-
2-Methylnaphthalene	0.02 ug/g dry	<0.04 [1]	-	<0.02	-
Methylnaphthalene (1&2)	0.04 ug/g dry	<0.08 [1]	-	<0.04	-
Naphthalene	0.01 ug/g dry	<0.02 [1]	-	<0.01	-
Phenanthrene	0.02 ug/g dry	0.09	-	0.04	-
Pyrene	0.02 ug/g dry	0.10	-	0.05	-
2-Fluorobiphenyl	Surrogate	109%	-	112%	-
Terphenyl-d14	Surrogate	122%	-	122%	-

Certificate of Analysis

Report Date: 08-Jul-2021

Client: Paterson Group Consulting Engineers

Order Date: 6-Jul-2021

Client PO: 30390

Project Description: PE5340

	Client ID:	BH4-21-SS8	BH5-21-SS5	BH5-21-SS7	TP1-21-G2
	Sample Date:	02-Jul-21 13:00	05-Jul-21 10:00	05-Jul-21 11:00	30-Jun-21 09:30
	Sample ID:	2128230-05	2128230-06	2128230-07	2128230-08
	MDL/Units	Soil	Soil	Soil	Soil
Physical Characteristics					
% Solids	0.1 % by Wt.	61.2	72.8	61.4	76.7
General Inorganics					
pH	0.05 pH Units	8.19	-	-	-
Metals					
Antimony	1.0 ug/g dry	-	1.3	-	1.3
Arsenic	1.0 ug/g dry	-	2.5	-	5.9
Barium	1.0 ug/g dry	-	251	-	235
Beryllium	0.5 ug/g dry	-	0.6	-	0.7
Boron	5.0 ug/g dry	-	<5.0	-	<5.0
Cadmium	0.5 ug/g dry	-	<0.5	-	<0.5
Chromium	5.0 ug/g dry	-	76.3	-	74.7
Cobalt	1.0 ug/g dry	-	15.8	-	14.9
Copper	5.0 ug/g dry	-	37.5	-	41.0
Lead	1.0 ug/g dry	-	85.8	-	140
Molybdenum	1.0 ug/g dry	-	<1.0	-	<1.0
Nickel	5.0 ug/g dry	-	40.9	-	39.4
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	-	67.2	-	69.6
Zinc	20.0 ug/g dry	-	119	-	141
Volatiles					
Benzene	0.02 ug/g dry	<0.02	-	<0.02	-
Ethylbenzene	0.05 ug/g dry	<0.05	-	<0.05	-
Toluene	0.05 ug/g dry	<0.05	-	<0.05	-
m,p-Xylenes	0.05 ug/g dry	<0.05	-	<0.05	-
o-Xylene	0.05 ug/g dry	<0.05	-	<0.05	-
Xylenes, total	0.05 ug/g dry	<0.05	-	<0.05	-
Toluene-d8	Surrogate	123%	-	114%	-
Hydrocarbons					
F1 PHCs (C6-C10)	7 ug/g dry	<7	-	<7	-
F2 PHCs (C10-C16)	4 ug/g dry	<4	-	<4	-
F3 PHCs (C16-C34)	8 ug/g dry	<8	-	<8	-
F4 PHCs (C34-C50)	6 ug/g dry	<6	-	<6	-

Certificate of Analysis

Report Date: 08-Jul-2021

Client: **Paterson Group Consulting Engineers**

Order Date: 6-Jul-2021

Client PO: **30390**

Project Description: PE5340

	Client ID:	BH4-21-SS8	BH5-21-SS5	BH5-21-SS7	TP1-21-G2
	Sample Date:	02-Jul-21 13:00	05-Jul-21 10:00	05-Jul-21 11:00	30-Jun-21 09:30
	Sample ID:	2128230-05	2128230-06	2128230-07	2128230-08
	MDL/Units	Soil	Soil	Soil	Soil
Semi-Volatiles					
Acenaphthene	0.02 ug/g dry	-	0.02	-	0.04
Acenaphthylene	0.02 ug/g dry	-	<0.02	-	0.20
Anthracene	0.02 ug/g dry	-	0.07	-	0.22
Benzo [a] anthracene	0.02 ug/g dry	-	0.03	-	0.51
Benzo [a] pyrene	0.02 ug/g dry	-	0.02	-	0.54
Benzo [b] fluoranthene	0.02 ug/g dry	-	<0.02	-	0.60
Benzo [g,h,i] perylene	0.02 ug/g dry	-	<0.02	-	0.31
Benzo [k] fluoranthene	0.02 ug/g dry	-	<0.02	-	0.33
Chrysene	0.02 ug/g dry	-	0.03	-	0.51
Dibenzo [a,h] anthracene	0.02 ug/g dry	-	<0.02	-	0.09
Fluoranthene	0.02 ug/g dry	-	0.11	-	1.09
Fluorene	0.02 ug/g dry	-	0.03	-	0.04
Indeno [1,2,3-cd] pyrene	0.02 ug/g dry	-	<0.02	-	0.29
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	-	0.02
Phenanthrene	0.02 ug/g dry	-	0.20	-	0.55
Pyrene	0.02 ug/g dry	-	0.08	-	0.94
2-Fluorobiphenyl	Surrogate	-	97.8%	-	108%
Terphenyl-d14	Surrogate	-	111%	-	113%

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						
Hydrocarbons									
F1 PHCs (C6-C10)	ND	7	ug/g						
F2 PHCs (C10-C16)	ND	4	ug/g						
F3 PHCs (C16-C34)	ND	8	ug/g						
F4 PHCs (C34-C50)	ND	6	ug/g						
Metals									
Antimony	ND	1.0	ug/g						
Arsenic	ND	1.0	ug/g						
Barium	ND	1.0	ug/g						
Beryllium	ND	0.5	ug/g						
Boron	ND	5.0	ug/g						
Cadmium	ND	0.5	ug/g						
Chromium	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	*1.27*		*ug/g*		*95.3*	*50-140*			
Surrogate: Terphenyl-d14	*1.41*		*ug/g*		*106*	*50-140*			
Volatiles									
Benzene	ND	0.02	ug/g						
Ethylbenzene	ND	0.05	ug/g						
Toluene	ND	0.05	ug/g						
m,p-Xylenes	ND	0.05	ug/g						
o-Xylene	ND	0.05	ug/g						
Xylenes, total	ND	0.05	ug/g						
Surrogate: Toluene-d8	*3.72*		*ug/g*		*116*	*50-140*			

Method Quality Control: Duplicate

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
General Inorganics									
SAR	0.05	0.01	N/A	0.05			0.0	30	
Conductivity	303	5	uS/cm	294			3.1	5	
pH	7.08	0.05	pH Units	7.12			0.6	2.3	
Hydrocarbons									
F1 PHCs (C6-C10)	ND	7	ug/g dry	ND			NC	40	
F2 PHCs (C10-C16)	ND	4	ug/g dry	ND			NC	30	
F3 PHCs (C16-C34)	20	8	ug/g dry	18			13.8	30	
F4 PHCs (C34-C50)	ND	6	ug/g dry	ND			NC	30	
Metals									
Antimony	3.4	1.0	ug/g dry	4.1			19.6	30	
Arsenic	7.0	1.0	ug/g dry	7.9			11.4	30	
Barium	246	1.0	ug/g dry	277			11.8	30	
Beryllium	0.8	0.5	ug/g dry	0.9			9.1	30	
Boron	17.7	5.0	ug/g dry	20.9			16.5	30	
Cadmium	0.6	0.5	ug/g dry	0.6			1.4	30	
Chromium	28.8	5.0	ug/g dry	33.3			14.5	30	
Cobalt	8.3	1.0	ug/g dry	9.6			14.3	30	
Copper	38.5	5.0	ug/g dry	42.6			10.2	30	
Lead	117	1.0	ug/g dry	129			10.1	30	
Molybdenum	3.4	1.0	ug/g dry	3.9			15.0	30	
Nickel	25.1	5.0	ug/g dry	28.0			11.1	30	
Selenium	1.4	1.0	ug/g dry	1.7			15.8	30	
Silver	ND	0.3	ug/g dry	ND			NC	30	
Thallium	ND	1.0	ug/g dry	ND			NC	30	
Uranium	ND	1.0	ug/g dry	ND			NC	30	
Vanadium	27.2	10.0	ug/g dry	31.6			15.2	30	
Zinc	116	20.0	ug/g dry	129			10.9	30	
Physical Characteristics									
% Solids	85.8	0.1	% by Wt.	86.3			0.6	25	
Semi-Volatiles									
Acenaphthene	0.048	0.02	ug/g dry	0.045			6.6	40	
Acenaphthylene	0.147	0.02	ug/g dry	0.126			15.0	40	
Anthracene	0.178	0.02	ug/g dry	0.159			11.5	40	
Benzo [a] anthracene	0.761	0.02	ug/g dry	0.646			16.4	40	
Benzo [a] pyrene	0.991	0.02	ug/g dry	0.808			20.4	40	
Benzo [b] fluoranthene	1.15	0.02	ug/g dry	0.967			17.4	40	
Benzo [g,h,i] perylene	0.596	0.02	ug/g dry	0.478			22.0	40	
Benzo [k] fluoranthene	0.573	0.02	ug/g dry	0.486			16.4	40	
Chrysene	0.874	0.02	ug/g dry	0.741			16.5	40	
Dibenzo [a,h] anthracene	0.155	0.02	ug/g dry	0.128			18.8	40	
Fluoranthene	1.97	0.02	ug/g dry	1.73			13.2	40	
Fluorene	0.053	0.02	ug/g dry	0.051			3.3	40	
Indeno [1,2,3-cd] pyrene	0.592	0.02	ug/g dry	0.492			18.5	40	
1-Methylnaphthalene	0.050	0.02	ug/g dry	0.065			27.2	40	
2-Methylnaphthalene	0.050	0.02	ug/g dry	0.054			9.3	40	
Naphthalene	0.031	0.01	ug/g dry	0.033			7.0	40	
Phenanthrene	0.767	0.02	ug/g dry	0.687			11.1	40	
Pyrene	1.64	0.02	ug/g dry	1.42			13.9	40	
Surrogate: 2-Fluorobiphenyl	*1.77*		*ug/g dry*		*116*	*50-140*			
Surrogate: Terphenyl-d14	*1.92*		*ug/g dry*		*126*	*50-140*			
Volatiles									
Benzene	ND	0.02	ug/g dry	ND			NC	50	
Ethylbenzene	ND	0.05	ug/g dry	ND			NC	50	
Toluene	ND	0.05	ug/g dry	ND			NC	50	
m,p-Xylenes	ND	0.05	ug/g dry	ND			NC	50	

Method Quality Control: Duplicate

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
o-Xylene	ND	0.05	ug/g dry	ND			NC	50	
Surrogate: Toluene-d8	*3.42*		*ug/g dry*		*97.8*	*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)	195	7	ug/g	ND	97.7	80-120			
F2 PHCs (C10-C16)	75	4	ug/g	ND	81.2	60-140			
F3 PHCs (C16-C34)	295	8	ug/g	18	123	60-140			
F4 PHCs (C34-C50)	197	6	ug/g	ND	138	60-140			
Metals									
Antimony	52.9	1.0	ug/g	1.7	103	70-130			
Arsenic	53.7	1.0	ug/g	3.2	101	70-130			
Barium	158	1.0	ug/g	111	94.7	70-130			
Beryllium	50.3	0.5	ug/g	ND	99.8	70-130			
Boron	54.0	5.0	ug/g	8.4	91.3	70-130			
Cadmium	49.5	0.5	ug/g	ND	98.4	70-130			
Chromium	66.0	5.0	ug/g	13.3	105	70-130			
Cobalt	55.4	1.0	ug/g	3.8	103	70-130			
Copper	66.7	5.0	ug/g	17.0	99.2	70-130			
Lead	98.9	1.0	ug/g	51.7	94.4	70-130			
Molybdenum	47.5	1.0	ug/g	1.6	91.8	70-130			
Nickel	61.2	5.0	ug/g	11.2	99.9	70-130			
Selenium	44.7	1.0	ug/g	ND	88.0	70-130			
Silver	47.1	0.3	ug/g	ND	94.1	70-130			
Thallium	46.7	1.0	ug/g	ND	93.1	70-130			
Uranium	47.9	1.0	ug/g	ND	95.2	70-130			
Vanadium	65.1	10.0	ug/g	12.6	105	70-130			
Zinc	96.0	20.0	ug/g	51.8	88.5	70-130			
Semi-Volatiles									
Acenaphthene	0.269	0.02	ug/g	0.045	118	50-140			
Acenaphthylene	0.339	0.02	ug/g	0.126	112	50-140			
Anthracene	0.404	0.02	ug/g	0.159	129	50-140			
Benzo [a] anthracene	0.135	0.02	ug/g	ND	81.2	50-140			
Benzo [a] pyrene	0.160	0.02	ug/g	ND	96.2	50-140			
Benzo [b] fluoranthene	0.179	0.02	ug/g	ND	108	50-140			
Benzo [g,h,i] perylene	0.777	0.02	ug/g	0.478	157	50-140			QM-06
Benzo [k] fluoranthene	0.157	0.02	ug/g	ND	94.4	50-140			
Chrysene	0.163	0.02	ug/g	ND	97.5	50-140			
Dibenzo [a,h] anthracene	0.338	0.02	ug/g	0.128	110	50-140			
Fluoranthene	0.156	0.02	ug/g	ND	93.3	50-140			
Fluorene	0.251	0.02	ug/g	0.051	105	50-140			
Indeno [1,2,3-cd] pyrene	0.797	0.02	ug/g	0.492	161	50-140			QM-06
1-Methylnaphthalene	0.249	0.02	ug/g	0.065	96.6	50-140			
2-Methylnaphthalene	0.261	0.02	ug/g	0.054	109	50-140			
Naphthalene	0.235	0.01	ug/g	0.033	106	50-140			
Phenanthrene	0.168	0.02	ug/g	ND	101	50-140			
Pyrene	0.157	0.02	ug/g	ND	94.0	50-140			
Surrogate: 2-Fluorobiphenyl	*1.56*		*ug/g*		*102*	*50-140*			
Surrogate: Terphenyl-d14	*1.65*		*ug/g*		*109*	*50-140*			
Volatiles									
Benzene	4.06	0.02	ug/g	ND	101	60-130			
Ethylbenzene	4.29	0.05	ug/g	ND	107	60-130			
Toluene	4.29	0.05	ug/g	ND	107	60-130			

Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
m,p-Xylenes	8.66	0.05	ug/g	ND	108	60-130			
o-Xylene	4.29	0.05	ug/g	ND	107	60-130			

Qualifier Notes:

Sample Qualifiers :

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

QC Qualifiers :

QM-06 : Due to noted non-homogeneity of the QC sample matrix, the spike recoveries were out side the accepted range. Batch data accepted based on other 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

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

CCME PHC additional information:

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

PARACEL LABORATORIES LTD.

Paracel ID: 2128230

Paracel Order Number (Lab Use Only)	Chain Of Custody (Lab Use Only)
2128230	

Client Name: Paterson Group Inc.	Project Ref: PE5340		Page 1 of 1
Contact Name: Mandy Wittman	Quote #:		**Turnaround Time**
~~Address:~~ + Mark D'Arcy	PO #: 30390		☐ 1 day ☐ 3 day
	E-mail:		☒ 2 day ☐ Regular
Telephone: 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	PHCs F1-F4+BTEX	VOCs	PAHs	Metals by ICP	Hg	CrVI	B (HWS)	EC/SAR	pH			
1	BH1-21-AU1	S		2	June 30	9 am			✓	✓				✓	✓			
2	BH1-21-SS5	"		2	2021	10 am	✓											
3	BH2-21-SS8	"		2	" "	2 pm			✓	✓								
4	BH3-21-SS3	"		2	July 2	9 am								✓				
5	BH4-21-SS8	"		2	July 2	1 pm	✓								✓			
6	BH5-21-SS5	"		2	July 5	10 am			✓	✓								
7	BH5-21-SS7	"		2	July 5	11 am	✓											
8	TP1-21-G2	"		2	June 30	9:30			✓	✓								
9																		
10																		

Comments:

Method of Delivery: Paracel Courier

Relinquished By (Sign): [signature]	Received By Driver/Depot: [signature]	Received at Lab: Sumeeparn Dhmon	Verified By: [signature]
Relinquished By (Print): Mark D'Arcy	Date/Time: 06/07/21 3:21	Date/Time: Jul 06, 2021 04.20	Date/Time: July 6, 2021 18:36
Date/Time: July 6/2021 ~3pm	Temperature: °C	Temperature: 15.3 C	pH Verified: ☐ By: