PATERSON GROUP

Phase II – Environmental Site Assessment

Part of 2500 Palladium Drive
Ottawa, Ontario

Prepared for Full Speed Builders

Report: PE6102-2
July 17, 2023

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EXECUTIVE SUMMARY

Assessment

Paterson Group was retained by Full Speed Builders to conduct a Phase II – Environmental Site Assessment (Phase II ESA) for part of the property addressed 2500 Palladium Drive, 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 were considered to result in areas of potential environmental concern (APECs) on the subject site (Phase II Property).

The subsurface investigation for this assessment was conducted on June 20, 2023 and consisted of drilling three (3) boreholes (BH1-23 to BH3-23) across the Phase II Property, in conjunction with a geotechnical investigation. The boreholes were advanced to depths ranging from approximately 6.71 m to 7.32 m below the existing ground surface and terminated within an overburden layer of grey silty clay or glacial till. Upon completion, all three boreholes were instrumented with groundwater monitoring wells in order to access the groundwater table.

In general, the subsurface soil profile encountered at the borehole locations consists of a thin pavement structure (asphaltic concrete over granular fill), underlain by stiff grey silty clay, transitioning to glacial till at deeper depths. Bedrock was not confirmed in any of the boreholes during the field drilling program.

A total of six soil samples were submitted for laboratory analysis of BTEX, PHCs (F_1-F_4), metals, PAHs, EC, SAR, and/or pH parameters. Based on the analytical test results, all detected parameter concentrations are in compliance with the selected MECP Table 3 Coarse-Grained Commercial Soil Standards, with the exception of the electrical conductivity level in Sample BH3-23-SS2. This exceedance is suspected to be the result of the use of road salt on the Phase II Property during snow and ice conditions and thus, as per Section 49.1 of O. Reg 153/04, does not represent a contaminant issue.

Three groundwater samples were submitted for laboratory analysis of VOCs and PHCs (F_1-F_4) parameters. Based on the analytical test results, No parameter concentrations were detected above the laboratory method detection limits in any of the samples analyzed. The results are in compliance with the MECP Table 3 Non-Potable Groundwater Standards.

Recommendations

Soil

Based on the soil test results, the on-site soils comply with the MECP Table 2.1 Excess Soil Quality Standards (Ontario Regulation 406/19), for off-site disposal. Additional excess soil testing will likely be required prior to taking soil off-site, depending upon the volume of the excess soil that will be generated from the construction project.

Monitoring Wells

It is recommended that the monitoring wells be maintained for future sampling purposes. The monitoring wells will be registered with the MECP under Ontario Regulation 903 (Ontario Water Resources Act). As such a time that the monitoring wells are no longer required, they must be decommissioned in accordance with O.Reg. 903.

1.0 INTRODUCTION

At the request of Full Speed Builders, Paterson Group (Paterson) conducted a Phase II – Environmental Site Assessment (Phase II ESA) for the proposed development portion of the property addressed 2500 Palladium Drive, in the City of Ottawa, Ontario (the Phase II Property).

The purpose of this Phase II ESA has been to address the areas of potential environmental concern (APECs) identified on the Phase II Property as a result the findings of the Phase I ESA.

1.1 Site Description

Address:	Part of 2500 Palladium Drive, #1200, Ottawa, Ontario.
Location:	The Phase II Property is situated on the west side of Palladium Drive, approximately 325 m southwest of Huntmar Drive, in the City of Ottawa, Ontario. Refer to Figure 1 – Key Plan, for the site location context.
Latitude and Longitude:	45° 17’ 32" N, 75° 55’ 50" W.

Site Description:

Configuration:	Irregular.
Area:	0.30 hectares (approximately).
Zoning:	GM – General Mixed-Use Zone.
Current Use:	The Phase II Property is partially occupied by an automotive dealership and service garage as well as a vehicular parking lot.
Services:	The Phase II Property is located within a municipally serviced area.

1.2 Property Ownership

The Phase II Property is currently owned by Capital Two Investments Limited. Paterson was retained to complete this Phase II ESA by Mr. Daniel Fox of Full Speed Builders, whose office is located at 16788 Highway 7, Perth, Ontario, and can be contacted via telephone at 613-466-0400.

1.3 Applicable Site Condition Standard

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

- ❒ Full depth soil conditions;
- ❒ Coarse-grained soil conditions;
- ❒ Non-potable groundwater conditions;
- ❒ Commercial land use.

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

2.0 BACKGROUND INFORMATION

2.1 Physical Setting

The Phase II Property is predominantly paved with an asphaltic concrete parking lot, used for vehicle inventory storage for the associated dealership on the property. Part of the Phase II Property also consists of a portion of the dealership building.

The site topography is relatively flat, while the regional topography appears to slope down towards the northeast, in the general direction the Carp River. The Phase II Property is considered to be at grade with respect to the adjacent streets and surrounding properties.

Water drainage on the Phase II Property occurs primarily via surface run-off towards catch basins present within the vehicle parking lot. No ponded water, stressed vegetation, surficial staining, or any other indications of potential sub-surface contamination were observed on the property at time of the site inspection.

3.0 SCOPE OF INVESTIGATION

3.1 Overview of Site Investigation

The subsurface investigation for this assessment was conducted on June 20, 2023 and consisted of drilling three (3) boreholes (BH1-23 to BH3-23) across the Phase II Property, in conjunction with a geotechnical investigation.

The boreholes were advanced to depths ranging from approximately 6.71 m to 7.32 m below the existing ground surface and terminated within an overburden layer of grey silty clay or glacial till. Bedrock was not encountered in any of the boreholes during the field drilling program.

Upon completion, all three boreholes were instrumented with groundwater monitoring wells in order to access the groundwater table.

3.2 Media Investigated

During the course of this subsurface investigation, soil and groundwater samples were obtained from the Phase II Property and submitted for laboratory analysis. The rationale for sampling and analyzing these media is based on the contaminants of potential concern identified in the Phase I ESA.

The contaminants of potential concern for the soil and/or groundwater on the Phase II Property include the following:

- Volatile Organic Compounds (VOCs);
- Benzene, Ethylbenzene, Toluene, and Xylenes (BTEX);
- Petroleum Hydrocarbons, fractions 1 – 4 (PHCs F_1-F_4);
- Electrical Conductivity (EC);
- Sodium Adsorption Ratio (SAR).

These CPCs have the potential to be present in the soil matrix and/or the groundwater situated beneath the Phase II Property.

It should be noted that supplementary soil samples were analyzed for excess soil qualification purposes, in accordance with O. Reg. 406/19, in anticipation of future off-site disposal of soil during construction activities. For this reason, select near-surface soil samples were also analyzed for metals and polycyclic aromatic hydrocarbons (PAHs), though these parameters are not considered to be contaminants of potential concern on the Phase II Property.

3.3 Phase I ESA Conceptual Site Model

Geological and Hydrogeological Setting

Based on the available mapping information, the bedrock beneath the Phase II Property generally consists of interbedded limestone and shale of the Verulam Formation. The surficial geology consists largely of offshore marine sediments (clay and silt), with an overburden ranging from approximately 10 m to 15 m in thickness.

Groundwater is anticipated to be encountered within the overburden and flow in a northeasterly direction towards the Carp River.

Water Bodies and Areas of Natural and Scientific Interest

No water bodies or areas of natural and scientific interest are present on the Phase II Property or within the Phase I Study Area.

The nearest named water body with respect to the Phase II Property is the Carp River, located approximately 1.2 km to the northeast.

Drinking Water Wells

Based on the availability of municipal services, no potable drinking water wells are anticipated to remain in use within the Phase I Study Area.

Existing Buildings and Structures

The northern portion of the Phase II Property is partially occupied by an automotive dealership.

Current and Future Property Use

The Phase II Property is partially occupied by an automotive dealership and maintenance garage building in the northern portion, while the remainder consists largely of an asphalt-covered vehicular parking lot.

It is our understanding that the Phase II Property is to be developed with an addition to the existing dealership building. Due to the continuing use of the property for commercial purposes, a record of site condition (RSC) will not be required to be filed with the MECP.

Neighbouring Land Use

The surrounding lands within the Phase I Study Area consist largely of commercial properties or vacant land. Current land use is depicted on Drawing PE6102-2 – Surrounding Land Use Plan, in the Figures section of this report.

Potentially Contaminating Activities and Areas of Potential Environmental Concern

As per Section 7.1 of the Phase I ESA report, four potentially contaminating activities (PCAs), resulting in areas of potential environmental concern (APECs), were identified on the Phase II Property. These APECs include:

- Three aboveground oil and transmission fluid storage tanks, located in the northern portion of the Phase II Property (APEC #1).
- An underground oil/water separator, located in the northern portion of the Phase II Property (APEC #2).
- The use of road salt for de-icing purposes during winter conditions throughout the asphalt-covered parking lot occupying the majority of the Phase II Property (APEC #3).
- An active vehicle maintenance garage adjacent to the north of the Phase II Property (APEC #4).

Other off-site PCAs were identified within the Phase I Study Area but were deemed not to be of any environmental concern to the Phase II Property based on their separation distances, or their inferred down-gradient or cross-gradient orientation with respect to the known groundwater flow to the northeast.

Contaminants of Potential Concern

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

- Volatile Organic Compounds (VOCs);
- Benzene, Ethylbenzene, Toluene, and Xylenes (BTEX);
- Petroleum Hydrocarbons, fractions 1 – 4 (PHCs F_1-F_4);
- Electrical Conductivity (EC);

- ❒ Sodium Adsorption Ratio (SAR).

These CPCs have the potential to be present in the soil matrix and/or the groundwater situated beneath the Phase II Property.

It should be noted that supplementary soil samples were analyzed for excess soil qualification purposes, in accordance with O. Reg. 406/19, in anticipation of future off-site disposal of soil during construction activities. For this reason, select near-surface soil samples were also analyzed for metals and polycyclic aromatic hydrocarbons (PAHs), though these parameters are not considered to be contaminants of potential concern on the Phase II Property.

Assessment of Uncertainty and/or Absence of Information

The information available for review as part of the preparation of this Phase I ESA is considered to be sufficient to conclude that there are PCAs and APECs associated with the Phase II Property.

The presence of any PCAs was confirmed by a variety of independent sources, and as such, the conclusions of this report are not affected by uncertainty which may be present with respect to the individual sources.

3.4 Deviations from the Sampling and Analysis Plan

No deviations from the Sampling and Analysis were made during the course of this Phase II ESA.

3.5 Physical Impediments

No physical impediments were encountered during the course of the field drilling program.

4.0 INVESTIGATION METHOD

4.1 Subsurface Investigation

The subsurface investigation for this assessment was conducted on June 20, 2023 and consisted of drilling three (3) boreholes (BH1-23 to BH3-23) across the Phase II Property, in conjunction with a geotechnical investigation.

The boreholes were advanced to depths ranging from approximately 6.71 m to 7.32 m below the existing ground surface and terminated within an overburden layer of grey silty clay or glacial till. Bedrock was not encountered in any of the boreholes during the field drilling program. Upon completion, all three boreholes were instrumented with groundwater monitoring wells in order to access the groundwater table.

Under the full-time supervision of Paterson personnel, the boreholes were drilled using a low-clearance drill rig provided by George Downing Estate Drilling of Hawkesbury, Ontario. The locations of the boreholes are illustrated on Drawing PE6102-3 – Test Hole Location Plan, appended to this report.

4.2 Soil Sampling

Soil 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.

The samples were recovered using a stainless-steel split spoon, while wearing protective gloves (changed after each sample), and immediately placed into plastic bags. If significant contamination was encountered, the samples were instead placed into glass jars. Sampling equipment was routinely washed in soapy water and rinsed with methylhydrate after each split spoon to prevent any cross contamination of the samples. The samples were also stored in coolers to reduce analyte volatilization during transportation.

A total of 28 soil samples were obtained from the boreholes by means of auger and split spoon sampling. The depths at which auger and split spoon samples were obtained from the boreholes are shown as "**AU**" and "**SS**", respectively, on the Soil Profile and Test Data Sheets, appended to this report.

4.3 Field Screening Measurements

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

The recovered soil samples were placed immediately into airtight plastic bags with nominal headspace. All lumps of soil inside the bags were broken by hand, and the soil was allowed to come to room temperature prior to conducting the vapour survey, ensuring consistency of readings between samples. To measure the soil vapours, the analyser probe was inserted into the nominal headspace above the sample. The sample was then agitated and manipulated gently by hand as the measurement was taken. The peak reading registered within the first 15 seconds was recorded as the vapour measurement. The parts per million (ppm) scale was used to measure concentrations of organic vapours.

The results of the vapour survey are presented on the Soil Profile and Test Data Sheets, appended to this report.

4.4 Groundwater Monitoring Well Installation

Three groundwater monitoring wells were installed on the Phase II Property as part of this assessment. These monitoring wells were constructed using 50 mm diameter Schedule 40 threaded PVC risers and screens. A sand pack consisting of silica sand was placed around the screen with a bentonite seal placed above to minimize cross-contamination.

The ground surface elevations of each borehole were subsequently surveyed with respect to a known geodetic elevation.

A summary of the monitoring well construction details are listed below in Table 1 as well as on the Soil Profile and Test Data Sheets provided in Appendix 1.

Table 1
Monitoring Well Construction Details

Well ID	Ground Surface Elevation (m ASL)	Total Depth (m BGS)	Screened Interval (m BGS)	Sand Pack (m BGS)	Bentonite Seal (m BGS)	Casing Type
BH1-23	102.69	6.71	3.83 - 5.33	3.20 - 5.33	2.74 - 3.20	Flushmount
BH2-23	102.75	7.32	3.83 - 5.33	3.05 - 5.33	2.44 - 3.05	Flushmount
BH3-23	102.82	6.71	3.83 - 5.33	3.20 - 5.33	2.74 - 3.20	Flushmount

4.5 Field Measurement of Water Quality Parameters

Groundwater monitoring and sampling was conducted on-site on June 28, 2023. At this time, water quality parameters were measured in the field using a multi-parameter analyzer. Parameters measured in the field included temperature, pH and electrical conductivity.

Field parameters were measured after each well volume purged. Wells were purged prior to sampling until at least three well volumes had been removed or the field parameters were relatively stable. Stabilized field parameter values are summarized in Table 2.

Table 2
Measurement of Water Quality Parameters

Well ID	Temperature (˚C)	Conductivity (µS)	pH (Units)
BH1-23	15.8	2,357	4.69
BH2-23	12.0	1,797	5.01
BH3-23	13.7	909	5.50

4.6 Groundwater Sampling

Groundwater sampling protocols were followed using the MECP document entitled, *"Guidance on Sampling and Analytical Methods for Use at Contaminated Sites in Ontario"*, dated May 1996.

Standing water was purged from each monitoring well prior to the recovery of the groundwater samples using dedicated sampling equipment. The samples were then stored in coolers to reduce possible analyte volatilization during their transportation. Further details of our standard operating procedure for groundwater sampling are provided in the Sampling and Analysis Plan, appended to this report.

4.7 Analytical Testing

The following soil and groundwater samples were submitted for laboratory analysis:

Table 3
Testing Parameters for Submitted Soil Samples

Sample ID	Sample Depth & Stratigraphic Unit	Parameters Analyzed							Rationale
		BTEX	PHCs (F_1-F_4)	Metals	PAHs	EC	SAR	pH	
BH1-23-SS2				X	X	X	X	X	To assess for potential impacts resulting from the use of road salt for de-icing purposes, and for excess soil qualification purposes.
BH1-23-SS6		X	X						To assess for potential impacts resulting from the presence of an active automotive service garage, aboveground fuel storage tanks, and an oil/water separator on the adjacent to the north.
BH2-23-SS2				X	X	X	X	X	To assess for potential impacts resulting from the use of road salt for de-icing purposes, and for excess soil qualification purposes..
BH2-23-SS5		X	X						To assess for potential impacts resulting from the presence of an active automotive service garage, aboveground fuel storage tanks, and an oil/water separator on the adjacent to the north.
BH3-23-SS2				X	X	X	X	X	To assess for potential impacts resulting from the use of road salt for de-icing purposes, and for excess soil qualification purposes..
BH3-23-SS5		X	X						To assess for potential impacts resulting from the presence of an active automotive service garage, aboveground fuel storage tanks, and an oil/water separator on the adjacent to the north.
DUP1[1]		X	X						For laboratory QA/QC purposes.

1 – Duplicate sample of BH3-23-SS5

Table 4
Testing Parameters for Submitted Groundwater Samples

Sample ID	Screened Interval & Stratigraphic Unit	Parameters Analyzed		Rationale
		VOCs	PHCs (F_1-F_4)	
BH1-23-GW1	3.83 – 5.83 m Silty Clay	X	X	To assess for potential impacts resulting from the presence of an active automotive service garage, aboveground fuel storage tanks, and an oil/water separator on the adjacent to the north.
BH2-23-GW1	3.83 – 5.83 m Silty Clay	X	X	
BH3-22-GW1	3.83 – 5.83 m Silty Clay	X	X	
DUP1[1]	3.83 – 5.83 m Silty Clay	X	X	For laboratory QA/QC purposes.

1 – Duplicate sample of BH1-23-GW1

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

4.8 Residue Management

All soil cuttings were removed from the site following the field program, while all purge water and equipment cleaning fluids were retained on-site.

4.9 Elevation Surveying

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

4.10 Quality Assurance and Quality Control Measures

A summary of the quality assurance and quality control (QA/QC) measures, undertaken as part of this assessment, is provided in the Sampling and Analysis Plan in Appendix 1.

5.0 REVIEW AND EVALUATION

5.1 Geology

In general, the subsurface soil profile encountered at the borehole locations consists of a thin pavement structure (asphaltic concrete over granular fill), underlain by stiff grey silty clay, transitioning to glacial till at deeper depths. Bedrock was not confirmed in any of the boreholes during the field drilling program.

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

5.2 Groundwater Elevations, Flow Direction, and Hydraulic Gradient

Groundwater levels were measured using an electronic water level meter on June 28, 2023. The 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
BH1-23	102.69	1.72	100.97	June 28, 2023
BH2-23	102.75	1.76	100.99	
BH3-23	102.82	2.19	100.63	

The groundwater at the Phase II Property was encountered within the overburden at depths ranging from approximately 1.72 m to 2.19 m below the existing ground surface.

No unusual visual observations were identified within the recovered groundwater samples.

Using the groundwater elevations recorded during the sampling event, groundwater contour mapping was completed as part of this assessment. According to the mapped contour data, illustrated on Drawing PE6102-3 – Test Hole Location Plan in the appendix, the groundwater flow on the subject site was calculated to be in a northerly direction. A horizontal hydraulic gradient of approximately 0.015 m/m was also calculated as part of this assessment. It should be noted that groundwater levels are expected to fluctuate throughout the year with seasonal variations.

5.3 Fine/Coarse Soil Texture

Grain size analysis was not completed as part of this investigation. As a result, the coarse-grained soil standards were chosen as a conservative approach.

5.4 Field Screening

Field screening of the soil samples collected during the drilling program resulted in organic vapour readings ranging from 0.1 ppm to 0.8 ppm, indicating that there is a negligible potential for the presence of volatile substances. 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

A total of six soil samples were submitted for laboratory analysis of BTEX, PHCs (F_1-F_4), metals, PAHs, EC, SAR, and/or pH parameters. The results of the analytical testing are presented below in Tables 6 to 9, as well as on the laboratory Certificates of Analysis included in Appendix 1.

Table 6
Analytical Test Results – Soil
BTEX & PHCs

Parameter	MDL (µg/g)	Soil Samples (µg/g)						MECP Table 3 Coarse-Grained Commercial Soil Standards (µg/g)
		June 20, 2023						
		BH1-23-SS2	BH1-23-SS6	BH2-23-SS2	BH2-23-SS5	BH3-23-SS2	BH3-22-SS5	
		Sample Depth (m bgs)						
		0.76 – 1.37 m	3.81 – 4.42 m	0.76 – 1.37 m	3.05 – 3.66 m	0.76 – 1.37 m	3.05 – 3.66 m	
Benzene	0.02	nd	nd	nd	nd	nd	nd	0.32
Ethylbenzene	0.05	nd	nd	nd	nd	nd	nd	9.5
Toluene	0.05	nd	nd	0.05	nd	nd	nd	68
Xylenes	0.05	nd	nd	nd	nd	nd	nd	26
PHCs F_1	7	nd	nd	nd	nd	nd	nd	55
PHCs F_2	4	nd	nd	nd	nd	20	nd	230
PHCs F_3	8	nd	nd	nd	nd	41	nd	1,700
PHCs F_4	6	nd	nd	nd	nd	15	nd	3,300

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

All detected BTEX and PHC parameter concentrations are in compliance with the MECP Table 3 Coarse-Grained Commercial Standards.

Table 7
Analytical Test Results – Soil
Metals

Parameter	MDL (µg/g)	Soil Samples (µg/g)			MECP Table 3 Coarse-Grained Commercial Soil Standards (µg/g)
		June 20, 2023			
		BH1-23-SS2	BH2-23-SS2	BH3-23-SS2	
		Sample Depth (m bgs)			
		0.76 – 1.37 m	0.76 – 1.37 m	0.76 – 1.37 m	
Antimony	1.0	nd	nd	nd	40
Arsenic	1.0	3.9	3.0	nd	18
Barium	1.0	131	113	134	670
Beryllium	0.5	0.6	0.5	nd	8
Boron	5.0	7.3	6.1	12.2	120
Cadmium	0.5	nd	nd	nd	1.9
Chromium	5.0	33.8	29.7	10.6	160
Cobalt	1.0	9.0	8.0	3.1	80
Copper	5.0	20.6	16.0	8.7	230
Lead	1.0	5.3	4.4	8.3	120
Molybdenum	1.0	1.7	nd	nd	40
Nickel	5.0	18.1	16.0	8.7	270
Selenium	1.0	nd	nd	nd	5.5
Silver	0.3	nd	nd	nd	40
Thallium	1.0	nd	nd	nd	3.3
Uranium	1.0	nd	nd	nd	33
Vanadium	10.0	51.0	45.6	nd	86
Zinc	20.0	46.9	42.7	nd	340

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

All detected metal parameter concentrations are in compliance with the MECP Table 3 Coarse-Grained Commercial Standards.

Table 8
Analytical Test Results – Soil
PAHs

Parameter	MDL (µg/g)	Soil Samples (µg/g) June 20, 2023			MECP Table 3 Coarse-Grained Commercial Soil Standards (µg/g)
		BH1-23-SS2	BH2-23-SS2	BH3-23-SS2	
		Sample Depth (m bgs)			
		0.76 – 1.37 m	0.76 – 1.37 m	0.76 – 1.37 m	
Acenaphthene	0.02	nd	nd	nd	96
Acenaphthylene	0.02	nd	nd	nd	0.15
Anthracene	0.02	nd	nd	nd	0.67
Benzo[a]anthracene	0.02	nd	nd	nd	0.96
Benzo[a]pyrene	0.02	nd	nd	nd	0.3
Benzo[b]fluoranthene	0.02	nd	nd	nd	0.96
Benzo[g,h,i]perylene	0.02	nd	nd	nd	9.6
Benzo[k]fluoranthene	0.02	nd	nd	nd	0.96
Chrysene	0.02	nd	nd	nd	9.6
Dibenzo[a,h]anthracene	0.02	nd	nd	nd	0.1
Fluoranthene	0.02	nd	nd	nd	9.6
Fluorene	0.02	nd	nd	nd	62
Indeno [1,2,3-cd] pyrene	0.02	nd	nd	nd	0.76
1-Methylnaphthalene	0.02	nd	nd	nd	76
2-Methylnaphthalene	0.02	nd	nd	nd	76
Methylnaphthalene (1&2)	0.04	nd	nd	nd	76
Naphthalene	0.01	nd	nd	nd	9.6
Phenanthrene	0.02	nd	nd	nd	12
Pyrene	0.02	nd	nd	nd	96

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

No PAH parameter concentrations were detected above the laboratory method detection limits in any of the samples analyzed. The results are in compliance with the MECP Table 3 Coarse-Grained Commercial Standards.

Table 9
Analytical Test Results – Soil
Inorganic Parameters

Parameter	MDL (units)	Soil Samples (µg/g) June 20, 2023			MECP Table 3 Coarse-Grained Commercial Soil Standards (units)
		BH1-23-SS2	BH2-23-SS2	BH3-23-SS2	
		Sample Depth (m bgs)			
		0.76 – 1.37 m	0.76 – 1.37 m	0.76 – 1.37 m	
Electrical Conductivity (EC)	5 µS/cm	586	428	**2,920**	1,400 µS/cm
Sodium Adsorption Ratio (SAR)	0.01	0.91	0.42	1.31	12
pH	0.05	7.70	7.68	7.93	5.00 – 11.00

Notes:
- MDL – Method Detection Limit
- **Bold and Underlined** – value exceeds selected MECP standards

All EC, SAR, and pH levels measured in the soil samples analyzed are in compliance with the selected MECP Table 3 Coarse-Grained Commercial Standards, with the exception of the EC level detected in Sample BH3-23-SS2. This exceedance is suspected to be the result of the use of road salt on the Phase II Property during snow and ice conditions and thus, as per Section 49.1 of O. Reg 153/04, does not represent a contaminant issue.

Table 10
Maximum Concentrations – Soil

Parameter	Maximum Concentration (µg/g)	Sample ID	Depth Interval (m BGS)
Toluene	0.05	BH2-23-SS2	0.76 – 1.37 m
PHCs F_2	20	BH3-22-SS5	3.05 – 3.66 m
PHCs F_3	41	BH3-22-SS5	3.05 – 3.66 m
PHCs F_4	15	BH3-22-SS5	3.05 – 3.66 m
Arsenic	3.9	BH1-23-SS2	0.76 – 1.37 m
Barium	134	BH3-23-SS2	0.76 – 1.37 m
Beryllium	0.6	BH1-23-SS2	0.76 – 1.37 m
Boron	12.2	BH3-23-SS2	0.76 – 1.37 m
Chromium	33.8	BH1-23-SS2	0.76 – 1.37 m
Cobalt	9.0	BH1-23-SS2	0.76 – 1.37 m
Copper	20.6	BH1-23-SS2	0.76 – 1.37 m
Lead	8.3	BH3-23-SS2	0.76 – 1.37 m
Molybdenum	1.7	BH1-23-SS2	0.76 – 1.37 m
Nickel	18.1	BH1-23-SS2	0.76 – 1.37 m
Vanadium	51.0	BH1-23-SS2	0.76 – 1.37 m
Zinc	46.9	BH1-23-SS2	0.76 – 1.37 m
Electrical Conductivity	**2,920**	BH3-22-SS2	0.76 – 1.37 m
Sodium Adsorption Ratio	1.31	BH3-22-SS2	0.76 – 1.37 m
pH	7.93	BH3-22-SS2	0.76 – 1.37 m

Notes:
- **Bold and Underlined** – value exceeds selected MECP standards

All other parameter concentrations analyzed were below the laboratory detection limits.

5.6 Groundwater Quality

Three groundwater samples were submitted for laboratory analysis of VOC and PHC (F_1-F_4) parameters. The results of the analytical testing are presented below in Table 11 and Table 12, as well as on the laboratory Certificates of Analysis included in Appendix 1.

Table 11
Analytical Test Results – Groundwater
Volatile Organic Compounds (VOCs)

Parameter	MDL (µg/L)	Groundwater Samples (ug/L)			MECP Table 3 Coarse-Grained Non-Potable Groundwater Standards (µg/L)
		June 28, 2023			
		BH1-23-GW1	BH2-23-GW1	BH3-23-GW1	
		Screening Interval (m bgs)			
		3.83 – 5.83 m	3.83 – 5.83 m	3.83 – 5.83 m	
Acetone	5.0	nd	nd	nd	130,000
Benzene	0.5	nd	nd	nd	44
Bromodichloromethane	0.5	nd	nd	nd	85,000
Bromoform	0.5	nd	nd	nd	380
Bromomethane	0.5	nd	nd	nd	5.6
Carbon Tetrachloride	0.2	nd	nd	nd	0.79
Chlorobenzene	0.5	nd	nd	nd	630
Chloroform	0.5	nd	nd	nd	2.4
Dibromochloromethane	0.5	nd	nd	nd	82,000
Dichlorodifluoromethane	1.0	nd	nd	nd	4,400
1,2-Dichlorobenzene	0.5	nd	nd	nd	4,600
1,3-Dichlorobenzene	0.5	nd	nd	nd	9,600
1,4-Dichlorobenzene	0.5	nd	nd	nd	8
1,1-Dichloroethane	0.5	nd	nd	nd	320
1,2-Dichloroethane	0.5	nd	nd	nd	1.6
1,1-Dichloroethylene	0.5	nd	nd	nd	1.6
cis-1,2-Dichloroethylene	0.5	nd	nd	nd	1.6
trans-1,2-Dichloroethylene	0.5	nd	nd	nd	1.6
1,2-Dichloropropane	0.5	nd	nd	nd	16
1,3-Dichloropropene	0.5	nd	nd	nd	5.2
Ethylbenzene	0.5	nd	nd	nd	2,300
Ethylene Dibromide	0.2	nd	nd	nd	0.25
Hexane	1.0	nd	nd	nd	51
Methyl Ethyl Ketone	5.0	nd	nd	nd	470,000
Methyl Isobutyl Ketone	5.0	nd	nd	nd	140,000
Methyl tert-butyl ether	2.0	nd	nd	nd	190
Methylene Chloride	5.0	nd	nd	nd	610
Styrene	0.5	nd	nd	nd	1,300
1,1,1,2-Tetrachloroethane	0.5	nd	nd	nd	3.3
1,1,2,2-Tetrachloroethane	0.5	nd	nd	nd	3.2
Tetrachloroethylene	0.5	nd	nd	nd	1.6
Toluene	0.5	nd	nd	nd	18,000
1,1,1-Trichloroethane	0.5	nd	nd	nd	640
1,1,2-Trichloroethane	0.5	nd	nd	nd	4.7
Trichloroethylene	0.5	nd	nd	nd	1.6
Trichlorofluoromethane	1.0	nd	nd	nd	2,500
Vinyl Chloride	0.5	nd	nd	nd	0.5
Xylenes	0.5	nd	nd	nd	4,200

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

No VOC parameter concentrations were detected above the laboratory method detection limits in any of the samples analyzed. The results are in compliance with the MECP Table 3 Non-Potable Groundwater Standards.

Table 12
Analytical Test Results – Groundwater
Petroleum Hydrocarbons (PHCs)

Parameter	MDL (µg/L)	Groundwater Samples (µg/L)			MECP Table 3 Non-Potable Groundwater Standards (µg/L)
		June 28, 2023			
		BH1-23-GW1	BH2-23-GW1	BH3-23-GW1	
		Screening Interval (m bgs)			
		3.83 – 5.83 m	3.83 – 5.83 m	3.83 – 5.83 m	
PHCs F_1	25	nd	nd	nd	750
PHCs F_2	100	nd	nd	nd	150
PHCs F_3	100	nd	nd	nd	500
PHCs F_4	100	nd	nd	nd	500

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

No PHC parameter concentrations were detected above the laboratory method detection limits in any of the samples analyzed. The results are in compliance with the MECP Table 3 Non-Potable Groundwater Standards.

5.7 Quality Assurance and Quality Control Results

All samples submitted as part of this Phase II ESA were handled in accordance with the analytical protocols with respect to holding time, preservation method, storage requirement, and container type.

As per Subsection 47(3) of O. Reg. 153/04, as amended by the Environmental Protection Act, the certificates of analysis have been received for each sample submitted for laboratory analysis and have been appended to this report.

As per the Sampling and Analysis Plan, a duplicate soil sample was obtained from sample BH3-23-SS5 and submitted for laboratory analysis of BTEX and PHC parameters. No parameter concentrations were detected in either the original or the duplicate samples above the laboratory method detection limits, and as such, they are considered to meet the data quality objectives outlined in the Sampling and Analysis Plan, appended to this report.

Similarly, a duplicate groundwater sample was obtained from sample BH1-23-GW1 and submitted for laboratory analysis of VOCs and PHC parameters. No parameter concentrations were detected in either the original or the duplicate samples above the laboratory method detection limits, and as such, they are considered to meet the data quality objectives outlined in the Sampling and Analysis Plan, appended to this report.

Based on the results of the QA/QC analysis, the 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 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

As described in Section 7.1 of the Phase I ESA report, as well as Section 2.2 of this report, the following PCAs, as defined by Table 2 of O. Reg. 153/04, are considered to result in APECs on the Phase II Property:

Table 15
Areas of Potential Environmental Concern

Area of Potential Environmental Concern	Location of APEC on Phase I Property	Potentially Contaminating Activity (Table 2 – O. Reg. 153/04)	Location of PCA (On-Site or Off-Site)	Contaminants of Potential Concern	Media Potentially Impacted (Groundwater, Soil, and/or Sediment)
APEC #1 Aboveground Oil/Fluid Storage Tanks	Northern Portion of Phase II Property	*"Item 28: Gasoline and Associated Products Storage in Fixed Tanks"*	On-Site	BTEX PHCs (F_1-F_4)	Soil and/or Groundwater
APEC #2 Oil/Water Separator	Northern Portion of Phase II Property	*"Item N/A: Oil/Water Separator"*	On-Site	BTEX PHCs (F_1-F_4)	Soil and/or Groundwater
APEC #3 Application of Road Salt	Central and Southern Portions of Phase II Property	*"Item N/A: Application of Road Salt for De-Icing Purposes During Snow and Ice Conditions"*	On-Site	EC SAR	Soil
APEC #4 Automotive Service Garage	Northern Portion of Phase II Property	*"Item 52: Storage, Maintenance, Fuelling and Repair of Equipment, Vehicles, and Material Used to Maintain Transportation Systems"*	On-Site & Off-Site	VOCs PHCs (F_1-F_4)	Soil and/or Groundwater

Contaminants of Potential Concern (CPCs)

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

- ❒ Volatile Organic Compounds (VOCs);
- ❒ Benzene, Ethylbenzene, Toluene, and Xylenes (BTEX);
- ❒ Petroleum Hydrocarbons, fractions 1 – 4 (PHCs F_1-F_4);
- ❒ Electrical Conductivity (EC);
- ❒ Sodium Adsorption Ratio (SAR).

These CPCs have the potential to be present in the soil matrix and/or the groundwater situated beneath the Phase II Property.

It should be noted that supplementary soil samples were analyzed for excess soil qualification purposes, in accordance with O. Reg. 406/19, in anticipation of future off-site disposal of soil during construction activities. For this reason, select near-surface soil samples were also analyzed for metals and polycyclic aromatic hydrocarbons (PAHs), though these parameters are not considered to be contaminants of potential concern on the Phase II Property.

Subsurface Structures and Utilities

Underground service locates were completed prior to the subsurface investigation. Underground utilities identified beneath the Phase II Property include sewer and water lines, gas lines, and buried electrical conduits.

Physical Setting

Site Stratigraphy

The stratigraphy of the Phase II Property generally consists of:

- ❒ Pavement Structure (asphaltic concrete underlain by engineered fill); extending to a maximum depth of approximately 1.60 m below ground surface.
- ❒ Grey Silty Clay; extending to depths ranging from approximately 6.40 m to 6.71 m below ground surface (bottom of BH1-23 and BH3-23).

- ❒ Grey Silty Sand; encountered at a depth of approximately 6.40 m below ground surface (BH2-23 only).
- ❒ Glacial Till; extending to a depth of approximately 7.32 m below ground surface (bottom of BH2-23 only).

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

Hydrogeological Characteristics

The groundwater at the Phase II Property was encountered within an overburden layer of grey silty clay at depths ranging from approximately 1.72 m to 2.19 m below the existing ground surface.

Based on the measured groundwater levels, the groundwater was calculated to flow in a northerly direction.

Approximate Depth to Bedrock

Bedrock was not confirmed in any of the boreholes during the field drilling program. Based on the available bedrock mapping data for the general area, bedrock is anticipated to be encountered at a depth of approximately 10 m to 15 m below ground surface.

Approximate Depth to Water Table

The depth to the water table is approximately 1.72 m to 2.19 m below the existing ground surface.

Sections 41 and 43.1 of Ontario Regulation 153/04

Section 41 of the Regulation does not apply to the Phase II Property, as the Phase II Property is not within 30 m of an environmentally sensitive area, the pH of the surface soil is between 5 and 9, and the pH of the subsurface soil is between 5 and 11.

Section 43.1 of the Regulation does not apply to the Phase II Property in that the Phase II Property is not a Shallow Soil Property and is not within 30 m of a water body.

Existing Buildings and Structures

The northern portion of the Phase II Property is partially occupied by an automotive dealership and maintenance garage building.

Environmental Condition

Areas Where Contaminants are Present

Based on the findings of this assessment, no contaminated areas were identified on the Phase II Property.

Types of Contaminants

Based on the analytical test results, no contaminant concentrations were identified on the Phase II Property in excess of the selected MECP Table 3 Coarse-Grained Commercial Soil Standards or the MECP Table 3 Non-Potable Groundwater Standards.

Contaminated Media

Based on the findings of this assessment, no contaminated media were identified on the Phase II Property.

What Is Known About Areas Where Contaminants Are Present

Based on the findings of this assessment, no contaminated areas were identified on the Phase II Property.

Distribution and Migration of Contaminants

Based on the findings of this assessment, no contamination was identified on the Phase II Property.

Discharge of Contaminants

Based on the findings of this assessment, no contamination was identified on the Phase II Property.

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 via the infiltration of precipitation, and the migration of contaminants via groundwater levels and/or flow, which may fluctuate seasonally.

Based on the findings of this assessment, no contamination was identified on the Phase II Property.

Potential for Vapour Intrusion

Given the clean soil and groundwater results, there is no potential for current or future vapour intrusion on the Phase II Property.

6.0 CONCLUSIONS

Assessment

Paterson Group was retained by Full Speed Builders to conduct a Phase II – Environmental Site Assessment (Phase II ESA) for part of the property addressed 2500 Palladium Drive, 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 were considered to result in areas of potential environmental concern (APECs) on the subject site (Phase II Property).

The subsurface investigation for this assessment was conducted on June 20, 2023 and consisted of drilling three (3) boreholes (BH1-23 to BH3-23) across the Phase II Property, in conjunction with a geotechnical investigation. The boreholes were advanced to depths ranging from approximately 6.71 m to 7.32 m below the existing ground surface and terminated within an overburden layer of grey silty clay or glacial till. Upon completion, all three boreholes were instrumented with groundwater monitoring wells in order to access the groundwater table.

In general, the subsurface soil profile encountered at the borehole locations consists of a thin pavement structure (asphaltic concrete over granular fill), underlain by stiff grey silty clay, transitioning to glacial till at deeper depths. Bedrock was not confirmed in any of the boreholes during the field drilling program.

A total of six soil samples were submitted for laboratory analysis of BTEX, PHCs (F_1-F_4), metals, PAHs, EC, SAR, and/or pH parameters. Based on the analytical test results, all detected parameter concentrations are in compliance with the selected MECP Table 3 Coarse-Grained Commercial Soil Standards, with the exception of the electrical conductivity level in Sample BH3-23-SS2. This exceedance is suspected to be the result of the use of road salt on the Phase II Property during snow and ice conditions and thus, as per Section 49.1 of O. Reg 153/04, does not represent a contaminant issue.

Three groundwater samples were submitted for laboratory analysis of VOCs and PHCs (F_1-F_4) parameters. Based on the analytical test results, No parameter concentrations were detected above the laboratory method detection limits in any of the samples analyzed. The results are in compliance with the MECP Table 3 Non-Potable Groundwater Standards.

Recommendations

Soil

Based on the soil test results, the on-site soils comply with the MECP Table 2.1 Excess Soil Quality Standards (Ontario Regulation 406/19), for off-site disposal. Additional excess soil testing will likely be required prior to taking soil off-site, depending upon the volume of the excess soil that will be generated from the construction project.

Monitoring Wells

It is recommended that the monitoring wells be maintained for future sampling purposes. The monitoring wells will be registered with the MECP under Ontario Regulation 903 (Ontario Water Resources Act). As such a time that the monitoring wells are no longer required, they must be decommissioned in accordance with O.Reg. 903.

7.0 STATEMENT OF LIMITATIONS

This Phase II – Environmental Site Assessment report has been prepared in general accordance with O. Reg. 153/04, as amended, and 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 Phase II Property 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 Full Speed Builders. Permission and notification from Full Speed Builders and Paterson Group will be required prior to the release of this report to any other party.

Paterson Group Inc.

Nick Sullivan, B.Sc.

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

Report Distribution:

- Full Speed Builders
- Paterson Group Inc.

FIGURES

FIGURE 1 – KEY PLAN

DRAWING PE6102-1 – SITE PLAN

DRAWING PE6102-2 – SURROUNDING LAND USE PLAN

DRAWING PE6102-3 – TEST HOLE LOCATION PLAN

DRAWING PE6102-4 – ANALYTICAL TESTING PLAN – SOIL

DRAWING PE6102-4A – CROSS SECTION A-A' – SOIL

DRAWING PE6102-4B – CROSS SECTION B-B' – SOIL

DRAWING PE6102-5 – ANALYTICAL TESTING PLAN – GROUNDWATER

DRAWING PE6102-5 – CROSS SECTION A-A' – GROUNDWATER

DRAWING PE6102-5 – CROSS SECTION B-B' – GROUNDWATER

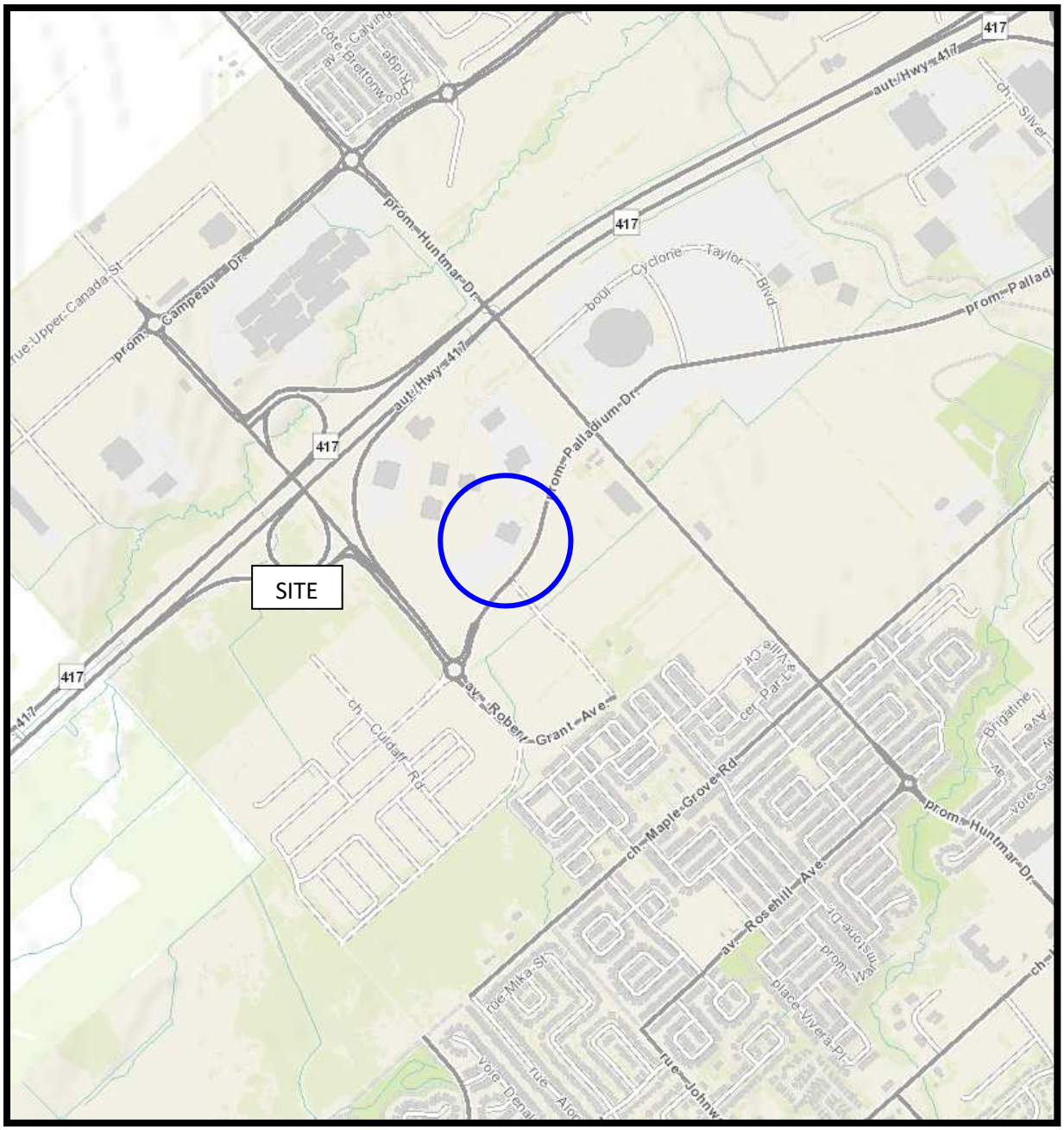

FIGURE 1

KEY PLAN

PATERSON GROUP

2500 PALLADIUM DRIVE # 1200
CAPITAL DODGE

INTERLOCK
VEHICLE SHOWROOM
VEHICLE PARTS STORAGE
VEHICLE MAINTENANCE GARAGE
VEHICLE WASH BAY
ABOVEGROUND OIL AND TRANSMISSION FLUID STORAGE TANKS
OIL / WATER SEPARATOR
NATURAL GAS CONNECTION
APEC 1
APEC 2
APEC 3
APEC 4
UTILITY POLE
FH
LANDSCAPED
ASPHALTIC CONCRETE PARKING LOT
CB
PRIVATE
AUTOPARK
PALLADIUM DRIVE

AREAS OR POTENTIAL ENVIRONMENTAL CONCREN:

ID #	PCA ID	DESCRIPTION
1)	28	ABOVEGROUND OIL & TRANSMISSION FLUID STORAGE TANKS
2)	N/A	OIL / WATER SEPARATOR
3)	N/A	USE OF ROAD SALT FOR DE-ICING PURPOSES DURING SNOW AND ICE CONDITIONS
4)	52	AUTOMOTIVE SERVICE GARAGE

SCALE: 1:400

0 5 10 15 20 25m

PATERSON GROUP
9 AURIGA DRIVE
OTTAWA, ON
K2E 7T9
TEL: (613) 226-7381

NO.	REVISIONS	DATE	INITIAL

FULL SPEED BUILDERS

PHASE I - ENVIRONMENTAL SITE ASSESSMENT
PART OF 2500 PALLADIUM DRIVE - # 1200

OTTAWA, ONTARIO

Title: SITE PLAN

Scale: 1:400	Date: 07/2023
Drawn by: YA	Report No.: PE6102-1
Checked by: NS	Dwg. No.: PE6102-1
Approved by: MSD	Revision No.:

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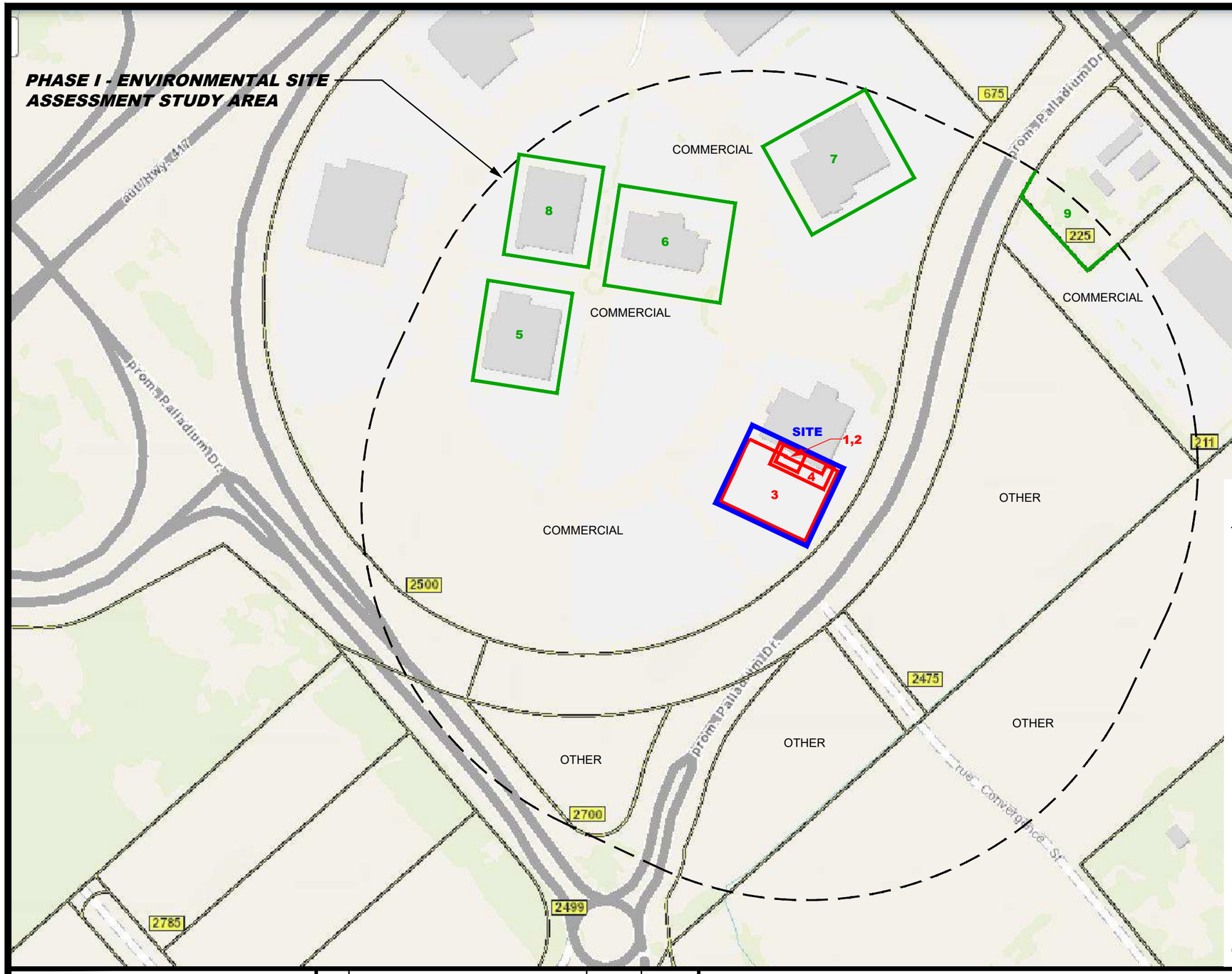

POTENTIALLY CONTAMINATING ACTIVITIES:

ID #	PCA ID	ADDRESS	DESCRIPTION
1)	28	ON-SITE	ABOVEGROUND OIL & TRANSMISSION FLUID STORAGE TANKS
2)	N/A	ON-SITE	OIL / WATER SEPARATOR
3)	N/A	ON-SITE	USE OF ROAD SALT FOR DE-ICING PURPOSES DURING SNOW AND ICE CONDITIONS
4)	52	ON-SITE	AUTOMOTIVE SERVICE GARAGE
5)	52	2500 PALLADIUM DR. #901	AUTOMOTIVE DEALERSHIP AND SERVICE GARAGE
6)	52	2500 PALLADIUM DR. #301	AUTOMOTIVE DEALERSHIP AND SERVICE GARAGE
7)	52	2500 PALLADIUM DR. #200	AUTOMOTIVE DEALERSHIP AND SERVICE GARAGE
8)	52	2500 PALLADIUM DR. #501	AUTOMOTIVE DEALERSHIP AND SERVICE GARAGE
9)	28	225 HUNTMAR DR.	RETAIL FUEL OUTLET

SCALE: 1:3000

0 25 50 75 100 125 150 200m

PATERSON GROUP
9 AURIGA DRIVE
OTTAWA, ON
K2E 7T9
TEL: (613) 226-7381

NO.	REVISIONS	DATE	INITIAL

FULL SPEED BUILDERS

PHASE I - ENVIRONMENTAL SITE ASSESSMENT
PART OF 2500 PALLADIUM DRIVE - # 1200

OTTAWA, ONTARIO

Title:

SURROUNDING LAND USE PLAN

Scale: 1:3000	Date: 07/2023
Drawn by: YA	Report No.: PE6102-1
Checked by: NS	Dwg. No.: PE6102-2
Approved by: MSD	Revision No.:

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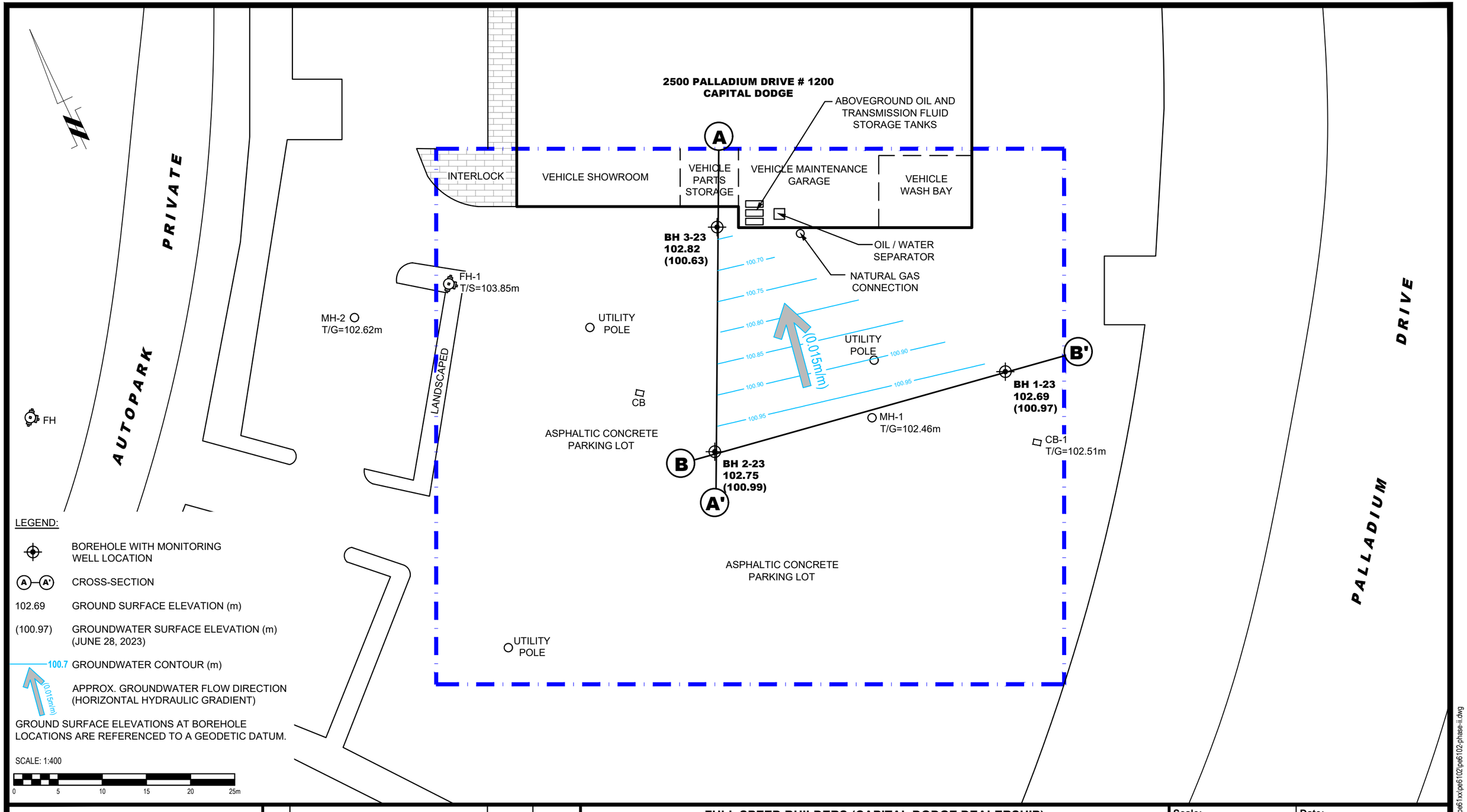

LEGEND:

- BOREHOLE WITH MONITORING WELL LOCATION
- A–A' CROSS-SECTION
- 102.69 GROUND SURFACE ELEVATION (m)
- (100.97) GROUNDWATER SURFACE ELEVATION (m) (JUNE 28, 2023)
- 100.7 GROUNDWATER CONTOUR (m)
- (0.015m/m) APPROX. GROUNDWATER FLOW DIRECTION (HORIZONTAL HYDRAULIC GRADIENT)

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

SCALE: 1:400

0 5 10 15 20 25m

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9 AURIGA DRIVE
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TEL: (613) 226-7381

NO.	REVISIONS	DATE	INITIAL

FULL SPEED BUILDERS (CAPITAL DODGE DEALERSHIP)

PHASE II - ENVIRONMENTAL SITE ASSESSMENT
1200, 2500 PALLADIUM DRIVE

OTTAWA, ONTARIO

Title:

TEST HOLE LOCATION PLAN

Scale: 1:400	Date: 06/2023
Drawn by: YA	Report No.: PE6102-2
Checked by: NS	Dwg. No.: PE6102-3
Approved by: MSD	Revision No.:

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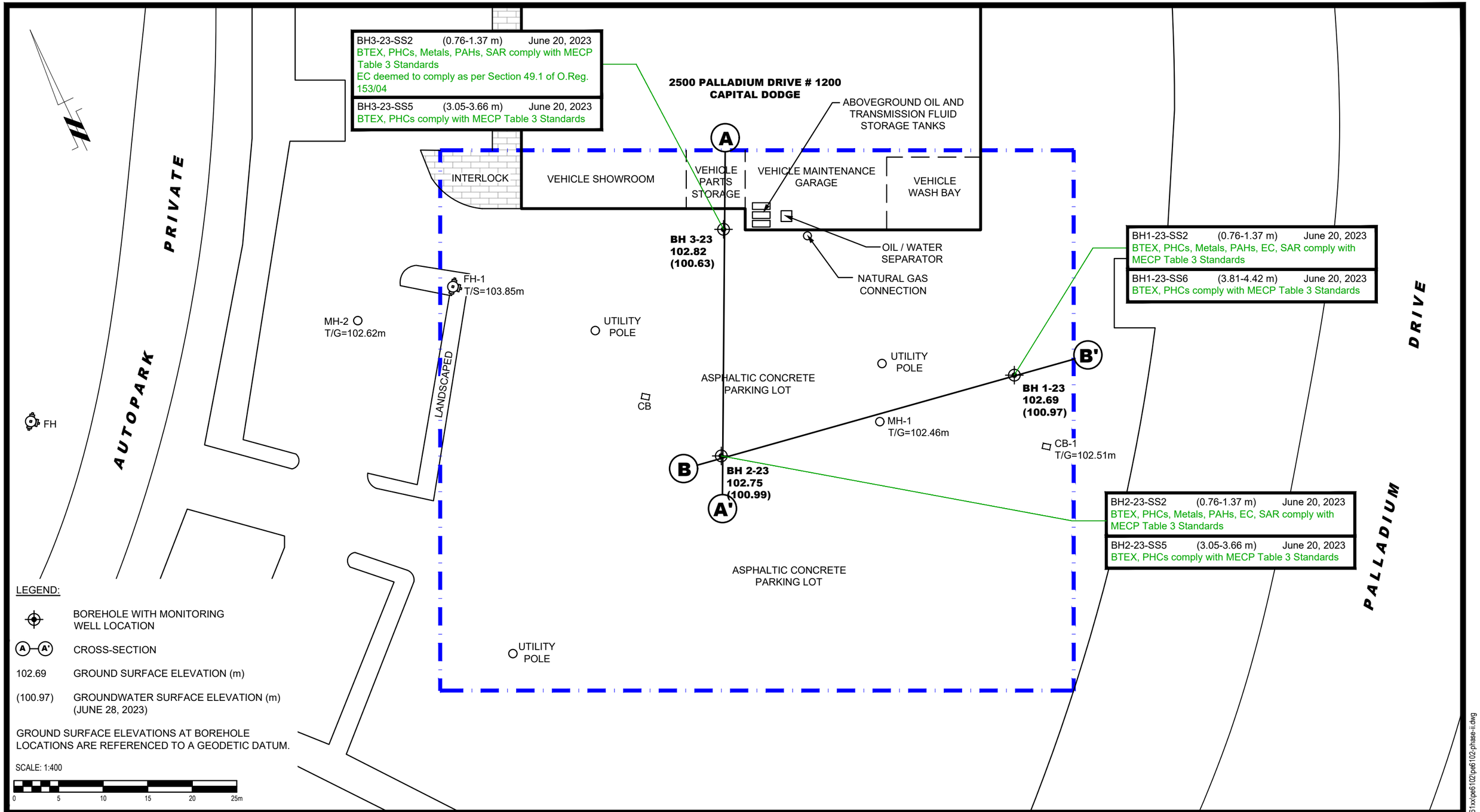

LEGEND:

- BOREHOLE WITH MONITORING WELL LOCATION
- A–A' CROSS-SECTION
- 102.69 GROUND SURFACE ELEVATION (m)
- (100.97) GROUNDWATER SURFACE ELEVATION (m) (JUNE 28, 2023)

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

SCALE: 1:400

0 5 10 15 20 25m

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NO.	REVISIONS	DATE	INITIAL

FULL SPEED BUILDERS (CAPITAL DODGE DEALERSHIP)

PHASE II - ENVIRONMENTAL SITE ASSESSMENT
1200, 2500 PALLADIUM DRIVE

OTTAWA, ONTARIO

Title:

ANALYTICAL TESTING PLAN - SOIL

Scale: 1:400	Date: 07/2023
Drawn by: YA	Report No.: PE6102-2
Checked by: NS	Dwg. No.: PE6102-4
Approved by: MSD	Revision No.:

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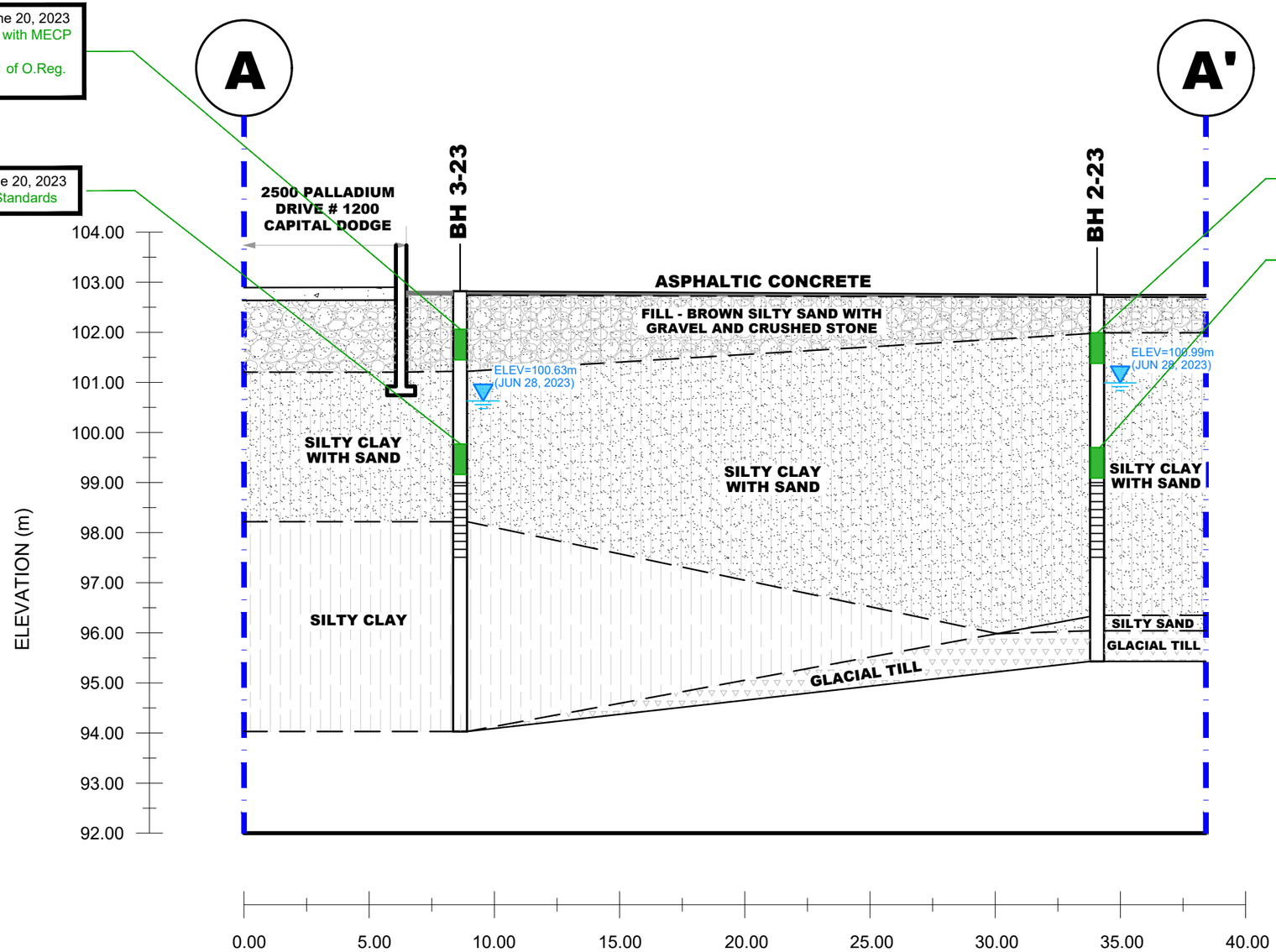
BH3-23-SS2 (0.76-1.37 m) June 20, 2023
BTEX, PHCs, Metals, PAHs, SAR comply with MECP Table 3 Standards
EC deemed to comply as per Section 49.1 of O.Reg. 153/04

BH3-23-SS5 (3.05-3.66 m) June 20, 2023
BTEX, PHCs comply with MECP Table 3 Standards

BH2-23-SS2 (0.76-1.37 m) June 20, 2023
BTEX, PHCs, Metals, PAHs, EC, SAR comply with MECP Table 3 Standards

BH2-23-SS5 (3.05-3.66 m) June 20, 2023
BTEX, PHCs comply with MECP Table 3 Standards



SOIL RESULT COMPLIES WITH THE MECP TABLE 3 STANDARDS

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9 AURIGA DRIVE
OTTAWA, ON
K2E 7T9
TEL: (613) 226-7381

NO.	REVISIONS	DATE	INITIAL

FULL SPEED BUILDERS (CAPITAL DODGE DEALERSHIP)

PHASE II - ENVIRONMENTAL SITE ASSESSMENT
1200, 2500 PALLADIUM DRIVE

OTTAWA, ONTARIO

Title:

CROSS SECTION A-A' - SOIL

Scale: AS SHOWN	Date: 07/2023
Drawn by: GK	Report No.: PE6102-2
Checked by: NS	Dwg. No.: PE6102-4A
Approved by: MSD	Revision No.:

11x17

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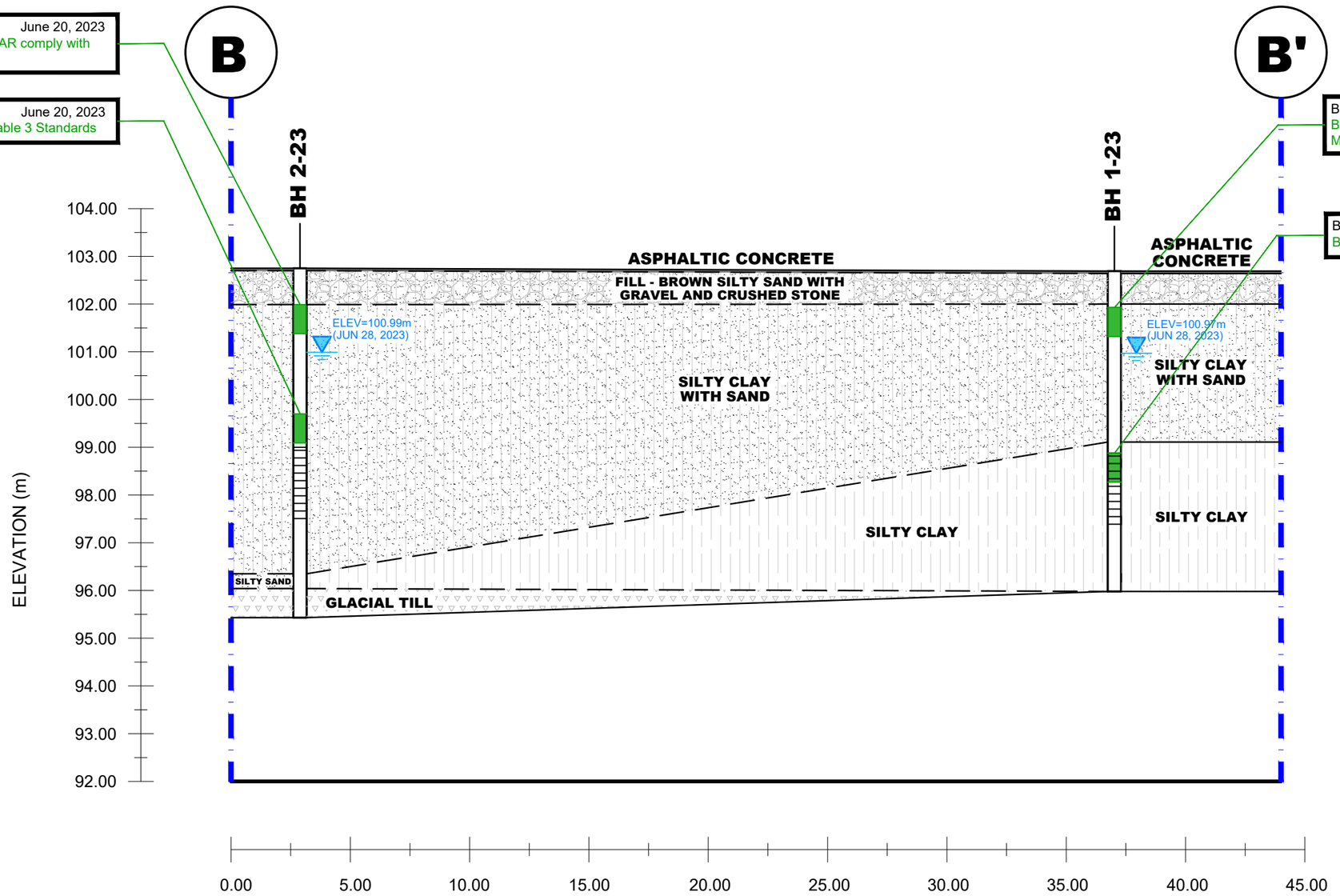
BH2-23-SS2 (0.76-1.37 m) June 20, 2023
BTEX, PHCs, Metals, PAHs, EC, SAR comply with MECP Table 3 Standards

BH2-23-SS5 (3.05-3.66 m) June 20, 2023
BTEX, PHCs comply with MECP Table 3 Standards

BH1-23-SS2 (0.76-1.37 m) June 20, 2023
BTEX, PHCs, Metals, PAHs, EC, SAR comply with MECP Table 3 Standards

BH1-23-SS6 (3.81-4.42 m) June 20, 2023
BTEX, PHCs comply with MECP Table 3 Standards



SOIL RESULT COMPLIES WITH THE MECP TABLE 3 STANDARDS

PATERSON GROUP
9 AURIGA DRIVE
OTTAWA, ON
K2E 7T9
TEL: (613) 226-7381

NO.	REVISIONS	DATE	INITIAL

FULL SPEED BUILDERS (CAPITAL DODGE DEALERSHIP)

PHASE II - ENVIRONMENTAL SITE ASSESSMENT
1200, 2500 PALLADIUM DRIVE

OTTAWA, ONTARIO

Title:

CROSS SECTION B-B' - SOIL

Scale: AS SHOWN	Date: 07/2023
Drawn by: GK	Report No.: PE6102-2
Checked by: NS	Dwg. No.: PE6102-4B
Approved by: MSD	Revision No.:

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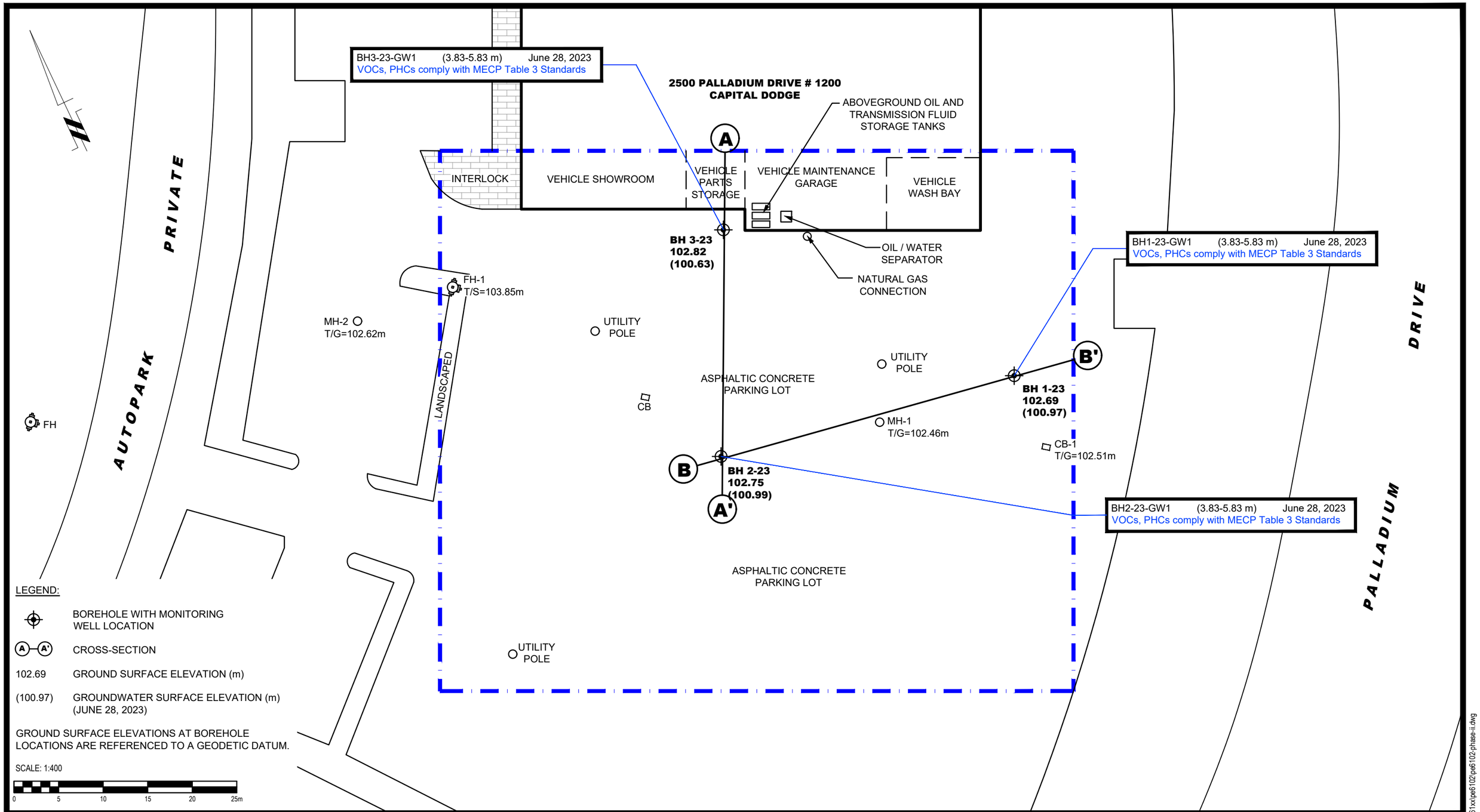

LEGEND:

- BOREHOLE WITH MONITORING WELL LOCATION
- A–A' CROSS-SECTION
- 102.69 GROUND SURFACE ELEVATION (m)
- (100.97) GROUNDWATER SURFACE ELEVATION (m) (JUNE 28, 2023)

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

SCALE: 1:400

0 5 10 15 20 25m

PATERSON GROUP
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OTTAWA, ON
K2E 7T9
TEL: (613) 226-7381

NO.	REVISIONS	DATE	INITIAL

FULL SPEED BUILDERS (CAPITAL DODGE DEALERSHIP)

PHASE II - ENVIRONMENTAL SITE ASSESSMENT
1200, 2500 PALLADIUM DRIVE

OTTAWA, ONTARIO

Title:

ANALYTICAL TESTING PLAN - GROUNDWATER

Scale: 1:400	Date: 07/2023
Drawn by: YA	Report No.: PE6102-2
Checked by: NS	Dwg. No.: PE6102-5
Approved by: MSD	Revision No.:

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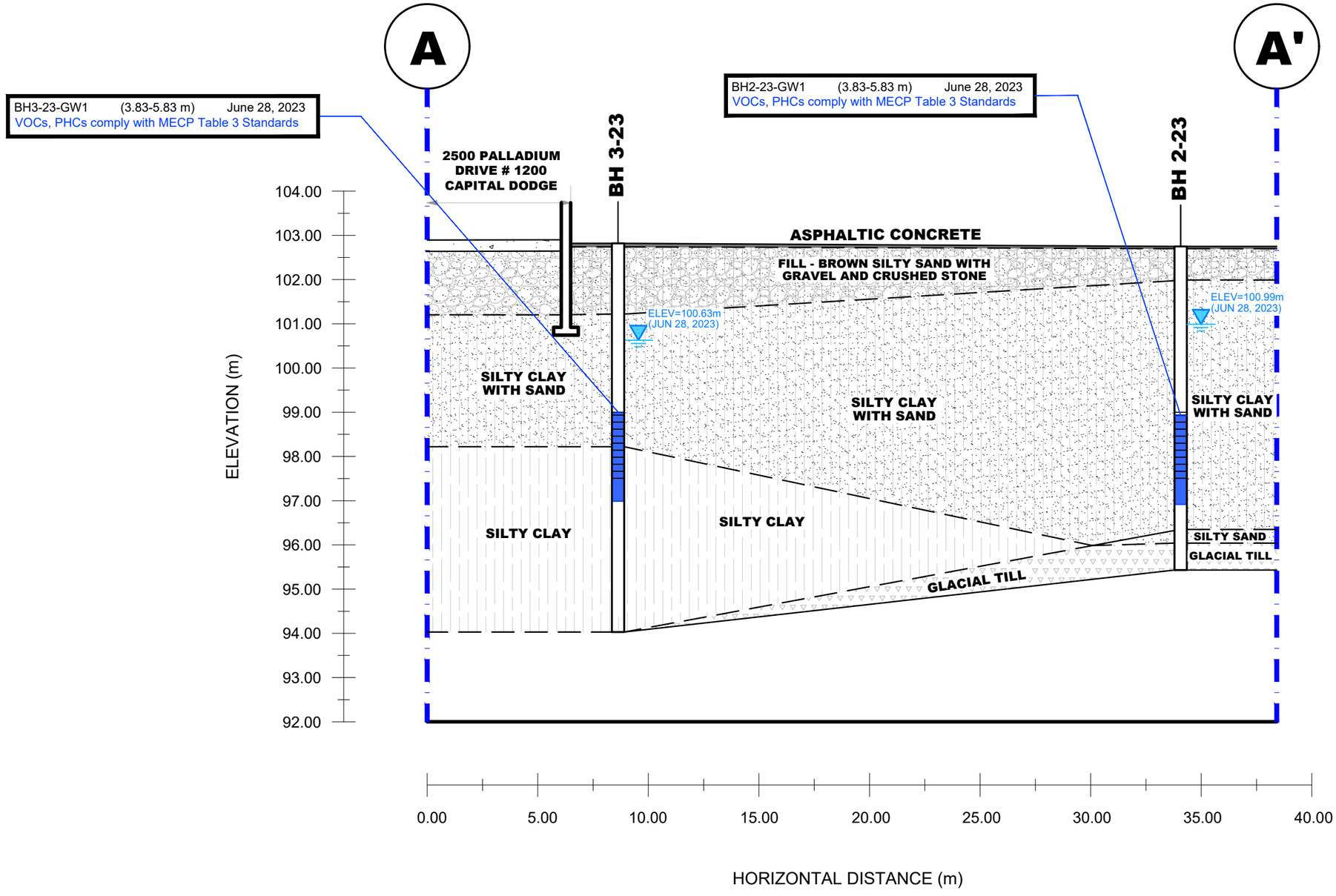

GROUNDWATER RESULT COMPLIES WITH THE MECP TABLE 3 STANDARDS

PATERSON GROUP
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NO.	REVISIONS	DATE	INITIAL

FULL SPEED BUILDERS (CAPITAL DODGE DEALERSHIP)

PHASE II - ENVIRONMENTAL SITE ASSESSMENT
1200, 2500 PALLADIUM DRIVE

OTTAWA, ONTARIO

Title:

CROSS SECTION A-A' - GROUNDWATER

Scale: AS SHOWN	Date: 07/2023
Drawn by: GK	Report No.: PE6102-2
Checked by: NS	Dwg. No.: PE6102-5A
Approved by: MSD	Revision No.:

11x17

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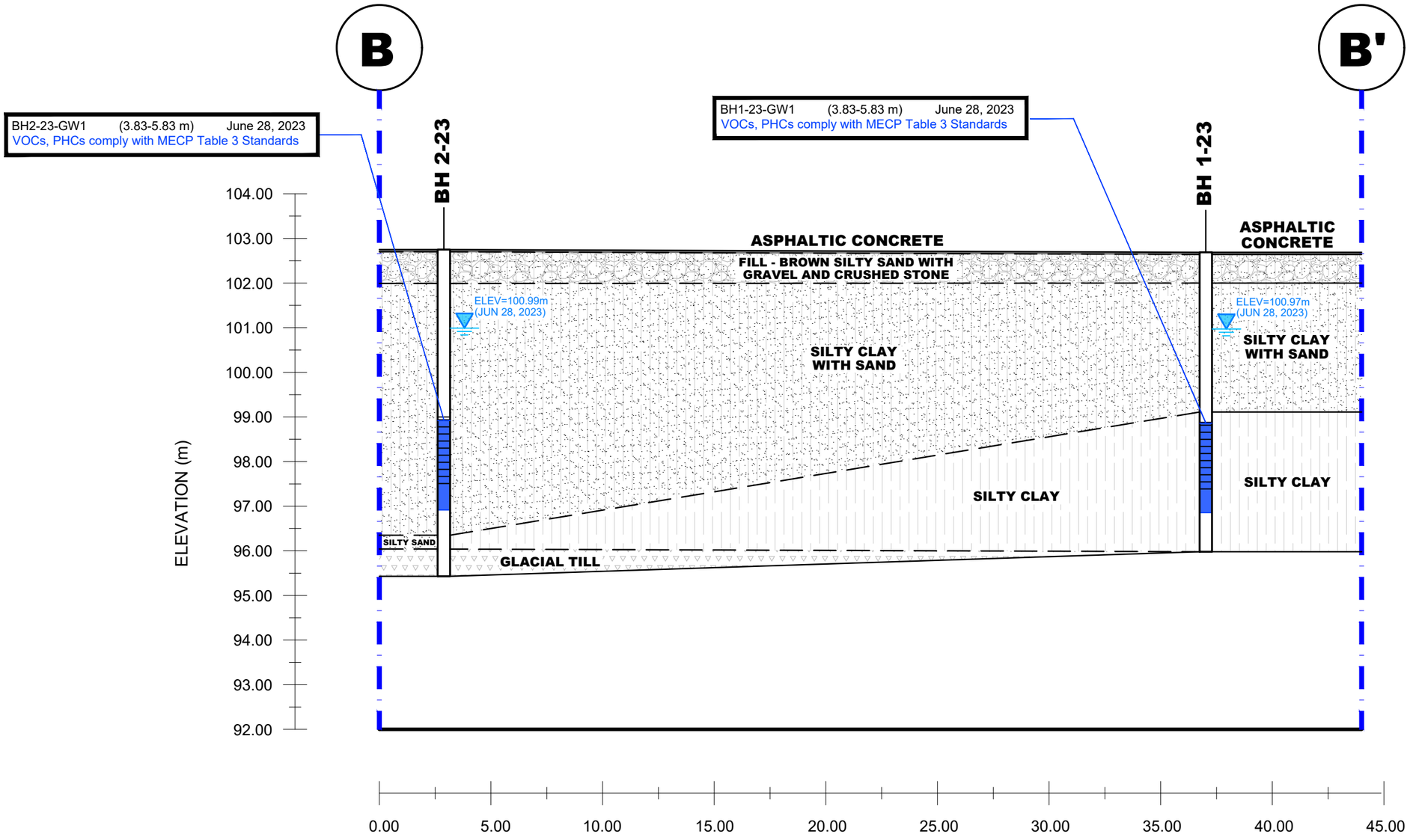

GROUNDWATER RESULT COMPLIES WITH THE MECP TABLE 3 STANDARDS

PATERSON GROUP
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OTTAWA, ON
K2E 7T9
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NO.	REVISIONS	DATE	INITIAL

FULL SPEED BUILDERS (CAPITAL DODGE DEALERSHIP)

PHASE II - ENVIRONMENTAL SITE ASSESSMENT
1200, 2500 PALLADIUM DRIVE

OTTAWA, ONTARIO

Title:

CROSS SECTION B-B' - GROUNDWATER

Scale: AS SHOWN	Date: 07/2023
Drawn by: GK	Report No.: PE6102-2
Checked by: NS	Dwg. No.: PE6102-5B
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

PATERSON GROUP

Sampling & Analysis Plan

Part of 2500 Palladium Drive
Ottawa, Ontario

Prepared for Full Speed Builders

Report: PE6102-SAP
June 1, 2023

TABLE OF CONTENTS

PAGE

1.0 SAMPLING PROGRAM

Paterson Group Inc. (Paterson) was commissioned by Full Speed Builders, to conduct a Phase II – Environmental Site Assessment (Phase II ESA) for part of the property addressed 2500 Palladium Drive, in the City of Ottawa, Ontario.

Based on the findings of the Phase I ESA, the following subsurface investigation program was developed.

Borehole	Location & Rationale	Proposed Depth & Rationale
BH1-23	Eastern portion of the Phase I Property; to assess for potential impacts resulting from the use of road salt for de-icing purposes, an active automotive service garage, aboveground fuel storage tanks, an oil/water separator, and for excess soil qualification purposes.	6-9 m; for geotechnical purposes and to intercept the groundwater table for the purpose of installing a monitoring well.
BH2-23	Central portion of the Phase I Property; to assess for potential impacts resulting from the use of road salt for de-icing purposes, an active automotive service garage, aboveground fuel storage tanks, an oil/water separator, and for excess soil qualification purposes.	6-9 m; for geotechnical purposes and to intercept the groundwater table for the purpose of installing a monitoring well.
BH3-23	Northern portion of the Phase I Property; to assess for potential impacts resulting from the use of road salt for de-icing purposes, an active automotive service garage, aboveground fuel storage tanks, an oil/water separator, and for excess soil qualification purposes.	6-9 m; for geotechnical purposes and to intercept the groundwater table for the purpose of installing a monitoring well.

Borehole locations are shown on Drawing PE6102-3 – Test Hole Location Plan, appended to the main report.

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

Following the borehole drilling, groundwater monitoring wells will be installed in all three boreholes to allow for the collection of groundwater samples.

2.0 ANALYTICAL TESTING PROGRAM

The analytical testing program for soil at the Phase I Property is based on the following general considerations:

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

The analytical testing program for soil at the Phase I Property 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 and orientations of boreholes with respect to site features (buildings, roadways, etc.) must be provided. Distances should be measured using a measuring tape or wheel rather than paced off. Ground surface elevations at each borehole should be surveyed relative to a geodetic benchmark, if one is available, or a temporary site benchmark which can be tied in at a later date if necessary.

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 F_1, 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" threaded sections of Schedule 40 PVC slotted well screen (5' x 1 ¼" if installing in cored hole in bedrock)
- ❒ 5' x 2" threaded sections of Schedule 40 PVC riser pipe (5' x 1 ¼" 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 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

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

9 Auriga Drive, Ottawa, Ontario K2E 7T9

SOIL PROFILE AND TEST DATA

Phase II - Environmental Site Assessment
Proposed Building Addition - 2500 Palladium Drive
Ottawa, Ontario

DATUM Geodetic

REMARKS

BORINGS BY Excavator **DATE** June 20, 2023

FILE NO. PE6102

HOLE NO. BH 1-23

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)
GROUND SURFACE						0	102.69
Asphaltic concrete 0.05							
FILL: Brown silty sand with gravel and crushed stone		AU	1				
0.69						1	101.69
		SS	2	67	4		
Very stiff to stiff, brown **SILTY CLAY,** some to trace sand		SS	3	83	5	2	100.69
- thin silty sand seams throughout		SS	4	83	P		
		SS	5	100	P	3	99.69
3.58							
		SS	6	100	P	4	98.69
		SS	7	100	P		
Firm, grey **SILTY CLAY**						5	97.69
		SS	8	100	P		
						6	96.69
		SS	9	12	P		
6.71							
End of Borehole							
(GWL @ 1.72m - June 28, 2023)							

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

9 Auriga Drive, Ottawa, Ontario K2E 7T9

SOIL PROFILE AND TEST DATA

Phase II - Environmental Site Assessment
Proposed Building Addition - 2500 Palladium Drive
Ottawa, Ontario

DATUM Geodetic

REMARKS

BORINGS BY Excavator **DATE** June 20, 2023

FILE NO. PE6102

HOLE NO. BH 2-23

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)
GROUND SURFACE							
Asphaltic concrete 0.05						0	102.75
FILL: Brown silty sand with gravel and crushed stone		AU	1				
0.76							
		SS	2	100	6	1	101.75
Very stiff to stiff, brown **SILTY CLAY,** some to trace sand		SS	3	0	P	2	100.75
- thin silty sand seams throughout		SS	4	100	P		
		SS	5	100	P	3	99.75
3.70							
		SS	6	100	P	4	98.75
Firm, grey **SILTY CLAY**		SS	7	100	P		
- trace sand to 4.6m depth						5	97.75
		SS	8	100	P		
						6	96.75
6.40		SS	9	75	P		
Compact, grey **SILTY SAND to SANDY SILT** 6.71							
GLACIAL TILL: Compact, grey silty clay with sand, trace some gravel		SS	10	92	11	7	95.75
7.32							
End of Borehole							
(GWL @ 1.76m - June 28, 2023)							

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

9 Auriga Drive, Ottawa, Ontario K2E 7T9

SOIL PROFILE AND TEST DATA

Phase II - Environmental Site Assessment
Proposed Building Addition - 2500 Palladium Drive
Ottawa, Ontario

DATUM Geodetic

REMARKS

BORINGS BY Excavator **DATE** June 20, 2023

FILE NO. PE6102

HOLE NO. BH 3-23

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)
GROUND SURFACE						0	102.82
Asphaltic concrete 0.08							
FILL: Brown silty sand with gravel and crushed stone		AU	1				
1.22		SS	2	50	19	1	101.82
FILL: Brown silty clay, some sand and gravel 1.60							
		SS	3	42	P	2	100.82
Stiff, brown **SILTY CLAY,** some to trace sand		SS	4	100	P		
- thin sand seams throughout		SS	5	100	P	3	99.82
3.73							
		SS	6	100	P	4	98.82
Firm, grey **SILTY CLAY**		SS	7	75	P		
- trace sand to 4.6m depth		SS	8	100	P	5	97.82
		SS	9	100	P	6	96.82
6.71							
End of Borehole							
(GWL @ 2.19m - June 28, 2023)							

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

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

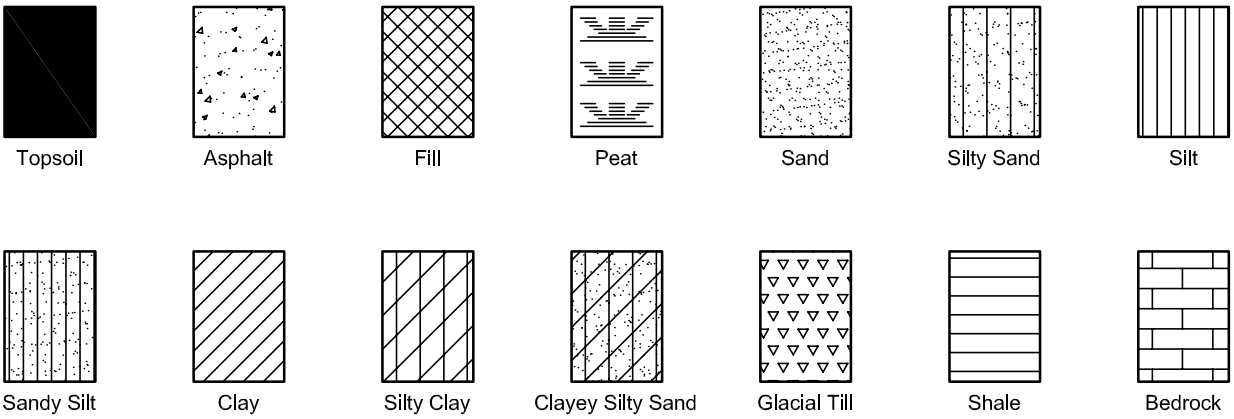
p'_o	-	Present effective overburden pressure at sample depth
p'_c	-	Preconsolidation pressure of (maximum past pressure on) sample
Ccr	-	Recompression index (in effect at pressures below p'_c)
Cc	-	Compression index (in effect at pressures above p'_c)
OC Ratio		Overconsolidaton ratio = p'_c / p'_o
Void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

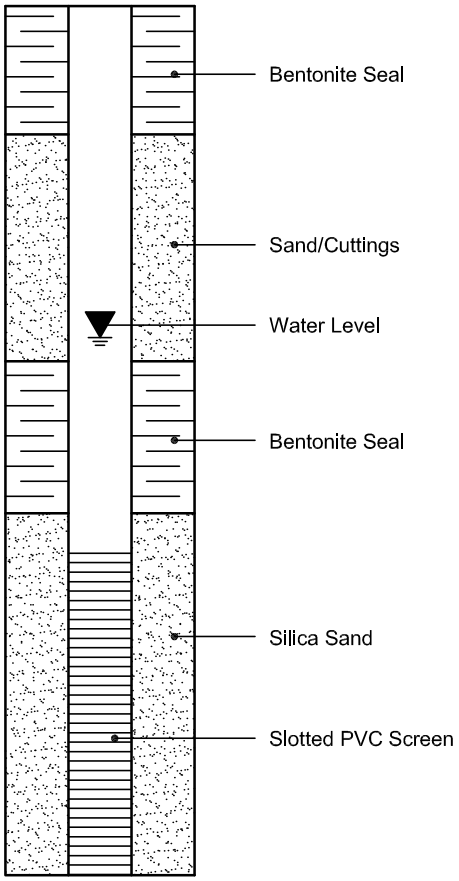
SYMBOLS AND TERMS (continued)

STRATA PLOT

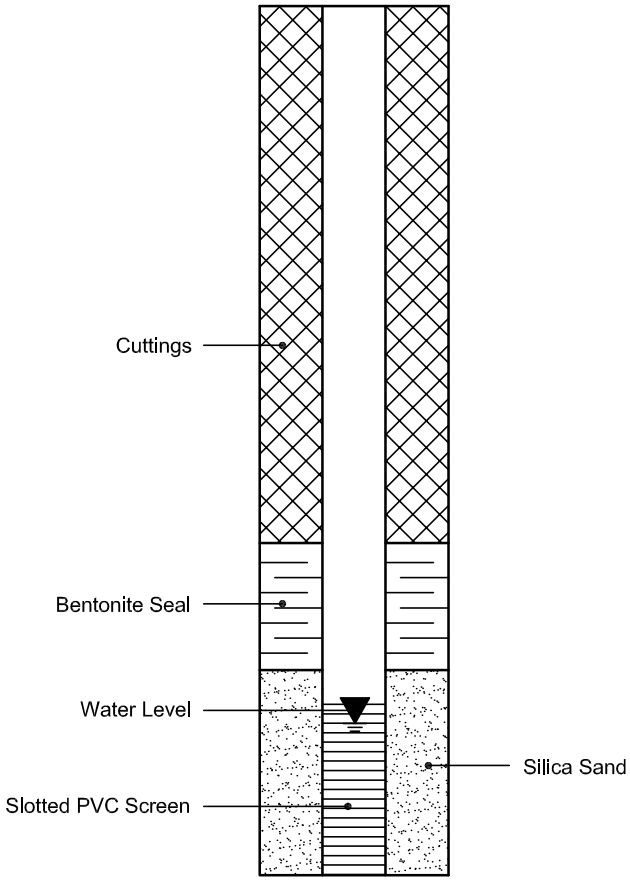


MONITORING WELL AND PIEZOMETER CONSTRUCTION

MONITORING WELL CONSTRUCTION



PIEZOMETER CONSTRUCTION



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Certificate of Analysis

Paterson Group Consulting Engineers

9 Auriga Drive
Ottawa, ON K2E 7T9
Attn: Mark D'Arcy

Client PO: 57764
Project: PE6102
Custody: 140750

Report Date: 27-Jun-2023
Order Date: 21-Jun-2023

Order #: 2325370

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

Paracel ID	Client ID
2325370-01	BH1-23-SS6
2325370-02	BH2-23-SS5
2325370-03	BH3-23-SS5
2325370-04	DUP1

Approved By:

Dale Robertson, BSc
Laboratory Director

Certificate of Analysis

Client: **Paterson Group Consulting Engineers**

Client PO: **57764**

Report Date: 27-Jun-2023

Order Date: 21-Jun-2023

Project Description: PE6102

Analysis Summary Table

Analysis	Method Reference/Description	Extraction Date	Analysis Date
BTEX by P&T GC-MS	EPA 8260 - P&T GC-MS	26-Jun-23	27-Jun-23
PHC F1	CWS Tier 1 - P&T GC-FID	26-Jun-23	27-Jun-23
PHCs F2 to F4	CWS Tier 1 - GC-FID, extraction	22-Jun-23	24-Jun-23
Solids, %	CWS Tier 1 - Gravimetric	22-Jun-23	23-Jun-23

Certificate of Analysis

Client: **Paterson Group Consulting Engineers**

Client PO: **57764**

Report Date: 27-Jun-2023

Order Date: 21-Jun-2023

Project Description: PE6102

	Client ID:	BH1-23-SS6	BH2-23-SS5	BH3-23-SS5	DUP1
	Sample Date:	20-Jun-23 09:00	20-Jun-23 09:00	20-Jun-23 09:00	20-Jun-23 09:00
	Sample ID:	2325370-01	2325370-02	2325370-03	2325370-04
	MDL/Units	Soil	Soil	Soil	Soil
Physical Characteristics					
% Solids	0.1 % by Wt.	70.6	71.3	73.3	72.7
Volatiles					
Benzene	0.02 ug/g dry	<0.02	<0.02	<0.02	<0.02
Ethylbenzene	0.05 ug/g dry	<0.05	<0.05	<0.05	<0.05
Toluene	0.05 ug/g dry	<0.05	0.05	<0.05	<0.05
m,p-Xylenes	0.05 ug/g dry	<0.05	<0.05	<0.05	<0.05
o-Xylene	0.05 ug/g dry	<0.05	<0.05	<0.05	<0.05
Xylenes, total	0.05 ug/g dry	<0.05	<0.05	<0.05	<0.05
Toluene-d8	Surrogate	102%	101%	102%	103%
Hydrocarbons					
F1 PHCs (C6-C10)	7 ug/g dry	<7	<7	<7	<7
F2 PHCs (C10-C16)	4 ug/g dry	<4	<4	<4	<4
F3 PHCs (C16-C34)	8 ug/g dry	<8	<8	<8	<8
F4 PHCs (C34-C50)	6 ug/g dry	<6	<6	<6	<6

Certificate of Analysis

Client: **Paterson Group Consulting Engineers**

Client PO: **57764**

Report Date: 27-Jun-2023

Order Date: 21-Jun-2023

Project Description: PE6102

Method Quality Control: Blank

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Hydrocarbons									
F1 PHCs (C6-C10)	ND	7	ug/g						
F2 PHCs (C10-C16)	ND	4	ug/g						
F3 PHCs (C16-C34)	ND	8	ug/g						
F4 PHCs (C34-C50)	ND	6	ug/g						
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	*7.79*		*ug/g*		*97.4*	*50-140*			

Certificate of Analysis

Client: **Paterson Group Consulting Engineers**

Client PO: **57764**

Report Date: 27-Jun-2023

Order Date: 21-Jun-2023

Project Description: PE6102

Method Quality Control: Duplicate

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Hydrocarbons									
F1 PHCs (C6-C10)	ND	7	ug/g	ND			NC	40	
F2 PHCs (C10-C16)	ND	4	ug/g	ND			NC	30	
F3 PHCs (C16-C34)	ND	8	ug/g	ND			NC	30	
F4 PHCs (C34-C50)	ND	6	ug/g	ND			NC	30	
Physical Characteristics									
% Solids	94.1	0.1	% by Wt.	94.9			0.9	25	
Volatiles									
Benzene	ND	0.02	ug/g	ND			NC	50	
Ethylbenzene	ND	0.05	ug/g	ND			NC	50	
Toluene	ND	0.05	ug/g	ND			NC	50	
m,p-Xylenes	ND	0.05	ug/g	ND			NC	50	
o-Xylene	ND	0.05	ug/g	ND			NC	50	
Surrogate: Toluene-d8	*9.49*		*ug/g*		*102*	*50-140*			

Certificate of Analysis

Client: **Paterson Group Consulting Engineers**

Client PO: **57764**

Report Date: 27-Jun-2023

Order Date: 21-Jun-2023

Project Description: PE6102

Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Hydrocarbons									
F1 PHCs (C6-C10)	62	7	ug/g	ND	87.9	80-120			
F2 PHCs (C10-C16)	99	4	ug/g	ND	118	60-140			
F3 PHCs (C16-C34)	270	8	ug/g	ND	131	60-140			
F4 PHCs (C34-C50)	180	6	ug/g	ND	138	60-140			
Volatiles									
Benzene	3.47	0.02	ug/g	ND		60-130			
Ethylbenzene	3.64	0.05	ug/g	ND		60-130			
Toluene	3.89	0.05	ug/g	ND		60-130			
m,p-Xylenes	7.32	0.05	ug/g	ND		60-130			
o-Xylene	3.79	0.05	ug/g	ND		60-130			
Surrogate: Toluene-d8	*7.85*		*ug/g*		*98.1*	*50-140*			

Qualifier Notes:

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 crite
- When reported, data for F4G has been processed using a silica gel cleanup.

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Paracel Order Number (Lab Use Only)	Chain Of Custody (Lab Use Only)
232870	№ 140750

Client Name: PATERSON
Project Ref: PE6102
Page 1 of 1

Contact Name: MARK D'ARCY
Quote #:

Address: 9 AURIGA DR. NEPEAN, ON.
PO #: 57764

Telephone: 613 226 7381
E-mail: MDARCY@PATERSONGROUP.CA
NSULLIVAN@PATERSONGROUP.CA

Turnaround Time
- ☐ 1 day
- ☐ 2 day
- ☐ 3 day
- ☑ Regular

Date Required:

Regulation				Other Regulation		
☒ REG 153/04	☐ REG 406/19			☐ REG 558	☐ PWQO	
☐ Table 1	☐ Res/Park	☐ Med/Fine		☐ CCME	☐ MISA	
☐ Table 2	☐ Ind/Comm	☐ Coarse		☐ SU - Sani	☐ SU - Storm	
☒ Table 3	☐ Agri/Other			Mun:		
☐ Table —				☐ Other		
For RSC: ☐ Yes ☐ No						

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

	Sample ID/Location Name	Matrix	Air Volume	# of Containers	Sample Taken: Date	Sample Taken: Time	PHCs F1-F4+BTEX	VOCs	PAHs	Metals by ICP	Hg	CrVI	B (HWS)
1	BH1-23-SS6	S	\	2	June 20/23	—	↘						
2	BH2-23-SS5	↓	↓	↓	↓	↓	/						
3	BH3-23-SS5						/						
4	DUP1						↘						
5													
6													
7													
8													
9													
10													

Comments:

Method of Delivery: Paracel Courier

Relinquished By (Sign):	Received By Driver/Depot:	Received at Lab: Juneegorm Bhamai	Verified By:
Relinquished By (Print): Dominic Lanoni	Date/Time:	Date/Time: JUN 21, 2023 04.23	Date/Time: Jun 22/2023
Date/Time: June 21 - 2023	Temperature: °C	Temperature: 24.1 °C	pH Verified: ☐ By:

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Certificate of Analysis

Paterson Group Consulting Engineers

9 Auriga Drive
Ottawa, ON K2E 7T9
Attn: Mark D'Arcy

Client PO: 57785
Project: PE6102
Custody: 140782

Report Date: 30-Jun-2023
Order Date: 26-Jun-2023

Order #: 2326141

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

Paracel ID	Client ID
2326141-01	BH1-23-SS2
2326141-02	BH2-23-SS2
2326141-03	BH3-23-SS2

Approved By:

Dale Robertson, BSc
Laboratory Director

Certificate of Analysis
Client: **Paterson Group Consulting Engineers**
Client PO: **57785**

Report Date: 30-Jun-2023
Order Date: 26-Jun-2023
Project Description: PE6102

Analysis Summary Table

Analysis	Method Reference/Description	Extraction Date	Analysis Date
BTEX by P&T GC-MS	EPA 8260 - P&T GC-MS	29-Jun-23	30-Jun-23
Conductivity	MOE E3138 - probe @25 °C, water ext	29-Jun-23	29-Jun-23
pH, soil	EPA 150.1 - pH probe @ 25 °C, CaCl buffered ext.	28-Jun-23	29-Jun-23
PHC F1	CWS Tier 1 - P&T GC-FID	29-Jun-23	30-Jun-23
PHCs F2 to F4	CWS Tier 1 - GC-FID, extraction	27-Jun-23	29-Jun-23
REG 153: Metals by ICP/MS, soil	EPA 6020 - Digestion - ICP-MS	29-Jun-23	29-Jun-23
REG 153: PAHs by GC-MS	EPA 8270 - GC-MS, extraction	27-Jun-23	29-Jun-23
SAR	Calculated	29-Jun-23	29-Jun-23
Solids, %	CWS Tier 1 - Gravimetric	29-Jun-23	29-Jun-23

Certificate of Analysis

Client: **Paterson Group Consulting Engineers**

Client PO: **57785**

Report Date: 30-Jun-2023

Order Date: 26-Jun-2023

Project Description: **PE6102**

	Client ID:	BH1-23-SS2	BH2-23-SS2	BH3-23-SS2	-
	Sample Date:	20-Jun-23 09:00	20-Jun-23 09:00	20-Jun-23 09:00	-
	Sample ID:	2326141-01	2326141-02	2326141-03	-
	MDL/Units	Soil	Soil	Soil	-
Physical Characteristics					
% Solids	0.1 % by Wt.	77.4	77.0	97.8	-
General Inorganics					
SAR	0.01 N/A	0.91	0.42	1.31	-
Conductivity	5 uS/cm	586	428	2920	-
pH	0.05 pH Units	7.70	7.68	7.93	-
Metals					
Antimony	1.0 ug/g dry	<1.0	<1.0	<1.0	-
Arsenic	1.0 ug/g dry	3.9	3.0	<1.0	-
Barium	1.0 ug/g dry	131	113	134	-
Beryllium	0.5 ug/g dry	0.6	0.5	<0.5	-
Boron	5.0 ug/g dry	7.3	6.1	12.2	-
Cadmium	0.5 ug/g dry	<0.5	<0.5	<0.5	-
Chromium	5.0 ug/g dry	33.8	29.7	10.6	-
Cobalt	1.0 ug/g dry	9.0	8.0	3.1	-
Copper	5.0 ug/g dry	20.6	16.0	<5.0	-
Lead	1.0 ug/g dry	5.3	4.4	8.3	-
Molybdenum	1.0 ug/g dry	1.7	<1.0	<1.0	-
Nickel	5.0 ug/g dry	18.1	16.0	8.7	-
Selenium	1.0 ug/g dry	<1.0	<1.0	<1.0	-
Silver	0.3 ug/g dry	<0.3	<0.3	<0.3	-
Thallium	1.0 ug/g dry	<1.0	<1.0	<1.0	-
Uranium	1.0 ug/g dry	<1.0	<1.0	<1.0	-
Vanadium	10.0 ug/g dry	51.0	45.6	<10.0	-
Zinc	20.0 ug/g dry	46.9	42.7	<20.0	-
Volatiles					
Benzene	0.02 ug/g dry	<0.02	<0.02	<0.02	-
Ethylbenzene	0.05 ug/g dry	<0.05	<0.05	<0.05	-
Toluene	0.05 ug/g dry	<0.05	<0.05	<0.05	-
m,p-Xylenes	0.05 ug/g dry	<0.05	<0.05	<0.05	-
o-Xylene	0.05 ug/g dry	<0.05	<0.05	<0.05	-
Xylenes, total	0.05 ug/g dry	<0.05	<0.05	<0.05	-
Toluene-d8	Surrogate	110%	112%	88.8%	-
Hydrocarbons					
F1 PHCs (C6-C10)	7 ug/g dry	<7	<7	<7	-
F2 PHCs (C10-C16)	4 ug/g dry	<4	<4	20	-

Certificate of Analysis

Client: **Paterson Group Consulting Engineers**

Client PO: **57785**

Report Date: 30-Jun-2023

Order Date: 26-Jun-2023

Project Description: PE6102

	Client ID:	BH1-23-SS2	BH2-23-SS2	BH3-23-SS2	-
	Sample Date:	20-Jun-23 09:00	20-Jun-23 09:00	20-Jun-23 09:00	-
	Sample ID:	2326141-01	2326141-02	2326141-03	-
	MDL/Units	Soil	Soil	Soil	-
F3 PHCs (C16-C34)	8 ug/g dry	<8	<8	41	-
F4 PHCs (C34-C50)	6 ug/g dry	<6	<6	15	-
Semi-Volatiles					
Acenaphthene	0.02 ug/g dry	<0.02	<0.02	<0.02	-
Acenaphthylene	0.02 ug/g dry	<0.02	<0.02	<0.02	-
Anthracene	0.02 ug/g dry	<0.02	<0.02	<0.02	-
Benzo [a] anthracene	0.02 ug/g dry	<0.02	<0.02	<0.02	-
Benzo [a] pyrene	0.02 ug/g dry	<0.02	<0.02	<0.02	-
Benzo [b] fluoranthene	0.02 ug/g dry	<0.02	<0.02	<0.02	-
Benzo [g,h,i] perylene	0.02 ug/g dry	<0.02	<0.02	<0.02	-
Benzo [k] fluoranthene	0.02 ug/g dry	<0.02	<0.02	<0.02	-
Chrysene	0.02 ug/g dry	<0.02	<0.02	<0.02	-
Dibenzo [a,h] anthracene	0.02 ug/g dry	<0.02	<0.02	<0.02	-
Fluoranthene	0.02 ug/g dry	<0.02	<0.02	<0.02	-
Fluorene	0.02 ug/g dry	<0.02	<0.02	<0.02	-
Indeno [1,2,3-cd] pyrene	0.02 ug/g dry	<0.02	<0.02	<0.02	-
1-Methylnaphthalene	0.02 ug/g dry	<0.02	<0.02	<0.02	-
2-Methylnaphthalene	0.02 ug/g dry	<0.02	<0.02	<0.02	-
Methylnaphthalene (1&2)	0.04 ug/g dry	<0.04	<0.04	<0.04	-
Naphthalene	0.01 ug/g dry	<0.01	<0.01	<0.01	-
Phenanthrene	0.02 ug/g dry	<0.02	<0.02	<0.02	-
Pyrene	0.02 ug/g dry	<0.02	<0.02	<0.02	-
2-Fluorobiphenyl	Surrogate	62.1%	55.6%	51.6%	-
Terphenyl-d14	Surrogate	101%	93.9%	79.7%	-

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	*0.842*		*ug/g*		*63.1*	*50-140*			
Surrogate: Terphenyl-d14	*1.23*		*ug/g*		*92.4*	*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	*3.16*		*ug/g*		*98.8*	*50-140*			

Method Quality Control: Duplicate

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
General Inorganics									
SAR	3.46	0.01	N/A	3.65			5.3	30	
Conductivity	477	5	uS/cm	476			0.2	5	
pH	7.75	0.05	pH Units	7.77			0.3	2.3	
Hydrocarbons									
F1 PHCs (C6-C10)	ND	7	ug/g	ND			NC	40	
F2 PHCs (C10-C16)	ND	4	ug/g	ND			NC	30	
F3 PHCs (C16-C34)	ND	8	ug/g	ND			NC	30	
F4 PHCs (C34-C50)	ND	6	ug/g	ND			NC	30	
Metals									
Antimony	ND	1.0	ug/g	1.4			NC	30	
Arsenic	4.1	1.0	ug/g	5.4			26.5	30	
Barium	74.5	1.0	ug/g	83.2			11.1	30	
Beryllium	0.8	0.5	ug/g	1.4			47.0	30	
Boron	8.4	5.0	ug/g	9.1			8.8	30	
Cadmium	ND	0.5	ug/g	1.2			NC	30	
Chromium	21.9	5.0	ug/g	24.5			11.3	30	
Cobalt	8.0	1.0	ug/g	9.8			20.2	30	
Copper	21.2	5.0	ug/g	24.5			14.5	30	
Lead	15.4	1.0	ug/g	17.6			13.1	30	
Molybdenum	ND	1.0	ug/g	1.7			NC	30	
Nickel	17.9	5.0	ug/g	20.2			12.2	30	
Selenium	ND	1.0	ug/g	ND			NC	30	
Silver	ND	0.3	ug/g	1.0			NC	30	
Thallium	ND	1.0	ug/g	1.1			NC	30	
Uranium	ND	1.0	ug/g	1.5			NC	30	
Vanadium	29.8	10.0	ug/g	33.6			12.0	30	
Zinc	60.8	20.0	ug/g	66.7			9.3	30	
Physical Characteristics									
% Solids	75.5	0.1	% by Wt.	75.0			0.6	25	
Semi-Volatiles									
Acenaphthene	ND	0.02	ug/g	ND			NC	40	
Acenaphthylene	ND	0.02	ug/g	ND			NC	40	
Anthracene	ND	0.02	ug/g	ND			NC	40	
Benzo [a] anthracene	ND	0.02	ug/g	ND			NC	40	
Benzo [a] pyrene	ND	0.02	ug/g	ND			NC	40	
Benzo [b] fluoranthene	ND	0.02	ug/g	ND			NC	40	
Benzo [g,h,i] perylene	ND	0.02	ug/g	ND			NC	40	
Benzo [k] fluoranthene	ND	0.02	ug/g	ND			NC	40	
Chrysene	ND	0.02	ug/g	ND			NC	40	
Dibenzo [a,h] anthracene	ND	0.02	ug/g	ND			NC	40	
Fluoranthene	ND	0.02	ug/g	ND			NC	40	
Fluorene	ND	0.02	ug/g	ND			NC	40	
Indeno [1,2,3-cd] pyrene	ND	0.02	ug/g	ND			NC	40	
1-Methylnaphthalene	ND	0.02	ug/g	ND			NC	40	
2-Methylnaphthalene	ND	0.02	ug/g	ND			NC	40	
Naphthalene	ND	0.01	ug/g	ND			NC	40	
Phenanthrene	ND	0.02	ug/g	ND			NC	40	
Pyrene	ND	0.02	ug/g	ND			NC	40	
Surrogate: 2-Fluorobiphenyl	*0.847*		*ug/g*		*63.5*	*50-140*			
Surrogate: Terphenyl-d14	*1.34*		*ug/g*		*100*	*50-140*			
Volatiles									
Benzene	ND	0.02	ug/g	ND			NC	50	
Ethylbenzene	ND	0.05	ug/g	ND			NC	50	
Toluene	ND	0.05	ug/g	ND			NC	50	
m,p-Xylenes	ND	0.05	ug/g	ND			NC	50	

Certificate of Analysis

Client: **Paterson Group Consulting Engineers**

Client PO: **57785**

Report Date: 30-Jun-2023

Order Date: 26-Jun-2023

Project Description: PE6102

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	ND			NC	50	
Surrogate: Toluene-d8	*3.42*		*ug/g*		*101*	*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)	185	7	ug/g	ND	92.4	80-120			
F2 PHCs (C10-C16)	105	4	ug/g	ND	82.5	60-140			
F3 PHCs (C16-C34)	245	8	ug/g	ND	78.8	60-140			
F4 PHCs (C34-C50)	177	6	ug/g	ND	89.8	60-140			
Metals									
Antimony	36.3	1.0	ug/g	ND	71.4	70-130			
Arsenic	52.2	1.0	ug/g	2.2	100	70-130			
Barium	77.5	1.0	ug/g	33.3	88.5	70-130			
Beryllium	51.7	0.5	ug/g	0.5	102	70-130			
Boron	50.6	5.0	ug/g	ND	93.9	70-130			
Cadmium	48.3	0.5	ug/g	0.5	95.6	70-130			
Chromium	63.6	5.0	ug/g	9.8	108	70-130			
Cobalt	55.8	1.0	ug/g	3.9	104	70-130			
Copper	57.6	5.0	ug/g	9.8	95.7	70-130			
Lead	51.9	1.0	ug/g	7.0	89.8	70-130			
Molybdenum	50.3	1.0	ug/g	ND	99.3	70-130			
Nickel	58.3	5.0	ug/g	8.1	100	70-130			
Selenium	45.9	1.0	ug/g	ND	91.0	70-130			
Silver	44.1	0.3	ug/g	0.4	87.5	70-130			
Thallium	47.3	1.0	ug/g	ND	93.7	70-130			
Uranium	48.7	1.0	ug/g	ND	96.2	70-130			
Vanadium	67.0	10.0	ug/g	13.4	107	70-130			
Zinc	70.1	20.0	ug/g	26.7	86.8	70-130			
Semi-Volatiles									
Acenaphthene	0.177	0.02	ug/g	ND	106	50-140			
Acenaphthylene	0.167	0.02	ug/g	ND	100	50-140			
Anthracene	0.146	0.02	ug/g	ND	87.7	50-140			
Benzo [a] anthracene	0.150	0.02	ug/g	ND	90.0	50-140			
Benzo [a] pyrene	0.140	0.02	ug/g	ND	84.3	50-140			
Benzo [b] fluoranthene	0.185	0.02	ug/g	ND	111	50-140			
Benzo [g,h,i] perylene	0.157	0.02	ug/g	ND	94.2	50-140			
Benzo [k] fluoranthene	0.171	0.02	ug/g	ND	102	50-140			
Chrysene	0.134	0.02	ug/g	ND	80.5	50-140			
Dibenzo [a,h] anthracene	0.166	0.02	ug/g	ND	99.4	50-140			
Fluoranthene	0.173	0.02	ug/g	ND	104	50-140			
Fluorene	0.168	0.02	ug/g	ND	101	50-140			
Indeno [1,2,3-cd] pyrene	0.163	0.02	ug/g	ND	97.6	50-140			
1-Methylnaphthalene	0.088	0.02	ug/g	ND	52.9	50-140			
2-Methylnaphthalene	0.097	0.02	ug/g	ND	58.0	50-140			
Naphthalene	0.146	0.01	ug/g	ND	87.6	50-140			
Phenanthrene	0.166	0.02	ug/g	ND	99.5	50-140			
Pyrene	0.164	0.02	ug/g	ND	98.6	50-140			
Surrogate: 2-Fluorobiphenyl	*0.714*		*ug/g*		*53.5*	*50-140*			
Surrogate: Terphenyl-d14	*1.16*		*ug/g*		*86.7*	*50-140*			
Volatiles									
Benzene	2.51	0.02	ug/g	ND	62.7	60-130			
Ethylbenzene	4.56	0.05	ug/g	ND	114	60-130			
Toluene	4.84	0.05	ug/g	ND	121	60-130			

Certificate of Analysis

Client: **Paterson Group Consulting Engineers**

Client PO: **57785**

Report Date: 30-Jun-2023

Order Date: 26-Jun-2023

Project Description: PE6102

Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
m,p-Xylenes	9.59	0.05	ug/g	ND	120	60-130			
o-Xylene	4.95	0.05	ug/g	ND	124	60-130			
Surrogate: Toluene-d8	*3.03*		*ug/g*		*94.8*	*50-140*			

Qualifier Notes:

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 crite
- When reported, data for F4G has been processed using a silica gel cleanup.

PARACEL LABORATORIES

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Paracel Order Number (Lab Use Only)	Chain Of Custody (Lab Use Only)
232141	№ 140782

Client Name: Paterson
Project Ref: PE6102
Page __ of __

Contact Name: Mark D'Arcy
Quote #:

Address: 9 Auriga
PO #: 57785

Telephone: 613 226 7381
E-mail: MDArcy@Patersongroup.ca
GPaterson@Patersongroup.ca

Turnaround Time
☐ 1 day ☐ 3 day
☐ 2 day ☒ Regular
Date Required: _____

☒ REG 153/04 ☐ REG 406/19

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

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

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)	EC/SAR	pH			
1	BH1-23-SS2	S		2	June 20		X		X	X				X	X			
2	BH2-23-SS2	S		2	↓		X		X	X				X	X			
3	BH3-23-SS2	S		2	↓		X		X	X				X	X			
4																		
5																		
6																		
7																		
8																		
9																		
10																		

Comments:

Method of Delivery: Paracel Courier

Relinquished By (Sign):	Received By Driver/Depot:	Received at Lab:	Verified By:
GPat		Jun 26 2023 15:30	
Relinquished By (Print): Grant Paterson	Date/Time:	Date/Time:	Date/Time: Jun 27 2023 9:59
Date/Time: June 26	Temperature: °C	Temperature: 6.2 °C	pH Verified: ☐ By:

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Certificate of Analysis

Paterson Group Consulting Engineers

9 Auriga Drive
Ottawa, ON K2E 7T9
Attn: Nick Sullivan

Client PO: 57810
Project: PE6102
Custody: 140792

Report Date: 7-Jul-2023
Order Date: 29-Jun-2023

Order #: 2326419

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

Paracel ID	Client ID
2326419-01	BH1-23-GW1
2326419-02	BH2-23-GW1
2326419-03	BH3-23-GW1
2326419-04	DUP1

Approved By:

Dale Robertson, BSc
Laboratory Director

Certificate of Analysis
Client: **Paterson Group Consulting Engineers**
Client PO: **57810**

Report Date: 07-Jul-2023
Order Date: 29-Jun-2023
Project Description: PE6102

Analysis Summary Table

Analysis	Method Reference/Description	Extraction Date	Analysis Date
PHC F1	CWS Tier 1 - P&T GC-FID	30-Jun-23	2-Jul-23
PHCs F2 to F4	CWS Tier 1 - GC-FID, extraction	6-Jul-23	7-Jul-23
REG 153: VOCs by P&T GC/MS	EPA 624 - P&T GC-MS	30-Jun-23	2-Jul-23

Certificate of Analysis

Client: **Paterson Group Consulting Engineers**

Client PO: **57810**

Report Date: 07-Jul-2023

Order Date: 29-Jun-2023

Project Description: PE6102

	Client ID:	BH1-23-GW1	BH2-23-GW1	BH3-23-GW1	DUP1
	Sample Date:	28-Jun-23 09:00	28-Jun-23 09:00	28-Jun-23 09:00	28-Jun-23 09:00
	Sample ID:	2326419-01	2326419-02	2326419-03	2326419-04
	MDL/Units	Ground Water	Ground Water	Ground Water	Ground Water
Volatiles					
Acetone	5.0 ug/L	<5.0	<5.0	<5.0	<5.0
Benzene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
Bromodichloromethane	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
Bromoform	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
Bromomethane	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
Carbon Tetrachloride	0.2 ug/L	<0.2	<0.2	<0.2	<0.2
Chlorobenzene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
Chloroform	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
Dibromochloromethane	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
Dichlorodifluoromethane	1.0 ug/L	<1.0	<1.0	<1.0	<1.0
1,2-Dichlorobenzene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
1,3-Dichlorobenzene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
1,4-Dichlorobenzene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
1,1-Dichloroethane	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
1,2-Dichloroethane	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
1,1-Dichloroethylene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
cis-1,2-Dichloroethylene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
trans-1,2-Dichloroethylene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
1,2-Dichloropropane	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
cis-1,3-Dichloropropylene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
trans-1,3-Dichloropropylene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
1,3-Dichloropropene, total	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
Ethylene dibromide (dibromoethane, 1,2-)	0.2 ug/L	<0.2	<0.2	<0.2	<0.2
Hexane	1.0 ug/L	<1.0	<1.0	<1.0	<1.0
Methyl Ethyl Ketone (2-Butanone)	5.0 ug/L	<5.0	<5.0	<5.0	<5.0
Methyl Isobutyl Ketone	5.0 ug/L	<5.0	<5.0	<5.0	<5.0
Methyl tert-butyl ether	2.0 ug/L	<2.0	<2.0	<2.0	<2.0
Methylene Chloride	5.0 ug/L	<5.0	<5.0	<5.0	<5.0
Styrene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
1,1,1,2-Tetrachloroethane	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
1,1,2,2-Tetrachloroethane	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
Tetrachloroethylene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
Toluene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5

Certificate of Analysis

Client: **Paterson Group Consulting Engineers**

Client PO: **57810**

Report Date: 07-Jul-2023

Order Date: 29-Jun-2023

Project Description: PE6102

	Client ID:	BH1-23-GW1	BH2-23-GW1	BH3-23-GW1	DUP1
	Sample Date:	28-Jun-23 09:00	28-Jun-23 09:00	28-Jun-23 09:00	28-Jun-23 09:00
	Sample ID:	2326419-01	2326419-02	2326419-03	2326419-04
	MDL/Units	Ground Water	Ground Water	Ground Water	Ground Water
1,1,1-Trichloroethane	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
1,1,2-Trichloroethane	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
Trichloroethylene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
Trichlorofluoromethane	1.0 ug/L	<1.0	<1.0	<1.0	<1.0
Vinyl chloride	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
m,p-Xylenes	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
o-Xylene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
Xylenes, total	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
4-Bromofluorobenzene	Surrogate	102%	106%	106%	105%
Dibromofluoromethane	Surrogate	100%	113%	119%	112%
Toluene-d8	Surrogate	103%	105%	104%	104%
Hydrocarbons					
F1 PHCs (C6-C10)	25 ug/L	<25	<25	<25	<25
F2 PHCs (C10-C16)	100 ug/L	<100	<100	<100	<100
F3 PHCs (C16-C34)	100 ug/L	<100	<100	<100	<100
F4 PHCs (C34-C50)	100 ug/L	<100	<100	<100	<100

Certificate of Analysis

Client: **Paterson Group Consulting Engineers**

Client PO: **57810**

Report Date: 07-Jul-2023

Order Date: 29-Jun-2023

Project Description: PE6102

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	*85.0*		*ug/L*		*106*	*50-140*			
Surrogate: Dibromofluoromethane	*87.6*		*ug/L*		*110*	*50-140*			
Surrogate: Toluene-d8	*84.9*		*ug/L*		*106*	*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	2.90	0.5	ug/L	2.44			17.2	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	12.7	0.5	ug/L	13.3			4.8	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	*84.4*		*ug/L*		*106*	*50-140*			
Surrogate: Dibromofluoromethane	*95.7*		*ug/L*		*120*	*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)	1740	25	ug/L	ND	87.1	68-117			
F2 PHCs (C10-C16)	1540	100	ug/L	ND	96.5	60-140			
F3 PHCs (C16-C34)	4150	100	ug/L	ND	106	60-140			
F4 PHCs (C34-C50)	2790	100	ug/L	ND	112	60-140			
Volatiles									
Acetone	72.7	5.0	ug/L	ND	72.7	50-140			
Benzene	25.7	0.5	ug/L	ND	64.4	60-130			
Bromodichloromethane	34.0	0.5	ug/L	ND	84.9	60-130			
Bromoform	24.2	0.5	ug/L	ND	60.4	60-130			
Bromomethane	43.5	0.5	ug/L	ND	109	50-140			
Carbon Tetrachloride	37.8	0.2	ug/L	ND	94.5	60-130			
Chlorobenzene	32.8	0.5	ug/L	ND	81.9	60-130			
Chloroform	37.2	0.5	ug/L	ND	93.1	60-130			
Dibromochloromethane	37.1	0.5	ug/L	ND	92.8	60-130			
Dichlorodifluoromethane	46.1	1.0	ug/L	ND	115	50-140			
1,2-Dichlorobenzene	29.8	0.5	ug/L	ND	74.6	60-130			
1,3-Dichlorobenzene	31.0	0.5	ug/L	ND	77.5	60-130			
1,4-Dichlorobenzene	30.0	0.5	ug/L	ND	75.0	60-130			
1,1-Dichloroethane	38.1	0.5	ug/L	ND	95.2	60-130			
1,2-Dichloroethane	27.9	0.5	ug/L	ND	69.7	60-130			
1,1-Dichloroethylene	45.2	0.5	ug/L	ND	113	60-130			
cis-1,2-Dichloroethylene	36.2	0.5	ug/L	ND	90.6	60-130			
trans-1,2-Dichloroethylene	39.8	0.5	ug/L	ND	99.5	60-130			
1,2-Dichloropropane	25.8	0.5	ug/L	ND	64.5	60-130			
cis-1,3-Dichloropropylene	39.3	0.5	ug/L	ND	98.3	60-130			
trans-1,3-Dichloropropylene	44.8	0.5	ug/L	ND	112	60-130			
Ethylbenzene	33.8	0.5	ug/L	ND	84.4	60-130			
Ethylene dibromide (dibromoethane, 1,2-	37.7	0.2	ug/L	ND	94.3	60-130			
Hexane	44.3	1.0	ug/L	ND	111	60-130			
Methyl Ethyl Ketone (2-Butanone)	66.0	5.0	ug/L	ND	66.0	50-140			
Methyl Isobutyl Ketone	86.5	5.0	ug/L	ND	86.5	50-140			
Methyl tert-butyl ether	80.0	2.0	ug/L	ND	80.0	50-140			
Methylene Chloride	37.2	5.0	ug/L	ND	93.0	60-130			
Styrene	27.8	0.5	ug/L	ND	69.6	60-130			
1,1,1,2-Tetrachloroethane	45.6	0.5	ug/L	ND	114	60-130			
1,1,2,2-Tetrachloroethane	33.7	0.5	ug/L	ND	84.2	60-130			
Tetrachloroethylene	32.6	0.5	ug/L	ND	81.5	60-130			
Toluene	32.8	0.5	ug/L	ND	82.1	60-130			
1,1,1-Trichloroethane	40.4	0.5	ug/L	ND	101	60-130			
1,1,2-Trichloroethane	25.9	0.5	ug/L	ND	64.7	60-130			
Trichloroethylene	25.5	0.5	ug/L	ND	63.8	60-130			
Trichlorofluoromethane	43.7	1.0	ug/L	ND	109	60-130			
Vinyl chloride	46.4	0.5	ug/L	ND	116	50-140			
m,p-Xylenes	67.5	0.5	ug/L	ND	84.4	60-130			
o-Xylene	32.5	0.5	ug/L	ND	81.2	60-130			
Surrogate: 4-Bromofluorobenzene	*89.8*		*ug/L*		*112*	*50-140*			
Surrogate: Dibromofluoromethane	*98.6*		*ug/L*		*123*	*50-140*			
Surrogate: Toluene-d8	*80.0*		*ug/L*		*100*	*50-140*			

Qualifier Notes:

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 crite
- When reported, data for F4G has been processed using a silica gel cleanup.

PARACE LABORATORIES LTI

Paracel ID: 2326419

Paracel Order Number (Lab Use Only)	Chain Of Custody (Lab Use Only)
2326419	№ 140792

Client Name: Paterson
Contact Name: Nick Sullivan
Address: 9 Auriga
Telephone: 613 226 7381

Project Ref: PE 6102
Quote #:
PO #: 5780
E-mail: NSullivan@PatersonGroup.ca GPaterson@PatersonGroup.ca

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

☒ REG 153/04 ☐ REG 406/19

Other Regulation

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

☐ 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)						
1	BH1-23-GW1	GW		3	June 28		X	X											
2	BH2-23-GW1	↓		↓	↓		X	X											
3	BH3-23-GW1						X	X											
4	DUP1			3			X	X											
5																			
6																			
7																			
8																			
9																			
10																			

Comments:

Method of Delivery: Paracel Carrier

Relinquished By (Sign):	Received By Driver/Depot:	Received at Lab:	Verified By:
G Pat		Sureepam Bhamati	
Relinquished By (Print): Grant Paterson	Date/Time:	Date/Time: June 29, 2023 12.25	Date/Time: Jun 29 2023 1149
Date/Time: June 29 2023	Temperature: °C	Temperature: 11.3 °C	pH Verified: ☐ By: