PATERSON GROUP

Phase II-Environmental Site Assessment

4497A & 4497B O'Keefe Court Ottawa, Ontario

Prepared For: Mattamy Homes

Report: PE6605-2
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EXECUTIVE SUMMARY

Assessment

A Phase II-ESA was conducted for the property addressed 4497A & 4497B O'Keefe Court, in the City of Ottawa, Ontario. The purpose of the Phase II-ESA was to address two potentially contaminating activities (PCAs) that were identified during the Phase I-ESA and were considered to result in an area of potential environmental concern (APEC) on the Phase II - Property.

The Phase II-ESA was carried out in conjunction with an ongoing hydrogeological investigation and builds upon a preexisting geotechnical investigation. The Phase II ESA program consisted of excavating 8 test pits, and sampling groundwater from two preexisting boreholes which were instrumented with groundwater monitoring wells as part of the hydrogeological investigation. The soil and groundwater sampling programs were carried out in August of 2024.

Soil samples obtained from the test pits were screened using visual and olfactory observations as well as organic vapour measurements. A total of 9 soil samples (including one duplicate) were submitted for laboratory analysis of metals (including As, Sb, Se), benzene, toluene, ethylbenzene, xylenes (BTEX), petroleum hydrocarbons (PHCs, F_1-F_4), and/or polycyclic aromatic hydrocarbons (PAHs). Metals, BTEX, PHC, and PAH concentrations identified in the soil samples submitted all comply with the MECP Table 8 Standards with the exception of elevated levels of Barium in 5 of the samples. The elevated Barium concentrations was attributed to naturally occurring elevated background concentrations. As a result, all soil samples are considered to meet the MECP Table 8 Standards.

One groundwater sample from a monitoring well installed in BH6-24 was submitted for laboratory analysis of Metals, BTEX, PHCs (F_1-F_4), and PAHs. Groundwater was not recoverable from BH5-24. No sheen, free product or odour was noted during the groundwater sampling event. All groundwater results comply with the selected MECP Table 8 Standards.

Based on the findings of this Phase II-ESA, it is our opinion that **no further environmental investigation is required.**

1.0 INTRODUCTION

At the request of Mattamy Homes, Paterson Group (Paterson) conducted a Phase II-Environmental Site Assessment for 4497A & 4497B O'Keefe Court (herein referred to as the Phase II Property), in the City of Ottawa, Ontario. The purpose of this Phase II-ESA has been to address two areas of potential environmental concern (APEC) identified on the Phase II Property, during the Phase I-ESA conducted by Paterson in August of 2024.

1.1 Site Description

Address:	4497A & 4497B O'Keefe Court, Ottawa, Ontario.
Legal Description:	Parts of Lot 22 Concession 4, Lot 23 Concession 4, Lot 24 Concession 4, and Lot 25 Concession 4, Nepean.
Location:	The Phase II Property is located approximately 425m north of O'Keefe Court and directly east of Highway 416, in the City of Ottawa, Ontario. Refer to Figure 1-Key Plan in the Figures section following the text.
Latitude and Longitude:	45° 16' 52.5" N, 75° 48' 2.2" W

Site Description:

Configuration:	Irregular
Area:	71.99 ha (approximate)

1.2 Property Ownership

The current registered property owner of the Phase II Property is Mattamy Homes. Paterson was engaged to conduct this Phase II – ESA by Mr. Conor Sutherland, Land Development Manager with Mattamy Homes. The Ottawa office of Mattamy Homes is located at 50 Hines Road, Suite #100, Ottawa, Ontario. Mr. Sutherland can be reached by telephone at (613) 512-5904.

1.3 Current and Proposed Future Uses

The Phase II Property exists as vacant land with forested areas covering much of the property. The study area consists of a mixture of commercial, agricultural or other, residential, and industrial properties. It is our understanding that the Phase

II Property will be developed as a residential community with multiple housing types, park spaces, stormwater management ponds and conservation lands. The proposed development will generally include asphalt-paved parking and roadways, as well as landscaped areas and undeveloped conservation lands. It is expected that the proposed development will be municipally serviced.

1.4 Applicable Site Condition Standard

The site condition standards for the property were obtained from Table 8 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), April 2011. The MECP selected Table 8 Standards are based on the following considerations:

- ❒ Coarse-grained soil conditions
- ❒ Shallow depth site conditions
- ❒ Potable groundwater conditions
- ❒ Residential land use.

Section 36 of O.Reg. 153/04 does apply to the Phase II Property in that some of the properties within 250m of the Phase II Property rely upon potable groundwater.

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

Section 43.1 of O.Reg. 153/04 does apply to the Phase II Property in that the property is a Shallow Soil property and the property is within 30m of a water body.

The residential standards were selected based on proposed land use of the Phase II Property. Coarse grained soil standards were assumed for the purposes of this Phase II ESA.

2.0 BACKGROUND INFORMATION

2.1 Physical Setting

The Phase II Property is situated on the east side of Highway 416, approximately 425m north of O'Keefe Court, in the City of Ottawa, Ontario, within an area comprised of residential, parkland, agricultural or other, commercial and industrial land uses.

The general area of the Phase II Property slopes down towards the south. Site drainage consists primarily of infiltration.

3.0 SCOPE OF INVESTIGATION

3.1 Overview of Site Investigation

An initial subsurface geotechnical investigation was conducted on December 2nd and 3rd, 2020. The field program consisted of excavating 14 test pits. These test pits were excavated to a maximum depth of between 5.6-6.7m below the existing grade or to practical refusal on bedrock.

A supplemental subsurface geotechnical investigation was conducted between March 27, 2024, and April 1, 2024, in conjunction with a hydrogeological investigation. A total of 8 boreholes, all of which were instrumented with groundwater monitoring wells, were drilled to maximum depths of between 5.61 and 6.48m below the existing grade.

An environmental investigation was conducted on August 27 and 28, 2024 to investigate two APECs that were identified on the Phase II Property, during the Phase I-ESA conducted by Paterson in August of 2024. As part of this investigation a total of 8 test pits were excavated by hand to a maximum depth of between 0.51 and 0.64m and soil samples were submitted for laboratory analysis. Additionally, two of the existing groundwater monitoring wells, BH5-24, and BH6-24 were purged and sampled where sufficient groundwater was present. BH5-24 was found to have no recoverable water. Samples from BH6-24 were submitted for laboratory analysis.

The borehole and test pit locations are shown on Drawing PE6605-3 – Test Hole Location Plan, appended to this report.

3.2 Media Investigated

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

3.3 Phase I Conceptual Site Model

Geological and Hydrogeological Setting

Based on information from the Geological Survey of Canada, bedrock beneath the Phase I Property consists of sandstone and dolostone of the March

Formation. It was reported that surficial soils consist of organic deposits, Paleozoic rock, till, and offshore marine sediment overburden soils. Hydrogeological conditions are considered to mimic the overland flow direction; as a result, groundwater is expected to flow south towards the Jock River.

Fill placement

Based on the historical use of the Phase I ESA Property as agricultural or other land, fill material is not likely present on the majority of the Phase I ESA Property. However, aerial imagery suggests that fill material was deposited on the west portion of the site between 1991 and 1999. This fill is considered to result in an Area of Potential Environmental Concern on the Phase II Property.

Areas of Natural Significance

One area of natural significance was identified within the Phase I Study Area. A small portion of Stony Swamp falls within the Phase I Study Area approximately 60m north of the Phase I Property on the north side of Highway 416.

Water Bodies

Miron quarry and Beaver Pond are two water bodies identified within the Phase I Property. These hydrologically connected water bodies both drain through outlet channels to the south, ultimately to the Jock River. No other water bodies were identified in the Phase I Study Area.

Drinking Water Wells

Five well records were identified in the ERIS report as being located on the Phase I Property and providing drinking water. Based on a review of the individual well records none of these wells are in active use. Nineteen drinking water well records were identified in the ERIS report as being within 250m of the Phase I Property, some of which appear to be in use. Three records of observation wells were identified within the Phase I Study Area, each of which was converted from a previously existing livestock water supply well.

Existing Buildings and Structures

There are no buildings or structures present on the Phase I ESA Property.

Subsurface Structures and Utilities

The Phase I Property is not municipally serviced. There are no underground utilities and/or structures on the Phase I Property.

Neighbouring Land Use

Neighbouring land use in the Phase I Study Area consists of residential, agricultural, commercial, industrial and parkland. Surrounding land use is shown on Drawing PE6605-2 – Surrounding Land Use Plan, attached.

Potentially Contaminating Activities and Areas of Potential Environmental Concern

Two PCAs were identified on the Phase I Property, both of which are considered to result in APECs. Eight off-site PCAs were identified within the Phase I Study Area, none of which are considered to have resulted in an APEC on the Phase I Property, as presented in the table below.

Table 1 – Areas of Potential Environmental Concern

Area of Potential Environmental Concern	Location of Area of Potential Environmental Concern with respect to Phase I Property	Potentially Contaminating Activity	Location of PCA (on-site or off-site)	Contaminants of Potential Concern	Media Potentially Impacted (Groundwater, Soil, and/or Sediment)
APEC 1 (Fill Material Imported in the 1990s)	Northwestern portion of the property addressed 4497 A O'Keefe Court.	PCA 30: Importation of Fill Material of Unknown Quality	On-Site	PHCs (F1-F4) Metals, PAHs	Soil
APEC 2 (Former Concrete Plant)	Western portion of the property addressed 4497 B O'Keefe Court	PCA 12: Concrete, Cement and Lime Manufacturing	On-Site	BTEX, PHCs, Metals	Soil and / or Groundwater

Off-site PCAs not considered to result in APECs on the Phase I Property include the following:

- ID #3 – PCA 48: Salt Manufacturing, Processing and Bulk Storage Associated with Road Salt Application to Highway 416.
- ID #4 – PCA 11: Commercial Trucking and Container Terminals Associated with the FedEx Trucking and Warehouse Operating at 985 Moodie Drive Resulting in the Generation of Oil Skimming's and Sludges, Inorganic Chemicals and Organic Chemicals.
- ID #5 – PCA N/A: Operations resulting in the generation of waste oils and lubricants associated with a landscaping contractors' yard at 995 Moodie Drive.

- ID #6 – PCA 8: Chemical Manufacturing, Processing and Bulk Storage associated with a commercial swimming pool supply store located at 999 Moodie Drive.
- ID #7 – PCA 39: Paints Manufacturing, Processing and Bulk Storage associated with Hydro Ottawa operations at 201 Dibblee Road.
- ID #8 – PCA 55: Transformer Manufacturing, Processing and Use associated with Hydro Ottawa transformer storage at 201 Dibblee Road.
- ID #9 – PCA N/A: Operations resulting in the generation of oils/sludges, alkaline solutions and other inorganic sludge, slurry, and solid waste associated with Hydro Ottawa operations at 201 Dibblee Road.
- ID #10 – PCA 52: Storage, maintenance, fuelling and repair of equipment, vehicles, and material used to maintain transportation systems associated with the operation of car dealerships and service garages at 510, 520, and 530 Motor Works Private.

As previously discussed, these PCAs are not considered to result in APECs on the Phase I Property based on separation distance, orientation relative to groundwater flow direction, nature of the activity, and/or low mobility of associated contaminants of potential concern (CPCs).

Assessment of Uncertainty and/or Absence of Information

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

A variety of independent sources were consulted as part of this assessment, and as such, the conclusions of this report are not affected by uncertainty which may be present with respect to the individual sources.

3.4 Deviations from Sampling and Analysis Plan

The Sampling and Analysis Plan for this project is included in Appendix 1 of this report. No deviations form the sampling and analysis plan were identified during the Phase II-ESA.

3.5 Impediments

Significant vegetative cover, including mature trees, hindered the operation of the high precision GPS unit, thereby preventing the geolocation of TP5-24 and TP6-24. Locations have been approximated based on observable landmarks in the vicinity of the test pits.

Groundwater sampling was attempted at BH5-24 on August 28th, 2024. At the time of the sampling attempt, there was insufficient water in the monitoring well to allow for the retrieval of a groundwater sample, however, since no contamination was identified in the fill material, no downward migration of contaminants into the groundwater is expected to have occurred.

No other physical impediments were encountered during the Phase II-ESA program.

4.0 INVESTIGATION METHOD

4.1 Subsurface Investigation

An environmental investigation was conducted on August 27th and 28th, 2024. The field program consisted of excavating 8 test pits by hand to a maximum depth of between 0.51 and 0.64m and retrieving water samples from two existing monitoring wells. Test pits were placed and monitoring wells were chosen to address the aforementioned areas of potential environmental concern (APECs).

Test hole locations are shown on Drawing PE6605-3 – Test Hole Location Plan appended to this report.

4.2 Soil Sampling

A total of 8 soil samples were obtained from the test pits by means of grab sampling. Samples were taken between 0.46 and 0.64m below existing grade. The depths at which grab samples were obtained from the test pits are shown as "**G**" on the Soil Profile and Test Data Sheets.

The site stratigraphy in the areas investigated generally consists of organics overlying fill material. The fill consisted of a brown silty clay with trace sand and occasional cobbles. Bedrock was not encountered in any of the 2024 test pits.

Specific details of the soil profile at each test hole location are presented on the Soil Profile and Test Data Sheets provided in Appendix 1.

4.3 Field Screening Measurements

Soil samples recovered at the time of sampling were placed immediately into airtight plastic bags with nominal headspace. All lumps of soil inside the bags were broken by hand, and the soil was allowed to come to room temperature prior to conducting the vapour survey. Allowing the samples to stabilize to room temperature ensures consistency of readings between samples.

To measure the soil vapours, the analyser probe is inserted into the nominal headspace above the soil sample. A photo ionization detector (PID) was used to measure the volatile organic vapour concentrations.

The sample is agitated/manipulated gently as the measurement is taken. The peak reading registered within the first 15 seconds is recorded as the vapour measurement.

The PID readings were found to be 0.0 ppm in the soil samples obtained. These results are not considered to be indicative of potential contamination from volatile contaminants. Vapour readings are noted on the Soil Profile and Test Data Sheets in Appendix 1.

4.4 Groundwater Monitoring Well Installation

Eight groundwater monitoring wells were installed on the Phase II – Property as part of the initial hydrogeological investigation. Attempts were made to sample two of these monitoring wells BH5-24 and BH6-24 on August 28, 2024. The monitoring well installed in BH5-24 consisted of 50mm diameter schedule 40 threaded PVC risers and screens. The monitoring well installed in BH6-24 consisted of 32mm diameter schedule 40 threaded PVC risers and screens. No recoverable water was present in BH5-24 at the time of the sampling event. Monitoring well construction details are listed below in Table 2 and are also presented on the Soil Profile and Test Data Sheets provided in Appendix 1.

Table 2 - Monitoring Well Construction Details

Well ID	Ground Surface Elevation	Total Depth (m BGS)	Screened Interval (m BGS)	Sand /Silt Pack (m BGS)	Bentonite Seal (m BGS)	Casing Type
BH5-24	116.50	5.61	4.08-5.61	3.20-5.61	0.30-3.20	Stick-Up
BH6-24	113.36	6.43	4.91-6.43	4.22-6.43	0.30-4.22	Stick-Up

4.5 Field Measurement of Water Quality Parameters

Groundwater sampling was conducted on August 28, 2024. 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, the field parameters were relatively stable, or the well was dry. Water sampling could not be conducted in BH5-24 as a result of dry well conditions. Stabilized field parameter values are summarized in Table 3.

Table 3 - Field Measurement of Water Quality Parameters – August 28, 2024		
Parameter	**BH5-24**	**BH6-24**
Temperature (°C)	N/A	12.5
pH	N/A	7.38
Electrical Conductivity (µS/cm)	N/A	962

4.6 Groundwater Sampling

Groundwater sampling protocols were followed using the MECP document entitled "Guidance on Sampling and Analytical Methods for Use at Contaminated Sites in Ontario," dated May 1996. Groundwater samples were obtained from each monitoring well, using dedicated sampling equipment.

Standing water was purged from each well prior to sampling. Samples were stored in coolers to reduce analyte volatilization during transportation.

Details of our standard operating procedure for groundwater sampling are provided in the Sampling and Analysis Plan in Appendix 1.

4.7 Analytical Testing

Based on the guidelines outlined in the Sampling and Analysis Plan, appended to this report, the following soil samples were submitted for analysis:

Table 4 - Soil Samples Submitted						
Sample ID	**Screened Interval/ Stratigraphic Unit**	**Parameter Analyzed**				**Rationale**
		Metals[1]	**PAH**	**BTEX**	**PHCs F_1-F_4**	
TP1-24 G1	0.58 – 0.64m Fill	X	X	X	X	Assess APEC 1 (Fill Material of Unknown Quality)
TP2-24 G1	0.51 – 0.56m Fill	X	X	X	X	Assess APEC 1 (Fill Material of Unknown Quality)
TP3-24 G1	0.46 – 0.51m Fill	X	X	X	X	Assess APEC 1 (Fill Material of Unknown Quality)
TP4-24 G1	0.46 – 0.51m Fill	X	X	X	X	Assess APEC 1 (Fill Material of Unknown Quality)
TP5-24 G1	0.58 – 0.64m Fill	X	X	X	X	Assess APEC 2 (Historical Concrete Plant)

Table 4 - Soil Samples Submitted						
Sample ID	Screened Interval/ Stratigraphic Unit	Parameter Analyzed				Rationale
		Metals[1]	PAH	BTEX	PHCs F_1-F_4	
TP6-24 G1	0.58 – 0.64m Fill	X	X	X	X	Assess APEC 2 (Historical Concrete Plant)
TP7-24 G1	0.48 – 0.53m Fill	X	X	X	X	Assess APEC 1 (Fill Material of Unknown Quality)
TP8-24 G1	0.58 – 0.64m Fill	X	X	X	X	Assess APEC 1 (Fill Material of Unknown Quality)
DUP[1]	0.46 – 0.51m Fill	X	X			Duplicate soil sample for QA/QC purposes
Notes: ▪ 1 – Duplicate of Sample TP3-24 G1						

Based on the guidelines outlined in the Sampling and Analysis Plan, appended to this report, the following groundwater samples were submitted for analysis:

Table 5 - Groundwater Samples Submitted						
Sample ID	Screened Interval/ Stratigraphic Unit	Parameter Analyzed				Rationale
		PHCs F_1-F_4	BTEX	PAH	Metals	
BH6-24	4.91 – 6.43m Fill	X	X	X	X	Assess APEC 2 (Historical Concrete Plant)

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

4.8 Residue Management

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

4.9 Elevation Surveying

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

4.10 Quality Assurance and Quality Control Measures

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

5.0 REVIEW AND EVALUATION

5.1 Geology

Stratigraphy at the Phase II Property in the APECs investigated for the Phase II ESA generally consists of the following:

- **Fill** was identified at ground surface at all test pit locations and extended to the termination of all test pits at depths of 0.51 – 0.64mbgs. Groundwater was not encountered in any of these test pits.

Based on records from previous geotechnical and hydrogeological investigations stratigraphy across the extent of the Phase II Property generally consists of the following:

- **Topsoil** was encountered across the Phase II Property with a strata thickness ranging between 0.1 - 0.4m. This layer was encountered at the surface except where bedrock was exposed or where it was overlain by fill material.
- **Glacial Till** generally consisting of brown silty sand with gravel, cobbles and boulders was encountered in all boreholes where native material had not been overlain by fill. It was encountered at depths ranging from 0.13 - 0.69mbgs.
- **Bedrock** generally consisting of fair to excellent quality grey limestone was first encountered at depths ranging from 0.28 – 3.3mbgs. Bedrock extended to the end of each borehole where it was encountered. Borehole depths ranged from approximately 6.15 - 6.48mbgs

5.2 Groundwater Elevations, Flow Direction, and Hydraulic Gradient

Groundwater levels were measured during the groundwater sampling events on April 15, 2024, using an electronic water level meter. Groundwater levels are summarized below in Table 6. All ground surface elevations were acquired

through a GPS survey completed at the time of the initial subsurface investigation.

Table 6 - Groundwater Level Measurements

Borehole Location	Ground Surface Elevation (m)	Water Level Depth (m below grade)	Water Level Elevation (Asl)	Date of Measurement
BH3-24	110.78	0.18	110.60	April 15, 2024
BH6-24	113.36	1.47	111.89	April 15, 2024
BH7-24	112.93	0.65	112.28	April 15, 2024
BH8-24	110.77	0.33	110.44	April 15, 2024

Based on the groundwater levels recorded on April 15, 2024, the groundwater appears to flow to the southeast.

5.3 Fine-Coarse Soil Texture

A grain size distribution analysis was not completed for the Phase II Property. As a conservative approach, coarse-grained soil standards were chosen for the purposes of this Phase II ESA.

5.4 Soil: Field Screening

Field screening of the soil samples collected resulted in vapour readings of 0.0 ppm for all samples. These results are not considered to be indicative of significant contamination from volatile contaminants. No visual or olfactory observations were noted at the time of sampling. Vapour readings are noted on the Soil Profile and Test Data Sheets in Appendix 1.

5.5 Soil Quality

A total of 9 soil samples (including one duplicate) were submitted for analysis of BTEX, PHCs (F_1-F_4), PAHs and metals. The results of the analytical soil testing completed during the subsurface program are presented in Table 1 following the body of this report. The laboratory certificates of analysis are provided in Appendix 1.

Metals

All metal parameter concentrations detected in the soil samples comply with the selected MECP Table 8 Standards with the exception of Barium, which was found to be elevated in soil samples TP1-24 G1, TP2-24 G1, TP3-24 G1, TP6-24 G1, and DUP (TP3-24 G1). The elevated Barium concentrations are attributed to naturally occurring elevated background levels and the values are well within the proposed barium values noted in *Elevated Background Metals Concentrations in*

Champlain Sea Clay – Ottawa Region. As a result, all soil samples are considered to meet the MECP Table 8 Standards. The analytical results are presented in Table 1, and on Drawing PE6605-4 – Analytical Testing Plan – Soil and Groundwater appended to this report.

BTEX and PHCs (F_1-F_4)

All BTEX and PHC parameter concentrations detected in the soil samples analysed comply with the selected MECP Table 8 Standards. The analytical results are presented in Table 1, and on Drawing PE6605-4 – Analytical Testing Plan – Soil and Groundwater appended to this report.

PAHs

All PAH parameter concentrations detected in the soil samples analysed comply with the selected MECP Table 8 Standards. The analytical results are presented in Table 1, and on Drawing PE6605-4 – Analytical Testing Plan – Soil and Groundwater appended to this report.

The maximum concentrations of analyzed parameters in the soil at the Phase II Property are summarized in Table 7.

TABLE 7 - Maximum Concentrations – Soil

Parameter	Maximum Concentration (µg/g)	Sample ID	Depth Interval (m BGS)
Arsenic	3.2	TP3-24 G1	0.46 – 0.51; Fill
Barium	312	TP1-24 G1	0.58 – 0.64; Fill
Beryllium	0.7	TP1-24 G1	0.58 – 0.64; Fill
Boron	6	TP3-24 G1	0.46 – 0.51; Fill
Chromium	64.4	TP1-24 G1	0.58 – 0.64; Fill
Cobalt	15.7	TP2-24 G1	0.51 – 0.56; Fill
Copper	30.3	TP5-24 G1	0.58 – 0.64; Fill
Lead	6.5	TP1-24 G1	0.58 – 0.64; Fill
Molybdenum	1.1	TP1-24 G1	0.58 – 0.64; Fill
Nickel	35.4	TP1-24 G1	0.58 – 0.64; Fill
Uranium	1.1	TP4-24 G1	0.46 – 0.51; Fill
Vanadium	78.9	TP2-24 G1	0.51 – 0.56; Fill
Zinc	94.1	TP1-24 G1	0.58 – 0.64; Fill
F3 PHCs (C16-C34)	29	TP4-24 G1	0.46 – 0.51; Fill
F4 PHCs (C34-C50)	23	TP4-24 G1	0.46 – 0.51; Fill
Fluoranthene	0.03	TP3-24 G1	0.46 – 0.51; Fill
Pyrene	0.02	TP3-24 G1	0.46 – 0.51; Fill

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

5.6 Groundwater Quality

One groundwater sample from the monitoring well installed in BH6-24 was submitted for laboratory analysis of PAHs, Metals, BTEX and PHCs (F_1-F_4).

The groundwater sample was obtained from the screened interval noted in Table 2. The results of the analytical testing are appended to this report. The laboratory certificate of analysis is provided in Appendix 1.

Metals

All metal parameter concentrations detected in the groundwater sample analysed comply with the selected MECP Table 8 Standards. The analytical results for Metals in the tested groundwater are presented in Table 2 and on Drawing PE6605-4 – Analytical Testing Plan – Soil and Groundwater appended to this report.

PHCs

No PHC parameter concentrations were detected in the groundwater sample analysed and therefore the results comply with the selected MECP Table 8 Standards. The analytical results for PHCs in the tested groundwater are presented in Table 2 and on Drawing PE6605-4 – Analytical Testing Plan – Soil and Groundwater appended to this report.

BTEX

No BTEX parameter concentrations were detected in the groundwater sample analysed and therefore the results comply with the selected MECP Table 8 Standards. The analytical results for BTEX in the tested groundwater are presented in Table 2 and on Drawing PE6605-4 – Analytical Testing Plan – Soil and Groundwater appended to this report.

PAH

No PAH parameter concentrations were detected in the groundwater samples analysed and therefore the results comply with the selected MECP Table 8 Standards. The analytical results for PAHs in the tested groundwater are presented in Table 2 and on Drawing PE6605-4 – Analytical Testing Plan – Soil and Groundwater appended to this report.

The maximum concentrations of analyzed parameters in the groundwater at the Phase II Property are summarized in Table 8.

TABLE 8 - Maximum Concentrations – Groundwater			
Parameter	**Maximum Concentration (µg/L)**	**Sample ID**	**Depth Interval (m BGS)**
Antimony	0.5	BH6-24	4.85 – 6.39; Bedrock
Arsenic	6	BH6-24	4.85 – 6.39; Bedrock
Barium	119	BH6-24	4.85 – 6.39; Bedrock
Boron	41	BH6-24	4.85 – 6.39; Bedrock
Cobalt	2.7	BH6-24	4.85 – 6.39; Bedrock
Copper	0.9	BH6-24	4.85 – 6.39; Bedrock
Lead	0.2	BH6-24	4.85 – 6.39; Bedrock
Molybdenum	16.3	BH6-24	4.85 – 6.39; Bedrock
Nickel	15	BH6-24	4.85 – 6.39; Bedrock
Sodium	35100	BH6-24	4.85 – 6.39; Bedrock
Uranium	16.5	BH6-24	4.85 – 6.39; Bedrock
Vanadium	1.8	BH6-24	4.85 – 6.39; Bedrock
Zinc	43	BH6-24	4.85 – 6.39; Bedrock

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

5.7 Quality Assurance and Quality Control Results

All soil and groundwater samples were handled in accordance with the Analytical Protocol with respect to holding time, preservation method, storage requirement, and container type.

As per Subsection 47(3) of O.Reg. 153/04 as amended, a Certificate of Analysis has been received for each sample submitted for analysis and all Certificates of Analysis are appended to this report.

As per the Sampling and Analysis Plan, a duplicate soil sample was obtained from Sample TP3-24 G1 and submitted for laboratory analysis of metals and PAH parameters. The duplicate was collected with the intent of calculating the relative percent difference (RPD) between duplicate sample values, as a way of assessing the quality of the analytical test results.

Where non-detect concentrations were present in the original sample, the corresponding duplicate sample, or both, the results are considered to be acceptable. The RPD calculations for the remaining soil samples are provided in Table 9.

Table 9 - QA/QC Calculations – Soil

Parameter	MDL (µg/g)	TP3-24 G1	DUP (TP3-24 G1)	RPD (%)	QA/QC Result
Arsenic	1.0	3.2	2.9	9.4	Meets Target
Barium	1.0	244	241	1.2	Meets Target
Beryllium	0.5	0.7	0.6	14.3	Meets Target
Boron	5.0	6	5.8	3.3	Meets Target
Chromium	5.0	49.6	51.3	3.4	Meets Target
Cobalt	1.0	13.1	13.3	1.5	Meets Target
Copper	5.0	27.6	25.6	7.2	Meets Target
Lead	1.0	5.9	5.9	0	Meets Target
Nickel	5.0	28.1	28.6	1.8	Meets Target
Vanadium	10.0	65.8	67.3	2.3	Meets Target
Zinc	20.0	78.3	76.9	1.8	Meets Target

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

The remaining parameter concentrations were not detected in the original, the duplicate, or both, therefore, the RPD values cannot be calculated.

Typically, RPD values below 20% are considered to be of satisfactory quality. All relative percent difference (RPD) results calculated were within the acceptable range of 20%, and thus meet the data quality objectives outlined in the Sampling and Analysis Plan, appended to this report. As a result, it is our opinion that the quality of the field data collected during this investigation 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. 269/11 amended by the Environmental Protection Act. Conclusions and recommendations are discussed in a subsequent section.

Site Description

The Phase II Property addressed 4497A & 4497B O'Keefe Court Property is situated on the east side of Highway 416, approximately 425m north of O'Keefe Court, in the City of Ottawa, Ontario. The legal description for the Phase II Property is Parts of Lot 22 Concession 4, Lot 23 Concession 4, Lot 24 Concession 4, and Lot 25 Concession 4, Nepean

The Phase II Property is an irregular shaped parcel of land, with an approximate area of 71.99 hectares. At the time of the 2024 Phase II-ESA, the Phase II Property existed as vacant land covered with a combination of low-lying vegetation and forest.

The Phase II Property is currently not serviced; municipal services will be provided to the Phase II Property upon development. Some residential and commercial properties within the 250m study area are not serviced with municipal water.

Based on the municipal and geological setting, the proposed residential development, and the proximity to a waterbody the MECP Table 8 Residential Standards are applicable to the Phase II Property. The more conservative coarse-grained soil standards were chosen to the represent the site conditions.

Background

A Phase I-ESA was carried out by Paterson in August of 2024. Based on the findings of the Phase I-ESA, two (2) on-site PCAs were considered to result in two (2) APECs on the Phase II Property.

A Phase II-ESA was subsequently carried out in September of 2024. Soil and groundwater quality at the Phase II Property was determined to comply with MECP Table 8 residential standards.

Potentially Contaminating Activity and Areas of Potential Environmental Concern

Based on the findings of the Phase-I and Phase-II ESAs completed for the Phase II Property, historical and/or existing on-site and off-site potentially contaminating activities (PCAs) were considered to result in two (2) areas of potential environmental concern (APEC) on the Phase II Property.

The PCAs resulting in APECs on the Phase II Property are presented in the table below and are depicted on Drawing: PE6605-1 – Site Plan.

Table 1 CSM: Table of Areas of Potential Environmental Concern 4497A & 4497B O'Keefe Court, Ottawa

Area of potential environmental concern	Location of area of potential environmental concern on Phase I Property	Potentially contaminating activity	Location of PCA (onsite or off-site)	Contaminants of potential concern	Media potentially impacted (Ground water, soil and/or sediment)
APEC 1 (Fill Material Imported in the 1990s)	Northwestern portion of the property addressed 4497 A O'Keefe Court.	PCA 30: Importation of Fill Material of Unknown Quality	On-Site	BTEX, PHCs (F1-F4) Metals, PAHs	Soil

Table 1 CSM: Table of Areas of Potential Environmental Concern 4497A & 4497B O'Keefe Court, Ottawa					
Area of potential environmental concern	**Location of area of potential environmental concern on Phase I Property**	**Potentially contaminating activity**	**Location of PCA (onsite or off-site)**	**Contaminants of potential concern**	**Media potentially impacted (Ground water, soil and/or sediment)**
APEC 2 (Former Concrete Plant)	Western portion of the property addressed 4497 B O'Keefe Court	PCA 12: Concrete, Cement and Lime Manufacturing	On-Site	BTEX, PHCs, Metals, PAHs	Soil and / or Groundwater

APEC 1 – Fill Material Imported to the Site in the 1990s – PCA 1 on Drawing PE6605-1, Item 30 "Importation of Fill Material of Unknown Quality"

The Phase I ESA identified a historical importation of fill material as noted in the on the west portion of the Phase II Property at 4497 A O'Keefe Court, and south of the hydro easement, identified as APEC 1. Based on the aerial images included in the Phase I ESA the identified fill material on the Phase II Property is absent in the 1991 aerial photograph and visible in the 2002 aerial photograph adjacent to Highway 416.

The presence of fill material of unknown quality on the Phase II Property is considered to be a potentially contaminating activity (PCA 1; Item 30), resulting in an APEC on the Phase II Property, as depicted on Drawing PE6605-1 – Site Plan.

APEC 2 – Operation of a Historical Concrete Plant – PCA 2 on Drawing PE6605-1, Item 12 "Concrete, Cement and Lime Manufacturing"

The Phase I ESA identified former concrete plant operations on the western portion of 4497 B O'Keefe Court adjacent to Highway 416, identified as APEC 2. The concrete plant operations can be seen north of the existing quarry on the Phase II Property in the 1965 aerial photograph included in the Phase I ESA Report.

The historical presence of this on-site concrete plant is considered to be a potentially contaminating activity (PCA 2; Item 12), resulting in an APEC on the Phase II Property, as depicted on Drawing PE6605-1 – Site Plan.

Additional PCAs Identified Within the Phase I Study Area

There were eight other PCAs identified within the Phase I Study Area. These PCAs were not considered to represent APECs on the Phase II Property based on separation distance, orientation relative to groundwater flow direction, and nature of the activity. These PCAs are shown on Drawing PE6605-2 – Surrounding Land Use Plan.

Contaminants of Potential Concern

The following Contaminants of Potential Concern (CPCs) were identified with respect to the soil on the Phase II Property:

- Benzene, Toluene, Ethylbenzene, Xylenes (BTEX)
- Petroleum Hydrocarbons fractions 1 through 4 (PHCs F_1-F_4)
- Metals, including arsenic (As), antimony (Sb), and selenium (Se)
- Polycyclic Aromatic Hydrocarbons (PAH)

The following Contaminants of Potential Concern (CPCs) were identified with respect to the groundwater beneath the Phase II Property:

- Benzene, Toluene, Ethylbenzene, Xylenes (BTEX)
- Petroleum Hydrocarbons fractions 1 through 4 (PHCs F_1-F_4)
- Metals, including arsenic (As), antimony (Sb), and selenium (Se)
- Polycyclic Aromatic Hydrocarbons (PAH)

Subsurface Structures

No subsurface structures were present on the Phase II Property at the time of the Phase I ESAs.

Underground Utilities

The site was not serviced at the time of the Phase I site visits. Underground service locates were completed prior to the subsurface investigation.

Based on the findings of the Phase II ESA, underground services are not considered to have created preferential pathways for contaminant migration.

Physical Setting

Site Stratigraphy

Stratigraphy at the Phase II Property in the APECs investigated for the Phase II ESA generally consists of the following:

- **Fill** was identified at ground surface at all test pit locations and extended to the termination of all test pits at depths of 0.51 – 0.64mbgs. Groundwater was not encountered in any of these test pits.

Based on records from a previous geotechnical ang hydrogeological investigation stratigraphy across the extent of the Phase II Property generally consists of the following:

- **Topsoil** was encountered across the Phase II Property with a strata thickness ranging between 0.1 - 0.4m. This layer was encountered at the surface except where bedrock was exposed or where it was overlain by fill material.
- **Glacial Till** generally consisting of brown silty sand with gravel, cobbles and boulders was encountered in all boreholes where native material had not been overlain by fill at depths ranging from 0.13 - 0.69mbgs.
- **Bedrock** generally consisting of fair to excellent quality grey limestone was encountered at depths ranging from 0.28 – 3.3mbgs. Bedrock extended to the end of each borehole were encountered with depths ranging from approximately 6.15 - 6.48mbgs

Hydrogeological Characteristics

Groundwater levels were measured at the Phase II Property in April of 2024.

The measured groundwater levels ranged from approximately 0.18 to 1.47m below existing grade. It is noted that groundwater elevations fluctuate seasonally.

Based on the groundwater levels recorded during the April 2024 monitoring event, groundwater contour mapping was completed. Based on the contour mapping, groundwater flow at the Phase II Property is interpreted to flow in a southernly direction. A horizontal hydraulic gradient of 0.001m/m was calculated. Groundwater contours are presented on Drawing PE6605-3 – Test Hole Location Plan.

Free product was not observed in any of the monitoring wells during the sampling event conducted at the Phase II Property.

Approximate Depth to Bedrock

Based on available mapping, bedrock in the area of the Phase II Property is reported to consist of interbedded sandstone and dolomite of the March Formation.

Bedrock was encountered on the Phase II Property as part of the geotechnical and hydrogeological investigation at depths ranging from approximately 0.1 to in excess of 5.6m below grade.

Approximate Depth to Water Table

Depth to water table at the Phase II Property varies between approximately 0.18m to 1.47m below existing grade.

Section 35 of the Regulation: Non-Potable Groundwater

Section 35 of the Regulation does not apply to the Phase II Property as follows:

- The Phase II Property, and other properties located in whole or in part, within 250 metres of the boundaries of the Phase II Property, are not supplied by a municipal drinking water system, as defined in the Safe Drinking Water Act, 2002.
- The Phase II Property is an agricultural or other use.
- Properties in the Phase I Study Area have a well used or intended for use as a source of water for human consumption or agriculture.

Section 41 of Ontario Regulation 153/04: Environmentally Sensitive Areas

Section 41 of the Regulation (Site Condition Standards, Environmentally Sensitive Areas) does not apply to the Phase II Property, in that the Phase II Property is not within 30m of an environmentally sensitive area and the pH of the surface soil is between 5 and 9.

Section 43.1 of Ontario Regulation 153/04: Shallow Soil Property or Water Body

Section 43.1 of the Regulation does apply to the Phase II Property as bedrock is generally located less than 2m below ground surface and there are water bodies located on or within 30m of the Phase II Property.

Existing Buildings and Structures

No buildings or structures are currently present on the Phase II Property.

Proposed Buildings and Other Structures

It is our understanding that the Phase II Property will be developed as a residential community with multiple housing types, park spaces, stormwater management ponds and conservation lands.

Environmental Condition

Areas Where Contaminants are Present

Based on the findings of the Phase II-ESA, groundwater results comply with the MECP Table 8 residential standards. Soil results comply with the MECP Table 8 standards with the exception of elevated concentrations of Barium in several samples which are considered to be naturally occurring and do not represent a contaminant. Therefore, no contaminants are present on the Phase II Property.

It should be noted that barium concentrations in excess of the selected MECP Table 8 Standards were identified on the Phase II Property in soil samples TP1-24 G1, TP2-24 G1, TP3-24 G1, TP6-24 G1, and DUP. It is the opinion of the QP that these parameters are naturally occurring and are not considered to represent contaminants on the Phase II Property. A rationale for this opinion is provided further below.

Rationale for Naturally Occurring Metals Opinion (Barium)

Champlain Sea Deposit

The silty clay fill present on the Phase II Property is typical of areas of eastern Ontario and western Quebec that fall within the Champlain Sea basin. Clays within this basin have distinct mineralogical compositions, structures, physical properties, and physio-chemical characteristics compared to soils of other origins in Ontario and Quebec.

Metals (primarily Barium, Chromium, Cobalt, and Vanadium) are commonly identified in Champlain Sea clay deposits at concentrations exceeding many MECP standards.

The area of the Phase II Property is located within the Champlain Sea Basin and a portion comprising APEC 1 is overlain by fill material comprised of Champlain Sea silty clay. As noted above, this fill was determined to have elevated levels of barium, exceeding the MECP Table 8 standards.

The origin of the fill material was determined to be from the Champlain Sea Basin based on the depositional time period aligning with the construction of Highway 416, which is also coincident with the Ministry of Transportation owning the Phase II Property. As a result, it was concluded that the fill material was generated from the construction of Highway 416, all of which lies within the Champlain Sea Basin.

Literature Review

GeoOttawa Dataset

The paper entitled "Elevated Background Metals Concentrations in Champlain Sea Clay - Ottawa Region", published jointly by Geofirma Engineering Ltd, Dillon Consulting Ltd. and the City of Ottawa, was consulted as an additional dataset for the baseline of Barium, Cobalt, and Vanadium concentrations in silty clay within the Ottawa region. The study analyzed a compilation of data from the Ottawa region to support the definition of local background concentrations (for Eastern Ontario). The study provides a supporting technical rationale for establishing a naturally occurring background argument and justifying the movement of these clay soils between sites in Eastern Ontario that have similar properties.

Subsequently the QP has concluded that the elevated concentrations of Barium, identified at the Phase II Property are naturally occurring and do not represent contamination on the Phase II Property; the elevated concentrations of these metal parameters are considered to comply with the MECP Table 8 standards.

Types of Contaminants

Based on the findings of the Phase II-ESA, there are no contaminants of concern present on the Phase II Property.

Contaminated Media

Based on the findings of the Phase II-ESA, there are no contaminated media present on the Phase II Property.

What Is Known About Areas Where Contaminants Are Present

Based on the findings of the Phase II-ESA, there are no contaminants present on the Phase II Property.

Distribution of Contaminants

Based on the findings of the Phase II-ESA, soil and groundwater at the Phase II Property comply with the MECP Table 8 standards.

Migration of Contaminants

Based on the findings of the Phase II-ESA, contaminants are not present on the Phase II Property and as such, no migration of contaminants has occurred.

Discharge of Contaminants

Based on the findings of the Phase II-ESA, discharge of contaminants is not considered to have occurred on the Phase II Property.

Climatic and Meteorological Conditions

Given that there are no contaminants present on the Phase II Property, climatic and meteorological conditions are not considered to have affected contaminant distribution at the Phase II Property.

Potential for Vapour Intrusion

Based on the findings of the Phase II-ESA, there is no potential for vapour intrusion on the Phase II Property.

6.0 CONCLUSIONS

Assessment

A Phase II-ESA was conducted for the property addressed 4497A & 4497B O'Keefe Court, in the City of Ottawa, Ontario. The purpose of the Phase II-ESA was to address two potentially contaminating activities (PCAs) that were identified during the Phase I-ESA and were considered to result in an area of potential environmental concern (APEC) on the Phase II - Property.

The Phase II-ESA was carried out in conjunction with an ongoing hydrogeological investigation and builds upon a preexisting geotechnical investigation. The Phase II ESA program consisted of excavating 8 test pits, and sampling groundwater from two preexisting boreholes which were instrumented with groundwater monitoring wells as part of the hydrogeological investigation. The soil and groundwater sampling programs were carried out in August of 2024.

Soil samples obtained from the test pits were screened using visual and olfactory observations as well as organic vapour measurements. A total of 9 soil samples (including one duplicate) were submitted for laboratory analysis of metals (including As, Sb, Se), benzene, toluene, ethylbenzene, xylenes (BTEX), petroleum hydrocarbons (PHCs, F_1-F_4), and/or polycyclic aromatic hydrocarbons (PAHs). Metals, BTEX, PHC, and PAH concentrations identified in the soil samples submitted all comply with the MECP Table 8 Standards with the exception of elevated levels of Barium in 5 of the samples. The elevated Barium concentrations was attributed to naturally occurring elevated background concentrations. As a result, all soil samples are considered to meet the MECP Table 8 Standards.

One groundwater sample from a monitoring well installed in BH6-24 was submitted for laboratory analysis of Metals, BTEX, PHCs (F_1-F_4), and PAHs. Groundwater was not recoverable from BH5-24. No sheen, free product or odour was noted during the groundwater sampling event. All groundwater results comply with the selected MECP Table 8 Standards.

Based on the findings of this Phase II-ESA, it is our opinion that **no further environmental investigation is required.**

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 (reaffirmed 2022) The conclusions presented herein are based on information gathered from a limited sampling and testing program. The test results represent conditions at specific test locations at the time of the field program.

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

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

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

Paterson Group Inc.

Mark Bujaki, B.Sc., MBA

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

Report Distribution:

- Mattamy Homes
- Paterson Group

FIGURES

FIGURE 1 – KEY PLAN

DRAWING PE6605-1 – SITE PLAN

DRAWING PE6605-2 – SURROUNDING LAND USE PLAN

DRAWING PE6605-3 – TEST HOLE LOCATION PLAN

DRAWING PE6605-4 – ANAYTICAL TESTING PLAN – SOIL AND GROUNDWATER

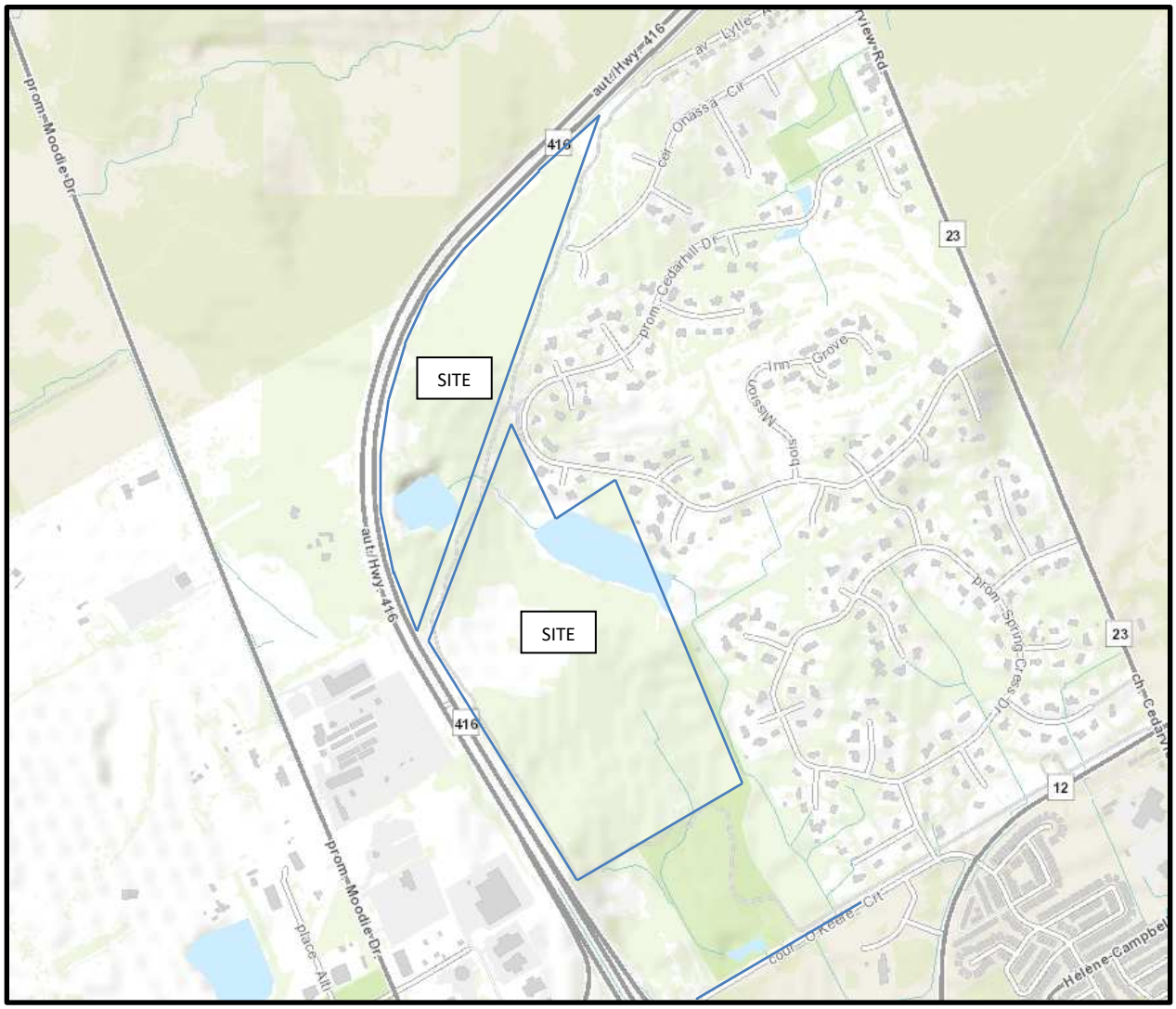
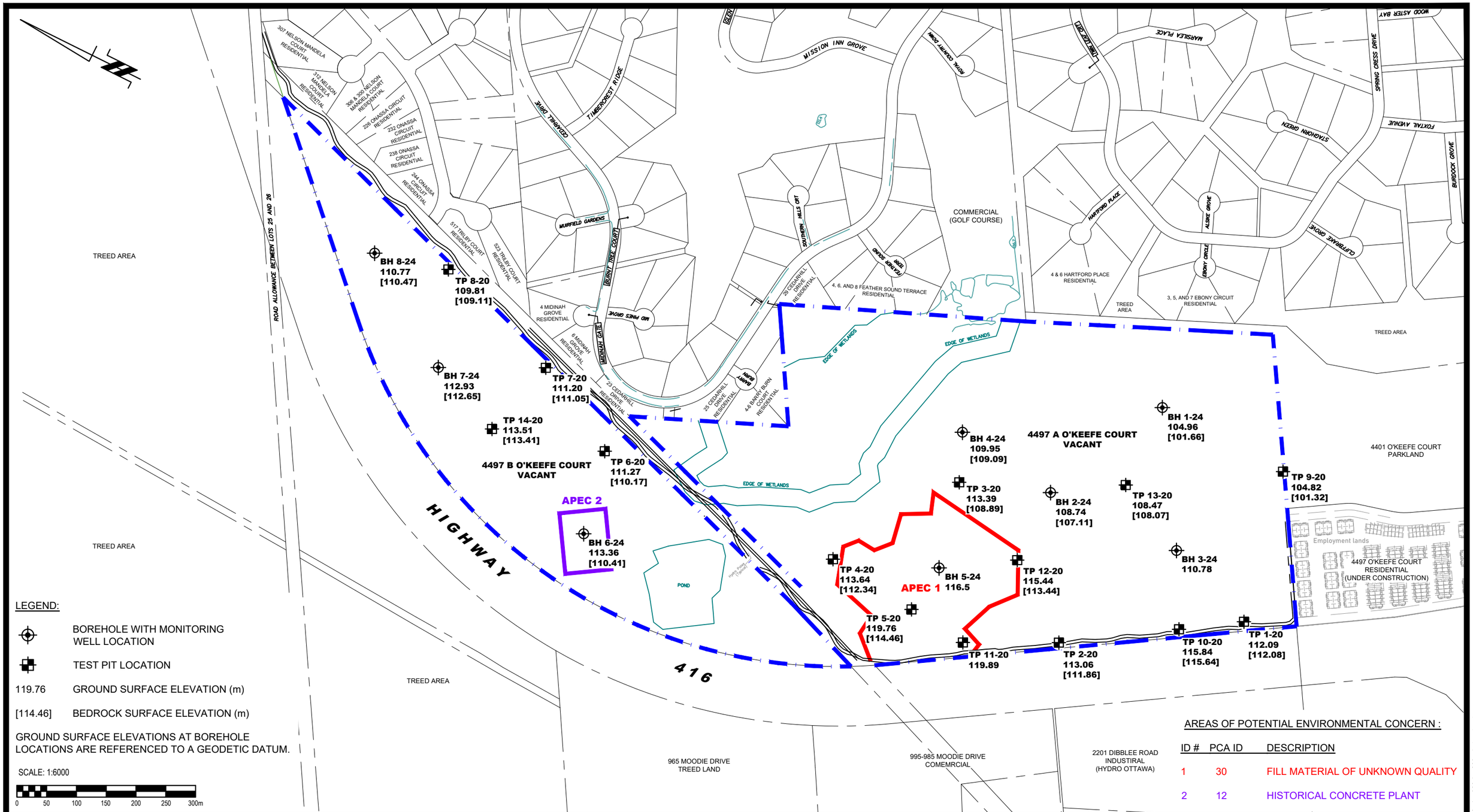


FIGURE 1

KEY PLAN

PATERSON GROUP



LEGEND:

- BOREHOLE WITH MONITORING WELL LOCATION
- TEST PIT LOCATION
- 119.76 GROUND SURFACE ELEVATION (m)
- [114.46] BEDROCK SURFACE ELEVATION (m)

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

SCALE: 1:6000

0 50 100 150 200 250 300m

AREAS OF POTENTIAL ENVIRONMENTAL CONCERN :

ID #	PCA ID	DESCRIPTION
1	30	FILL MATERIAL OF UNKNOWN QUALITY
2	12	HISTORICAL CONCRETE PLANT

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NO.	REVISIONS	DATE	INITIAL

MATTAMY CORPORATION

PHASE I - ENVIRONMENTAL SITE ASSESSMENT
4497A AND 4497B O'KEEFE COURT

OTTAWA, ONTARIO

Title:

SITE PLAN

Scale: 1:6000	Date: 06/2024
Drawn by: YA	Report No.: PE6605-1
Checked by: MB	Dwg. No.: PE6605-1
Approved by: MSD	Revision No.:

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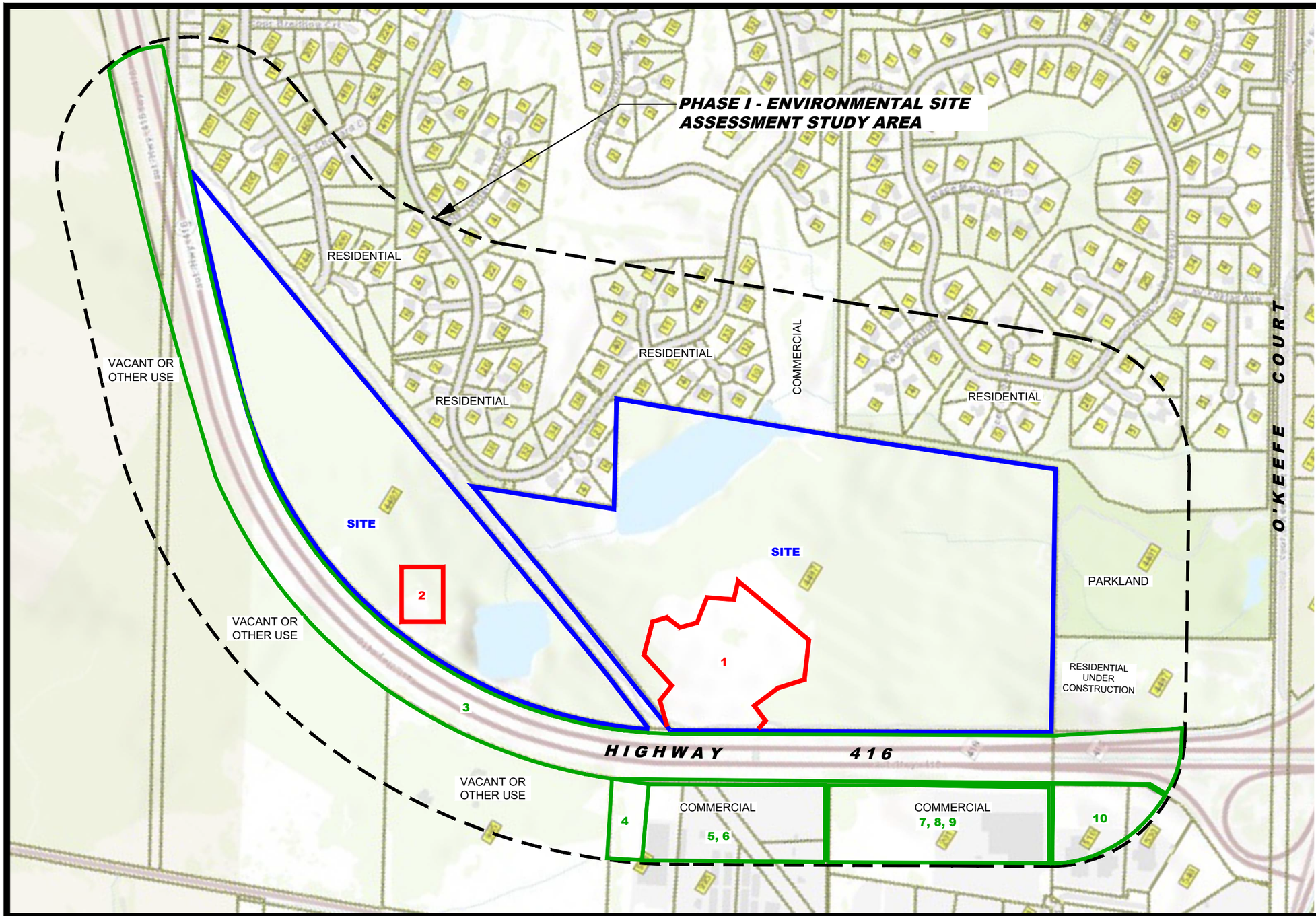

POTENTIALLY CONTAMINATING ACTIVITIES :

ID #	PCA ID	DESCRIPTION
1	30	IMPORTETION OF FILL MATERIAL OF UNKNOWN QUALITY ASSOCIATED WITH AN AREA OF FILL ON THE WEST PORTION OF THE SITE.
2	12	CONCRETE, CEMENT AND LIME MANUFACTURING ASSOCIATED WITH A SUSPECTED CONCRETE PLANT.
3	48	SALT MANUFACTURING, PROCESSING AND BULK STORAGE ASSOCIATED WITH ROAD SALT APPLICATION TO HIGHWAY 416.
4	11	COMMERCIAL TRUCKING AND CONTAINER TERMINALS ASSOCIATED WITH THE FED EX TRUCKING AND WAREHOUSE OPERATING AT 985 MOODIE DRIVE RESULTING IN THE GENERATION OF OIL SKIMMINGS AND SLUDGES, INORGANIC CHEMICALS AND ORGANIC CHEMICALS.
5	N/A	STORAGE, MAINTENANCE, FUELING AND REPAIR OF EQUIPMENT, VEHICLES, AND MATERIAL USED TO MAINTAIN TRANSPORTATION SYSTEMS ASSOCIATED WITH A LANDSCAPING CONTRACTORS YARD PRODUCING WASTE OILS AND LUBRICANTS AT 995 MOODIE DRIVE.
6	8	CHEMICAL MANUFACTURING, PROCESSING AND BULK STORAGE ASSOCIATED WITH A COMMERCIAL SWIMMING POOL SUPPLY STORE LOCATED AT 999 MOODIE DRIVE.
7.	39	PAINTS MANUFACTURING, PROCESSING AND BULK STORAGE ASSOCIATED WITH HYDRO OTTAWA OPERATIONS AT 201 DIBBLEE ROAD.
8.	55	TRANSFORMER MANUFACTURING, PROCESSING AND USE ASSOCIATED WITH HYDRO OTTAWA TRANSFORMER STORAGE AT 201 DIBBLEE ROAD.
9	N/A	STORAGE, MAINTENANCE, FUELING AND REPAIR OF EQUIPMENT, VEHICLES, AND MATERIAL USED TO MAINTAIN TRANSPORTATION SYSTEMS ASSOCIATED WITH HYDRO OTTAWA OPERATIONS AT 201 DIBBLEE ROAD RESULTING IN THE PRODUCTION OF ALKALINE SOLUTIONS CONTAINING HEAVY METALS, WASTE OILS/SLUDGES, WASTE COMPRESSED GASSES AND OTHER INORGANIC SULDGES, SLURRIES OR SOLIDS.
10.	52	STORAGE, MAINTENANCE, FUELING AND REPAIR OF EQUIPMENT, VEHICLES, AND MATERIAL USED TO MAINTAIN TRANSPORTATION SYSTEMS ASSOCIATED WITH THE OPERATION OF CAR DEALERSHIPS AND SERVICE GARAGES AT 510, 520, AND 530 MOTOR WORKS PRIVATE

SCALE: 1:7500

0 100 200 300 500m

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NO.	REVISIONS	DATE	INITIAL

MATTAMY CORPORATION

PHASE I - ENVIRONMENTAL SITE ASSESSMENT
4497A AND 4497B O'KEEFE COURT
OTTAWA, ONTARIO

Title:

SURROUNDING LAND USE PLAN

Scale: 1:7500	Date: 07/2024
Drawn by: GK	Report No.: PE6605-1
Checked by: MB	Dwg. No.: PE6605-2
Approved by: MSD	Revision No.:

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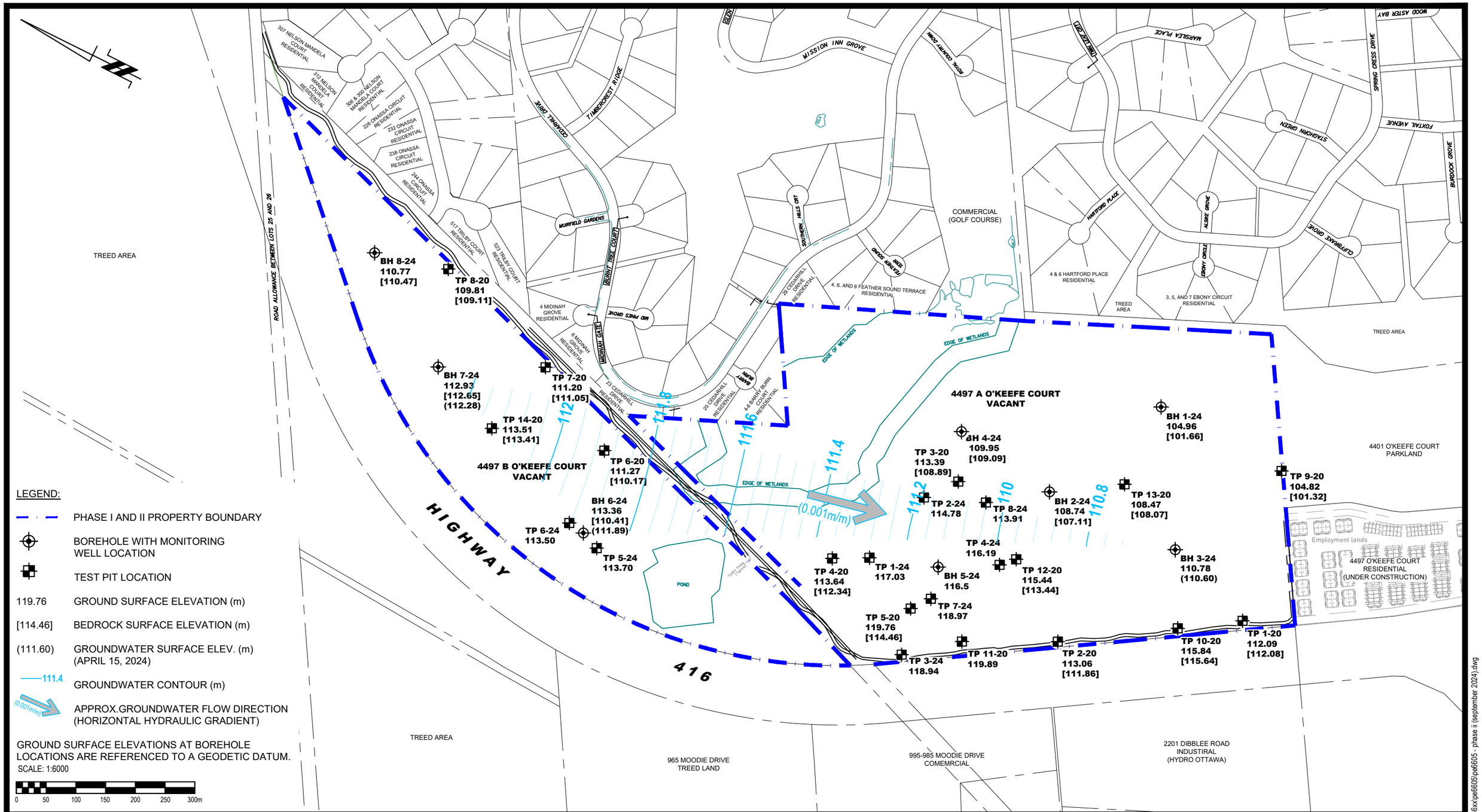

LEGEND:

- PHASE I AND II PROPERTY BOUNDARY
- BOREHOLE WITH MONITORING WELL LOCATION
- TEST PIT LOCATION
- 119.76 GROUND SURFACE ELEVATION (m)
- [114.46] BEDROCK SURFACE ELEVATION (m)
- (111.60) GROUNDWATER SURFACE ELEV. (m) (APRIL 15, 2024)
- 111.4 GROUNDWATER CONTOUR (m)
- (0.001m/m) APPROX.GROUNDWATER FLOW DIRECTION (HORIZONTAL HYDRAULIC GRADIENT)

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

SCALE: 1:6000

0 50 100 150 200 250 300m

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NO.	REVISIONS	DATE	INITIAL

MATTAMY CORPORATION

PHASE II - ENVIRONMENTAL SITE ASSESSMENT
4497A AND 4497B O'KEEFE COURT

OTTAWA, ONTARIO

Title:

TEST HOLE LOCATION PLAN

Scale: 1:6000	Date: 09/2024
Drawn by: YA	Report No.: PE6605-REP.02
Checked by: MSWB	Dwg. No.: PE6605-3
Approved by: MSD	Revision No.:

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BH6-24	4.85-6.39	28-AUG-2024
Metals (including As, Sn, Se) and PAHs comply with MECP Table 8 Standards		

TP6-24 G1	0.58-0.64m	27-AUG-2024
Parameter	Result(µg/g)	Standard(µg/g)
*Barium	241	220
Remaining Metals, PHCs, PAHs, and BTEX comply with MECP Table 8 standards		
*Considered to be naturally occurring; refer to CSM		

TP5-24-G1	0.58-0.64m	27-AUG-2024
Metals, PHCs, PAHs, and BTEX comply with MECP Table 8 standards		

TP1-24 G1	0.58-0.64m	27-AUG-2024
Parameter	Result(µg/g)	Standard(µg/g)
*Barium	312	220
Remaining Metals, PHCs, PAHs, and BTEX comply with MECP Table 8 standards		
*Considered to be naturally occurring; refer to CSM		

TP2-24 G1	0.51-0.56m	27-AUG-2024
Parameter	Result(µg/g)	Standard(µg/g)
*Barium	271	220
Remaining Metals, PHCs, PAHs, and BTEX comply with MECP Table 8 standards		
*Considered to be naturally occurring; refer to CSM		

TP8-24-G1	0.58-0.64m	27-AUG-2024
Metals, PHCs, PAHs, and BTEX comply with MECP Table 8 standards		

TP3-24 G1	0.46-0.51m	27-AUG-2024
Parameter	Result(µg/g)	Standard(µg/g)
*Barium	244	220
Remaining Metals, PHCs, PAHs, and BTEX comply with MECP Table 8 standards		
*Considered to be naturally occurring; refer to CSM		

DUP	0.46-0.51m	27-AUG-2024
Parameter	Result(µg/g)	Standard(µg/g)
*Barium	244	220
Remaining Metals, PHCs, PAHs, and BTEX comply with MECP Table 8 standards		
*Considered to be naturally occurring; refer to CSM		

TP4-24-G1	0.46-0.51m	27-AUG-2024
Metals, PHCs, PAHs, and BTEX comply with MECP Table 8 standards		

TP7-24-G1	0.48-0.53m	27-AUG-2024
Metals, PHCs, PAHs, and BTEX comply with MECP Table 8 standards		

LEGEND:

SOIL RESULT COMPLIES WITH THE MECP TABLE 8 STANDARDS

GROUNDWATER RESULT COMPLIES WITH THE MECP TABLE 8 STANDARDS

- PHASE - I AND II PROPERTY BOUNDARY
- BOREHOLE WITH MONITORING WELL LOCATION
- TEST PIT LOCATION
- 119.76 GROUND SURFACE ELEVATION (m)
- [114.46] BEDROCK SURFACE ELEVATION (m)
- (111.60) GROUNDWATER SURFACE ELEV. (M) (APRIL 15, 2024)

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

NOTE :

METALS INCLUDE AS, SB, SE) AND CAN INCLUDE : Hg (+MeHg), Cr(VI) and B-HWS

SCALE: 1:6000

0 50 100 150 200 250 300m

HIGHWAY 417

ROAD 25 AND

307 NELSON MANDELA COURT RESIDENTIAL

312 NELSON MANDELA COURT RESIDENTIAL

308 & 310 NELSON MANDELA COURT RESIDENTIAL

226 ONASSA CIRCUIT RESIDENTIAL

232 ONASSA CIRCUIT RESIDENTIAL

238 ONASSA CIRCUIT RESIDENTIAL

244 ONASSA CIRCUIT RESIDENTIAL

517 TRLBY COURT RESIDENTIAL

523 TRLBY COURT RESIDENTIAL

CHAMAIL DRIVE

TIMBERCREST RIDGE

MURFIELD GARDENS

BURNT TREE COURT

MIDINAH GATE

MID PINES GROVE

4 MIDINAH GROVE RESIDENTIAL

6 MIDINAH GROVE RESIDENTIAL

23 CEDARHILL DRIVE RESIDENTIAL

4,6 BARRY BURN COURT RESIDENTIAL

BARRY BURN

FEATHER SOUND TERRACE

4, 6, AND 8 FEATHER SOUND TERRACE RESIDENTIAL

4 & 6 HARTFORD PLACE RESIDENTIAL

3, 5, AND 7 B RESIDENTIAL

TREED AREA

EDGE OF WETLANDS

POND

4497 A O'KEEFE COURT VACANT

4497 B O'KEEFE COURT VACANT

4401 O'KEEFE COURT PARKLAND

4497 O'KEEFE COURT RESIDENTIAL (UNDER CONSTRUCTION)

Employment lands

995-985 MOODIE DRIVE COMEMRCIAL

WISEMAN INN GROVE

MARSELEA PLACE

SPRING CRESS DRIVE

FOXTAIL AVENUE

BURDOCK GROVE

STAGHORN GREEN

ALSIKE GROVE

CLIFFBRAKE GROVE

BH 8-24 110.77 [110.47]

TP 8-20 109.81 [109.11]

BH 7-24 112.93 [112.65] [112.28]

TP 7-20 111.20 [111.05]

TP 14-20 113.51 [113.41]

TP 6-20 111.27 [110.17]

BH 6-24 113.36 [110.41] (111.89)

TP 6-24 113.50

TP 5-24 113.70

TP 4-20 113.64 [112.34]

TP 1-24 117.03

BH 5-24 116.5

TP 4-24 116.19

TP 12-20 115.44 [113.44]

TP 7-24 118.97

TP 5-20 119.76 [114.46]

TP 3-24 118.94

TP 11-20 119.89

TP 2-20 113.06 [111.86]

TP 10-20 115.84 [115.64]

TP 1-20 112.09 [112.08]

BH 4-24 109.95 [109.09]

TP 3-20 113.39 [108.89]

TP 2-24 114.78

TP 8-24 113.91

BH 2-24 108.74 [107.11]

TP 13-20 108.47 [108.07]

BH 1-24 104.96 [101.66]

TP 9-20 104.82 [101.32]

BH 3-24 110.78 (110.60)

NO.	REVISIONS		DATE	INITIAL

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

MATTAMY CORPORATION

PHASE II - ENVIRONMENTAL SITE ASSESSMENT
4497A AND 4497B O'KEEFE COURT

OTTAWA, ONTARIO

Title:

ANALYTICAL TESTING PLAN SOIL AND GROUNDWATER

Scale: 1:6000	Date: 09/2024
Drawn by: GK	Report No.: PE6605-REP.02
Checked by: MSWB	Dwg. No.: PE6605-4
Approved by: MSD	Revision No.:

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TABLES

TABLE 1 – ANALYTICAL TEST RESULTS – SOIL – METALS, BTEX, PHCs, VOCs, ABNs – MECP TABLE 8 COMPARISON

TABLE 2 – ANALYTICAL TEST RESULTS – GROUNDWATER – METALS, PHCs, VOCs, ABNs – MECP TABLE 8 COMPARISSON

Table 1: Analytical Test Results - Soil
Metals, BTEX, PHCs. VOCs. ABNs - MECP Table 8 Comparison

Parameter	Units	Regulation	TP1-24 G1 2435337-01	TP2-24 G1 2435337-02	TP3-24 G1 2435337-03	TP4-24 G1 2435337-04	TP5-24 G1 2435337-05	TP6-24 G1 2435337-06	TP7-24 G1 2435337-07	TP8-24 G1 2435337-08	DUP 2436205-01
Sample Depth (m)		Reg 153/04-Table 8 Residential/Industrial, Potable	0.58 - 0.64	0.51 - 0.56	0.46 - 0.51	0.46 - 0.51	0.58 - 0.64	0.58 - 0.64	0.48 - 0.53	0.58 - 0.64	0.46 - 0.51
Sample Date			27-Aug-2024	27-Aug-2024	27-Aug-2024	27-Aug-2024	27-Aug-2024	27-Aug-2024	27-Aug-2024	27-Aug-2024	27-Aug-2024
Physical Characteristics											
% Solids	% by Wt.		79.3	77.4	84.7	82.7	89.3	81.2	81.7	80.3	83.7
Metals											
Antimony	ug/g dry	1.3	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)
Arsenic	ug/g dry	18	3.1	3.1	3.2	2.8	2.9	3.1	2.8	2.7	2.9
Barium	ug/g dry	220	312	271	244	220	199	266	212	185	241
Beryllium	ug/g dry	2.5	0.7	0.7	0.7	0.6	0.6	0.7	0.6	0.6	0.6
Boron	ug/g dry	36	5.2	ND (5.0)	6	5.9	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)	5.8
Cadmium	ug/g dry	1.2	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)
Chromium	ug/g dry	70	64.4	63.2	49.6	47.4	43.6	55	48.5	43.1	51.3
Cobalt	ug/g dry	22	15.4	15.7	13.1	12.7	12.7	14.8	12.4	11.3	13.3
Copper	ug/g dry	92	29.4	30.2	27.6	25.6	30.3	29.2	26.2	23.7	25.6
Lead	ug/g dry	120	6.5	6.2	5.9	5.8	5.6	6.1	5.2	4.5	5.9
Molybdenum	ug/g dry	2.0	1.1	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)
Nickel	ug/g dry	82	35.4	35.1	28.1	26.8	25.6	31.1	27.4	24.5	28.6
Selenium	ug/g dry	1.5	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)
Silver	ug/g dry	0.5	ND (0.3)	ND (0.3)	ND (0.3)	ND (0.3)	ND (0.3)	ND (0.3)	ND (0.3)	ND (0.3)	ND (0.3)
Thallium	ug/g dry	1.0	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)
Uranium	ug/g dry	2.5	ND (1.0)	ND (1.0)	ND (1.0)	1.1	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)
Vanadium	ug/g dry	86	77.3	78.9	65.8	63.7	62	70.2	62.9	59.2	67.3
Zinc	ug/g dry	290	94.1	92.1	78.3	72.2	65.8	79.4	71.1	64.7	76.9
BTEX											
Benzene	ug/g dry	0.02	ND (0.02)	ND (0.02)	ND (0.02)	ND (0.02)	ND (0.02)	ND (0.02)	ND (0.02)	ND (0.02)	N/A
Ethylbenzene	ug/g dry	0.05	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	N/A
Toluene	ug/g dry	0.2	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	N/A
m/p-Xylene	ug/g dry	0.05	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	N/A
o-Xylene	ug/g dry	0.05	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	N/A
Xylenes, total	ug/g dry	0.05	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	N/A
Hydrocarbons											
F1 PHCs (C6-C10)	ug/g dry	25	ND (7)	ND (7)	ND (7)	ND (7)	ND (7)	ND (7)	ND (7)	ND (7)	N/A
F2 PHCs (C10-C16)	ug/g dry	10	ND (4)	ND (4)	ND (4)	ND (4)	ND (4)	ND (4)	ND (4)	ND (4)	N/A
F3 PHCs (C16-C34)	ug/g dry	240	11	ND (8)	22	29	ND (8)	11	21	ND (8)	N/A
F4 PHCs (C34-C50)	ug/g dry	120	16	ND (6)	16	23	ND (6)	10	10	ND (6)	N/A
Semi-Volatiles											
Acenaphthene	ug/g dry	0.072	ND (0.02)	ND (0.02)	ND (0.02)	ND (0.02)	ND (0.02)	ND (0.02)	ND (0.02)	ND (0.02)	ND (0.02)
Acenaphthylene	ug/g dry	0.093	ND (0.02)	ND (0.02)	ND (0.02)	ND (0.02)	ND (0.02)	ND (0.02)	ND (0.02)	ND (0.02)	ND (0.02)
Anthracene	ug/g dry	0.22	ND (0.02)	ND (0.02)	ND (0.02)	ND (0.02)	ND (0.02)	ND (0.02)	ND (0.02)	ND (0.02)	ND (0.02)
Benzo[a]anthracene	ug/g dry	0.36	ND (0.02)	ND (0.02)	ND (0.02)	ND (0.02)	ND (0.02)	ND (0.02)	ND (0.02)	ND (0.02)	ND (0.02)
Benzo[a]pyrene	ug/g dry	0.3	ND (0.02)	ND (0.02)	ND (0.02)	ND (0.02)	ND (0.02)	ND (0.02)	ND (0.02)	ND (0.02)	ND (0.02)
Benzo[b]fluoranthene	ug/g dry	0.47	ND (0.02)	ND (0.02)	ND (0.02)	ND (0.02)	ND (0.02)	ND (0.02)	ND (0.02)	ND (0.02)	ND (0.02)
Benzo[g,h,i]perylene	ug/g dry	0.68	ND (0.02)	ND (0.02)	ND (0.02)	ND (0.02)	ND (0.02)	ND (0.02)	ND (0.02)	ND (0.02)	ND (0.02)
Benzo[k]fluoranthene	ug/g dry	0.48	ND (0.02)	ND (0.02)	ND (0.02)	ND (0.02)	ND (0.02)	ND (0.02)	ND (0.02)	ND (0.02)	ND (0.02)
Chrysene	ug/g dry	2.8	ND (0.02)	ND (0.02)	ND (0.02)	ND (0.02)	ND (0.02)	ND (0.02)	ND (0.02)	ND (0.02)	ND (0.02)
Dibenzo[a,h]anthracene	ug/g dry	0.1	ND (0.02)	ND (0.02)	ND (0.02)	ND (0.02)	ND (0.02)	ND (0.02)	ND (0.02)	ND (0.02)	ND (0.02)
Fluoranthene	ug/g dry	0.69	ND (0.02)	ND (0.02)	0.03	ND (0.02)	ND (0.02)	ND (0.02)	ND (0.02)	ND (0.02)	ND (0.02)
Fluorene	ug/g dry	0.19	ND (0.02)	ND (0.02)	ND (0.02)	ND (0.02)	ND (0.02)	ND (0.02)	ND (0.02)	ND (0.02)	ND (0.02)
Indeno [1,2,3-cd] pyrene	ug/g dry	0.23	ND (0.02)	ND (0.02)	ND (0.02)	ND (0.02)	ND (0.02)	ND (0.02)	ND (0.02)	ND (0.02)	ND (0.02)
1-Methylnaphthalene	ug/g dry	0.59	ND (0.02)	ND (0.02)	ND (0.02)	ND (0.02)	ND (0.02)	ND (0.02)	ND (0.02)	ND (0.02)	ND (0.02)
2-Methylnaphthalene	ug/g dry	0.59	ND (0.02)	ND (0.02)	ND (0.02)	ND (0.02)	ND (0.02)	ND (0.02)	ND (0.02)	ND (0.02)	ND (0.02)
Methylnaphthalene (1&2)	ug/g dry	0.59	ND (0.04)	ND (0.04)	ND (0.04)	ND (0.04)	ND (0.04)	ND (0.04)	ND (0.04)	ND (0.04)	ND (0.04)
Naphthalene	ug/g dry	0.09	ND (0.01)	ND (0.01)	ND (0.01)	ND (0.01)	ND (0.01)	ND (0.01)	ND (0.01)	ND (0.01)	ND (0.01)
Phenanthrene	ug/g dry	0.69	ND (0.02)	ND (0.02)	ND (0.02)	ND (0.02)	ND (0.02)	ND (0.02)	ND (0.02)	ND (0.02)	ND (0.02)
Pyrene	ug/g dry	1.0	ND (0.02)	ND (0.02)	0.02	ND (0.02)	ND (0.02)	ND (0.02)	ND (0.02)	ND (0.02)	ND (0.02)

2.00	Result exceeds Reg 153/04-Table 8 Residential/Industrial, Potable Standards
ND (0.2)	MDL exceeds Reg 153/04-Table 8 Residential/Industrial, Potable Standards
ND (0.2)	No concentrations identified above the MDL
N/A	Parameter not analysed
NV	No value given for indicated parameter

Table 2: Analytical Test Results - Groundwater
Metals, PHCs, VOCs, ABNs, MECP Table 8 Comparisson

Parameter	Units	Regulation	BH6-24 2435346-01
Sample Depth (m)		Reg 153/04-Table 8 Groundwater	4.85 - 6.39
Sample Date			28-Aug-2024
Metals			
Antimony	ug/L	6.0	0.5
Arsenic	ug/L	25	6
Barium	ug/L	1000	119
Beryllium	ug/L	4.0	ND (0.5)
Boron	ug/L	5000	41
Cadmium	ug/L	2.1	ND (0.1)
Chromium	ug/L	50	ND (1)
Cobalt	ug/L	3.8	2.7
Copper	ug/L	69	0.9
Lead	ug/L	10	0.2
Molybdenum	ug/L	70	16.3
Nickel	ug/L	100	15
Selenium	ug/L	10	ND (1)
Silver	ug/L	1.2	ND (0.1)
Sodium	ug/L	490000	35100
Thallium	ug/L	2.0	ND (0.1)
Uranium	ug/L	20	16.5
Vanadium	ug/L	6.2	1.8
Zinc	ug/L	890	43
BTEX			
Benzene	ug/L	5.0	ND (0.5)
Ethylbenzene	ug/L	2.4	ND (0.5)
Toluene	ug/L	22	ND (0.5)
m/p-Xylene	ug/L	300	ND (0.5)
o-Xylene	ug/L	300	ND (0.5)
Xylenes, total	ug/L	300	ND (0.5)
Hydrocarbons			
F1 PHCs (C6-C10)	ug/L	420	ND (25)
F2 PHCs (C10-C16)	ug/L	150	ND (100)
F3 PHCs (C16-C34)	ug/L	500	ND (100)
F4 PHCs (C34-C50)	ug/L	500	ND (100)
Semi-Volatiles			
Acenaphthene	ug/L	4.1	ND (0.05)
Acenaphthylene	ug/L	1.0	ND (0.05)
Anthracene	ug/L	1.0	ND (0.01)
Benzo[a]anthracene	ug/L	1.0	ND (0.01)
Benzo[a]pyrene	ug/L	0.01	ND (0.01)
Benzo[b]fluoranthene	ug/L	0.1	ND (0.05)
Benzo[g,h,i]perylene	ug/L	0.2	ND (0.05)
Benzo[k]fluoranthene	ug/L	0.1	ND (0.05)
Chrysene	ug/L	0.1	ND (0.05)
Dibenzo[a,h]anthracene	ug/L	0.2	ND (0.05)
Fluoranthene	ug/L	0.41	ND (0.01)
Fluorene	ug/L	120	ND (0.05)
Indeno [1,2,3-cd] pyrene	ug/L	0.2	ND (0.05)
1-Methylnaphthalene	ug/L	3.2	ND (0.05)
2-Methylnaphthalene	ug/L	3.2	ND (0.05)
Methylnaphthalene (1&2)	ug/L	3.2	ND (0.10)
Naphthalene	ug/L	11	ND (0.05)
Phenanthrene	ug/L	1.0	ND (0.05)
Pyrene	ug/L	4.1	ND (0.01)

2.00	Result exceeds Reg 153/04-Table 8 Groundwater Standards
ND (0.2)	MDL exceeds Reg 153/04-Table 8 Groundwater Standards
ND (0.2)	No concentrations identified above the MDL
N/A	Parameter not analysed
NV	No value given for indicated parameter

APPENDIX 1

SAMPLING AND ANALYSIS PLAN

SOIL PROFILE AND TEST DATA SHEETS

SYMBOLS AND TERMS

LABORATORY CERTIFICATE OF ANALYSIS

PATERSON GROUP

Sampling and Analysis Plan

4497A & 4497B O'Keefe Court
Ottawa, Ontario

Prepared for Mattamy Corporation

Report: PE6605-SAP
Date: August 26, 2024

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1.0 SAMPLING PROGRAM

Paterson Group Inc. (Paterson) was commissioned by Mattamy Homes to conduct a Phase II – Environmental Site Assessment (Phase II-ESA) at 4497A & 4497B O'Keefe Court, in the City of Ottawa, Ontario.

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

Borehole/Test Pit	Location & Rationale	Proposed Depth & Rationale
TP1-24	Place on the northwest portion of the 4497A to assess potential fill material of unknown quality.	0.4 - 0.6 m; Hand excavate to retrieve a representative soil sample.
TP2-24	Place on the northwest portion of the 4497A to assess potential fill material of unknown quality.	0.4 - 0.6 m; Hand excavate to retrieve a representative soil sample.
TP3-24	Place on the northwest portion of the 4497A to assess potential fill material of unknown quality.	0.4 - 0.6 m; Hand excavate to retrieve a representative soil sample.
TP4-24	Place on the northwest portion of the 4497A to assess potential fill material of unknown quality.	0.4 - 0.6 m; Hand excavate to retrieve a representative soil sample.
TP5-24	Place on the west portion of the 4497B to assess potential soil impacts resulting from the presence of a historic concrete plant.	0.4 - 0.6 m; Hand excavate to retrieve a representative soil sample.
TP6-24	Place on the west portion of the 4497B to assess potential soil impacts resulting from the presence of a historic concrete plant.	0.4 - 0.6 m; Hand excavate to retrieve a representative soil sample.
TP7-24	Place on the northwest portion of the 4497A to assess potential fill material of unknown quality.	0.4 - 0.6 m; Hand excavate to retrieve a representative soil sample.
TP8-24	Place on the northwest portion of the 4497A to assess potential fill material of unknown quality.	0.4 - 0.6 m; Hand excavate to retrieve a representative soil sample.
BH3-24	Measure existing groundwater elevation on the south portion of 4497A to determine the overall groundwater flow direction.	0.0 – 6.32 m; Determine groundwater level within the monitoring well.
BH5-24	Sample existing groundwater monitoring well located on the northwest portion of 4497A to assess the groundwater impacts from potential fill material of unknown quality.	3.91 – 5.61 m; Well screen interval.
BH6-24	Sample existing groundwater monitoring well located on the west portion of 4497B to assess the groundwater impacts resulting from the presence of a historic concrete plant.	4.85 – 6.39 m; Well screen interval.
BH7-24	Measure existing groundwater elevation in the central portion of 4497B to determine the overall groundwater flow direction.	0.0 – 6.15 m; Determine groundwater level within the monitoring well.

Borehole, test pit and stockpile locations are shown on Drawing PE6605-3 – Test Hole Location Plan, appended to the main report.

Eight test pits will be placed across the APECs on the Phase II Property for to assess for contaminants of potential environmental concern related to the historic PCAs identified in the Phase I ESA Report. At each test pit location, samples will be collected at a depth of approximately 0.4 to 0.6m.

2.0 ANALYTICAL TESTING PROGRAM

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

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

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

- ❒ Groundwater monitoring wells should be installed in all boreholes with visual or olfactory evidence of soil contamination, in stratigraphic units where soil contamination was encountered, where those stratigraphic units are at or below the water table (i.e. a water sample can be obtained).
- ❒ Groundwater monitoring well screens should straddle the water table at sites where the contaminants of concern are suspected to be LNAPLs.
- ❒ At least one groundwater monitoring well should be installed in a stratigraphic unit below the suspected contamination, where said stratigraphic unit is water-bearing.
- ❒ Parameters analyzed should be consistent with the Contaminants of Concern identified in the Phase I ESA and with the contaminants identified in the soil samples.

3.0 STANDARD OPERATING PROCEDURES

3.1 Environmental Drilling Procedure

Purpose

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

Equipment

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

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

Determining Borehole Locations

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

After drilling is completed a plan with the borehole locations must be provided. Distances 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 TO SAMPLING & ANALYSIS PLAN

Physical impediments to the Sampling and Analysis plan may include:

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

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

SOIL PROFILE AND TEST DATA

Phase II Environmental Site Assessment

4497 A&B O'Keefe Court, Ottawa ON

COORD. SYS.: MTM ZONE 9 **EASTING:** 359597.31 **NORTHING:** 5015957.32 **ELEVATION:** 117.03

PROJECT: Phase II Environmental Site Assessment

BORINGS BY:

REMARKS:

DATE: August 27, 2024

FILE NO. : PE6605

HOLE NO. : TP 1-24

SAMPLE DESCRIPTION	STRATA PLOT	DEPTH (m)	SAMPLE TYPE AND NO.	SAMPLE RECOVERY (%)	SAMPLE N, Nc OR RQD	SAMPLE ANALYTICAL TESTS	GASTECH (ppm) / GASTECH (% LEL) / PID (ppm) / PID (% LEL)	PIEZOMETER CONSTRUCTION	ELEVATION (m)
GROUND SURFACE									
FILL: Brown silty clay, some sand, occasional cobbles		0	G 1						117
0.64m [116.39m]									
End of Test Pit		1							116
		2							115
		3							114
		4							113
		5							112
		6							111
		7							110
		8							

GASTECH (ppm) / GASTECH (% LEL): 50 100 150 200

PID (ppm) / PID (% LEL): 20 40 60 80

SOIL PROFILE AND TEST DATA

Phase II Environmental Site Assessment

4497 A&B O'Keefe Court, Ottawa ON

COORD. SYS.: MTM ZONE 9 **EASTING:** 359728.92 **NORTHING:** 5015920.48 **ELEVATION:** 114.78

PROJECT: Phase II Environmental Site Assessment

BORINGS BY:

REMARKS:

DATE: August 27, 2024

FILE NO. : PE6605

HOLE NO. : TP 2-24

SAMPLE DESCRIPTION	STRATA PLOT	DEPTH (m)	SAMPLE TYPE AND NO.	SAMPLE RECOVERY (%)	SAMPLE N, Nc OR RQD	SAMPLE ANALYTICAL TESTS	GASTECH (ppm) / GASTECH (% LEL) 50 100 150 200 / PID (ppm) / PID (% LEL) 20 40 60 80	PIEZOMETER CONSTRUCTION	ELEVATION (m)
GROUND SURFACE									
FILL: Brown silty clay, some sand, occasional cobbles		0	G 1				▲		114
0.56m [114.22m]									
End of Test Pit		1							113
		2							112
		3							111
		4							110
		5							109
		6							108
		7							107
		8							

SOIL PROFILE AND TEST DATA

Phase II Environmental Site Assessment

4497 A&B O'Keefe Court, Ottawa ON

COORD. SYS.: MTM ZONE 9 **EASTING:** 359475.47 **NORTHING:** 5015836.29 **ELEVATION:** 118.94

PROJECT: Phase II Environmental Site Assessment

BORINGS BY:

REMARKS:

DATE: August 27, 2024

FILE NO. : PE6605

HOLE NO. : TP 3-24

SAMPLE DESCRIPTION	STRATA PLOT	DEPTH (m)	SAMPLE: TYPE AND NO.	SAMPLE: RECOVERY (%)	SAMPLE: N, Nc OR RQD	SAMPLE: ANALYTICAL TESTS	GASTECH (ppm) / GASTECH (% LEL) 50 100 150 200 / PID (ppm) / PID (% LEL) 20 40 60 80	PIEZOMETER CONSTRUCTION	ELEVATION (m)
GROUND SURFACE		0							118
FILL: Brown silty clay, some sand, occasional cobbles			G 1						
0.51m [118.43m]									
End of Test Pit		1							117
		2							116
		3							115
		4							114
		5							113
		6							112
		7							111
		8							

SOIL PROFILE AND TEST DATA

Phase II Environmental Site Assessment

4497 A&B O'Keefe Court, Ottawa ON

COORD. SYS.: MTM ZONE 9 **EASTING:** 359684.04 **NORTHING:** 5015756.15 **ELEVATION:** 116.19

PROJECT: Phase II Environmental Site Assessment

FILE NO. : PE6605

BORINGS BY:

HOLE NO. : TP 4-24

REMARKS: **DATE:** August 27, 2024

SAMPLE DESCRIPTION	STRATA PLOT	DEPTH (m)	SAMPLE TYPE AND NO.	SAMPLE RECOVERY (%)	SAMPLE N, Nc OR RQD	SAMPLE ANALYTICAL TESTS	GASTECH (ppm) / GASTECH (% LEL) / PID (ppm) / PID (% LEL)	PIEZOMETER CONSTRUCTION	ELEVATION (m)
GROUND SURFACE							50 100 150 200 / 20 40 60 80		
FILL: Brown silty clay, some sand, occasional cobbles		0	G 1				▲		116
0.51m [115.68m]									
End of Test Pit		1							115
		2							114
		3							113
		4							112
		5							111
		6							110
		7							109
		8							

SOIL PROFILE AND TEST DATA

Phase II Environmental Site Assessment

4497 A&B O'Keefe Court, Ottawa ON

COORD. SYS.: MTM ZONE 9 **EASTING:** 359407.64 **NORTHING:** 5016375.22 **ELEVATION:** 113.70

PROJECT: Phase II Environmental Site Assessment

BORINGS BY:

REMARKS:

DATE: August 27, 2024

FILE NO. : PE6605

HOLE NO. : TP 5-24

SAMPLE DESCRIPTION	STRATA PLOT	DEPTH (m)	SAMPLE TYPE AND NO.	SAMPLE RECOVERY (%)	SAMPLE N, Nc OR RQD	SAMPLE ANALYTICAL TESTS	GASTECH (ppm) / GASTECH (% LEL) 50 100 150 200 / PID (ppm) / PID (% LEL) 20 40 60 80	PIEZOMETER CONSTRUCTION	ELEVATION (m)
GROUND SURFACE									
FILL: Brown silty clay, with some sand, trace gravel and organics		0	G 1				▲		113
0.64m [113.06m]									
End of Test Pit		1							112
		2							111
		3							110
		4							109
		5							108
		6							107
		7							106
		8							

SOIL PROFILE AND TEST DATA

Phase II Environmental Site Assessment

4497 A&B O'Keefe Court, Ottawa ON

COORD. SYS.: MTM ZONE 9 **EASTING:** 359425.04 **NORTHING:** 5016435.37 **ELEVATION:** 113.50

PROJECT: Phase II Environmental Site Assessment

BORINGS BY:

REMARKS:

DATE: August 27, 2024

FILE NO. : PE6605

HOLE NO. : TP 6-24

SAMPLE DESCRIPTION	STRATA PLOT	DEPTH (m)	SAMPLE: TYPE AND NO.	SAMPLE: RECOVERY (%)	SAMPLE: N, Nc OR RQD	SAMPLE: ANALYTICAL TESTS	GASTECH (ppm) / GASTECH (% LEL) 50 100 150 200 / PID (ppm) / PID (% LEL) 20 40 60 80	PIEZOMETER CONSTRUCTION	ELEVATION (m)
GROUND SURFACE		0							113
FILL: Brown sandy clay, with trace gravel			G 1						
0.64m [112.86m]									
End of Test Pit		1							112
		2							111
		3							110
		4							109
		5							108
		6							107
		7							106
		8							

SOIL PROFILE AND TEST DATA

Phase II Environmental Site Assessment

4497 A&B O'Keefe Court, Ottawa ON

COORD. SYS.: MTM ZONE 9 **EASTING:** 359581.58 **NORTHING:** 5015834.15 **ELEVATION:** 118.97

PROJECT: Phase II Environmental Site Assessment

BORINGS BY:

REMARKS:

DATE: August 27, 2024

FILE NO. : PE6605

HOLE NO. : TP 7-24

SAMPLE DESCRIPTION	STRATA PLOT	DEPTH (m)	SAMPLE TYPE AND NO.	SAMPLE RECOVERY (%)	SAMPLE N, Nc OR RQD	SAMPLE ANALYTICAL TESTS	GASTECH (ppm) / GASTECH (% LEL) 50 100 150 200 / PID (ppm) / PID (% LEL) 20 40 60 80	PIEZOMETER CONSTRUCTION	ELEVATION (m)
GROUND SURFACE									
FILL: Brown silty clay, with some sand, occasional cobbles		0	G 1						118
0.53m [118.44m]									
End of Test Pit		1							117
		2							116
		3							115
		4							114
		5							113
		6							112
		7							111
		8							

SOIL PROFILE AND TEST DATA

Phase II Environmental Site Assessment

4497 A&B O'Keefe Court, Ottawa ON

COORD. SYS.: MTM ZONE 9 **EASTING:** 359767.79 **NORTHING:** 5015823.41 **ELEVATION:** 113.91

PROJECT: Phase II Environmental Site Assessment

BORINGS BY:

REMARKS:

DATE: August 27, 2024

FILE NO. : PE6605

HOLE NO. : TP 8-24

SAMPLE DESCRIPTION	STRATA PLOT	DEPTH (m)	SAMPLE TYPE AND NO.	SAMPLE RECOVERY (%)	SAMPLE N, Nc OR RQD	SAMPLE ANALYTICAL TESTS	GASTECH (ppm) / GASTECH (% LEL) / PID (ppm) / PID (% LEL)	PIEZOMETER CONSTRUCTION	ELEVATION (m)
GROUND SURFACE							50 100 150 200 / 20 40 60 80		
FILL: Brown silty clay, occasional cobbles		0	G 1				▲		113
0.64m [113.27m]									
End of Test Pit		1							112
		2							111
		3							110
		4							109
		5							108
		6							107
		7							106
		8							

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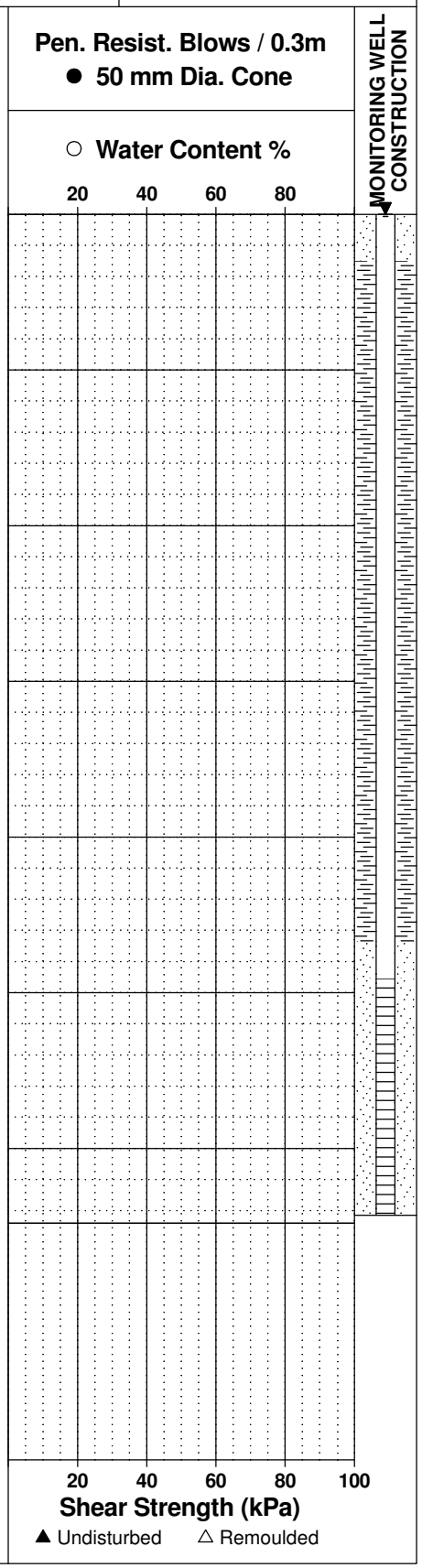
SOIL PROFILE AND TEST DATA

Geotechnical Investigation
Prop. Residential Dev. - 800 Cedarview Road
Ottawa, Ontario

EASTING: 360042.722 **NORTHING:** 5015631.119 **ELEVATION:** 104.96
DATUM: Geodetic
REMARKS:
BORINGS BY: CME 55 Mechanical Earth Auger on Track **DATE:** 2024 March 27

FILE NO. PG5600
HOLE NO. BH 1-24

SAMPLE DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)
GROUND SURFACE						0	104.96
TOPSOIL with organics							
0.28							
GLACIAL TILL: Compact, brown silty sand to sandy silt with clay and gravel, occasional cobbles		AU	1				
		SS	2	100	8	1	103.96
		SS	3	50	14	2	102.96
2.21							
GLACIAL TILL: Compact to dense, grey silty sand with gravel, cobbles and boulders		SS	4	100	28	3	101.96
		SS	5	80	+50		
3.30							
BEDROCK: Fair quality, grey limestone bedrock - Good to excellent quality by 3.6m depth		RC	1	100	60	4	100.96
		RC	2	100	100	5	99.96
		RC	3	100	100	6	98.96
6.48							
End of Borehole							
(GWL at surface - April 17, 2024)							



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SOIL PROFILE AND TEST DATA

Geotechnical Investigation
Prop. Residential Dev. - 800 Cedarview Road
Ottawa, Ontario

EASTING: 359831.302 **NORTHING:** 5015735.647 **ELEVATION:** 108.74
DATUM: Geodetic
REMARKS:
BORINGS BY: CME 55 Mechanical Earth Auger on Track **DATE:** 2024 March 27

FILE NO. PG5600
HOLE NO. BH 2-24

SAMPLE DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)
GROUND SURFACE						0	108.74
TOPSOIL with organics							
0.25							
Compact, brown **SILTY SAND**		AU	1				
0.69							
GLACIAL TILL: Very dense, brown silty sand with gravel, cobbles and boulders		SS	2	83	36	1	107.74
1.63		SS	3	100	+50		
BEDROCK: Excellent quality, grey limestone bedrock		RC	1	100	97	2	106.74
		RC	2	100	95	3	105.74
		RC	3	100	100	4	104.74
		RC	4	100	92	5	103.74
						6	102.74
6.32							
End of Borehole							
(GWL @ 0.45m - April 17, 2024)							

Pen. Resist. Blows / 0.3m
● 50 mm Dia. Cone
○ Water Content %

20 40 60 80

20 40 60 80 100
Shear Strength (kPa)
▲ Undisturbed △ Remoulded

MONITORING WELL CONSTRUCTION

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9 Auriga Drive, Ottawa, Ontario K2E 7T9

SOIL PROFILE AND TEST DATA

Geotechnical Investigation
Prop. Residential Dev. - 800 Cedarview Road
Ottawa, Ontario

EASTING: 359838.455 **NORTHING:** 5015502.999 **ELEVATION:** 110.78
DATUM: Geodetic
REMARKS:
BORINGS BY: CME 55 Mechanical Earth Auger on Track **DATE:** 2024 March 27

FILE NO. PG5600
HOLE NO. BH 3-24

SAMPLE DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)
GROUND SURFACE						0	110.78
TOPSOIL with organics							
0.28							
FILL: Brown silty sand to sandy silt with clay		AU	1				
0.69							
GLACIAL TILL: Dense to very dense, brown silty sand with gravel, cobbles and boulders		SS	2	62	+50	1	109.78
		RC	1	32		2	108.78
		RC	2	29		3	107.78
- Grey by 4.1m depth		SS	3	55	+50	4	106.78
		SS	4	80	+50	5	105.78
6.32		SS	5	0	+50	6	104.78
End of Borehole							
(GWL @ 0.18m - April 15, 2024)							

Pen. Resist. Blows / 0.3m
● 50 mm Dia. Cone
○ Water Content %
20 40 60 80

MONITORING WELL CONSTRUCTION

20 40 60 80 100
Shear Strength (kPa)
▲ Undisturbed △ Remoulded

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9 Auriga Drive, Ottawa, Ontario K2E 7T9

SOIL PROFILE AND TEST DATA

Geotechnical Investigation
Prop. Residential Dev. - 800 Cedarview Road
Ottawa, Ontario

EASTING: 359856.182 **NORTHING:** 5015913.238 **ELEVATION:** 109.95
DATUM: Geodetic
REMARKS:
BORINGS BY: CME 55 Mechanical Earth Auger on Track **DATE:** 2024 March 28

FILE NO. PG5600
HOLE NO. BH 4-24

SAMPLE DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)
GROUND SURFACE						0	109.95
TOPSOIL with organics							
0.25							
Brown **SILTY SAND**, trace gravel		AU	1				
0.69							
GLACIAL TILL: Very dense, brown silty sand with gravel, cobbles and boulders		SS	2	0	+50	1	108.95
0.86		RC	1	100	100		
BEDROCK: Excellent quality, grey limestone bedrock							
- Fair to good quality from 1.4m to 2.3m depth		RC	2	100	64	2	107.95
						3	106.95
		RC	3	100	86		
						4	105.95
		RC	4	100	100	5	104.95
		RC	5	100	100	6	103.95
6.30							
End of Borehole							
(GWL @ 1.21m - April 17, 2024)							

Pen. Resist. Blows / 0.3m
● 50 mm Dia. Cone
○ Water Content %
20 40 60 80

MONITORING WELL CONSTRUCTION

20 40 60 80 100
Shear Strength (kPa)
▲ Undisturbed △ Remoulded

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9 Auriga Drive, Ottawa, Ontario K2E 7T9

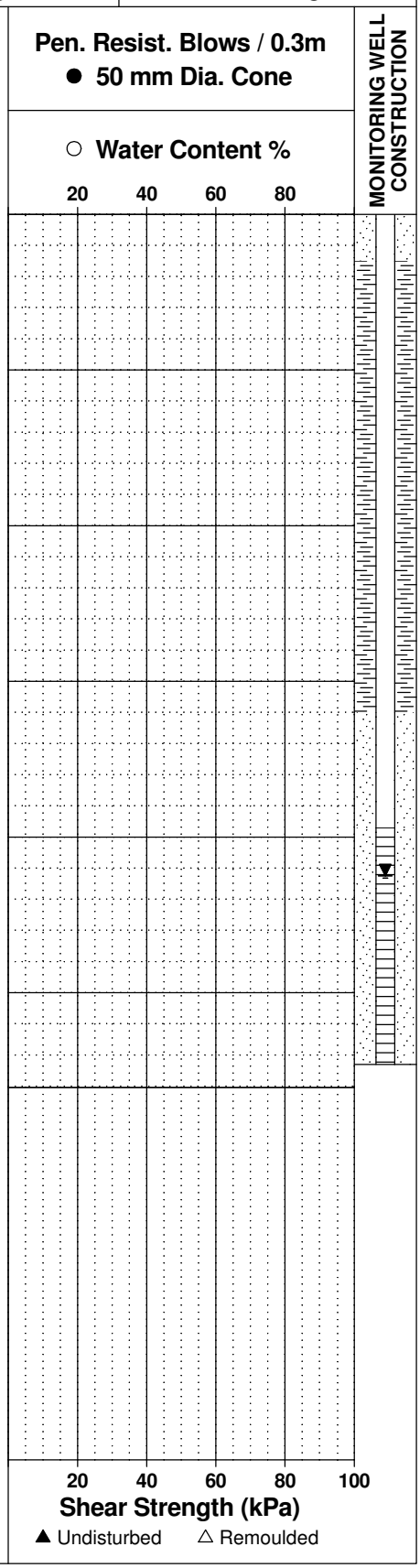
SOIL PROFILE AND TEST DATA

Geotechnical Investigation
Prop. Residential Dev. - 800 Cedarview Road
Ottawa, Ontario

EASTING: 359634.713 **NORTHING:** 5015846.98 **ELEVATION:** 116.50
DATUM: Geodetic
REMARKS:
BORINGS BY: CME 55 Mechanical Earth Auger on Track **DATE:** 2024 March 28

FILE NO. PG5600
HOLE NO. BH 5-24

SAMPLE DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)
GROUND SURFACE							
TOPSOIL with organics 0.05						0	116.50
FILL: Brown silty clay, trace topsoil and organics		AU	1				
		SS	2	58	6	1	115.50
1.45							
FILL: Brown silty clay with gravel, trace sand, wood and organics		SS	3	50	11	2	114.50
2.21							
FILL: Brown silty clay with sand, gravel and cobbles, trace organics and crushed stone		SS	4	100	+50	3	113.50
2.97							
FILL: Brown silty sand with gravel, cobbles and boulders, trace crushed stone		SS	5	50	39		
		SS	6	60	+50	4	112.50
		SS	7	80	+50		
						5	111.50
5.61							
End of Borehole							
Practical refusal to augering at 5.61m depth							
(GWL @ 4.25m - April 17, 2024)							



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9 Auriga Drive, Ottawa, Ontario K2E 7T9

SOIL PROFILE AND TEST DATA

Geotechnical Investigation
Prop. Residential Dev. - 800 Cedarview Road
Ottawa, Ontario

EASTING: 359420.374 **NORTHING:** 5016406.742 **ELEVATION:** 113.36
DATUM: Geodetic
REMARKS:
BORINGS BY: CME 55 Mechanical Earth Auger on Track **DATE:** 2024 April 1

FILE NO. PG5600
HOLE NO. BH 6-24

SAMPLE DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)
GROUND SURFACE						0	113.36
TOPSOIL with organics 0.13							
GLACIAL TILL: Compact, brown silty sand with gravel, trace clay, cobbles and boulders		SS	1	75	7		
		SS	2	67	+50	1	112.36
		SS	3	17	9	2	111.36
		SS	4	48	15		
2.95						3	110.36
BEDROCK: Fair quality, grey limestone bedrock		RC	1	100	63	4	109.36
		RC	2	100	46	5	108.36
		RC	3	100	67	6	107.36
6.43							
End of Borehole							
(GWL @ 1.47m - April 15, 2024)							

Pen. Resist. Blows / 0.3m
● 50 mm Dia. Cone
○ Water Content %
20 40 60 80

MONITORING WELL CONSTRUCTION

20 40 60 80 100
Shear Strength (kPa)
▲ Undisturbed △ Remoulded

patersongroup Consulting Engineers

9 Auriga Drive, Ottawa, Ontario K2E 7T9

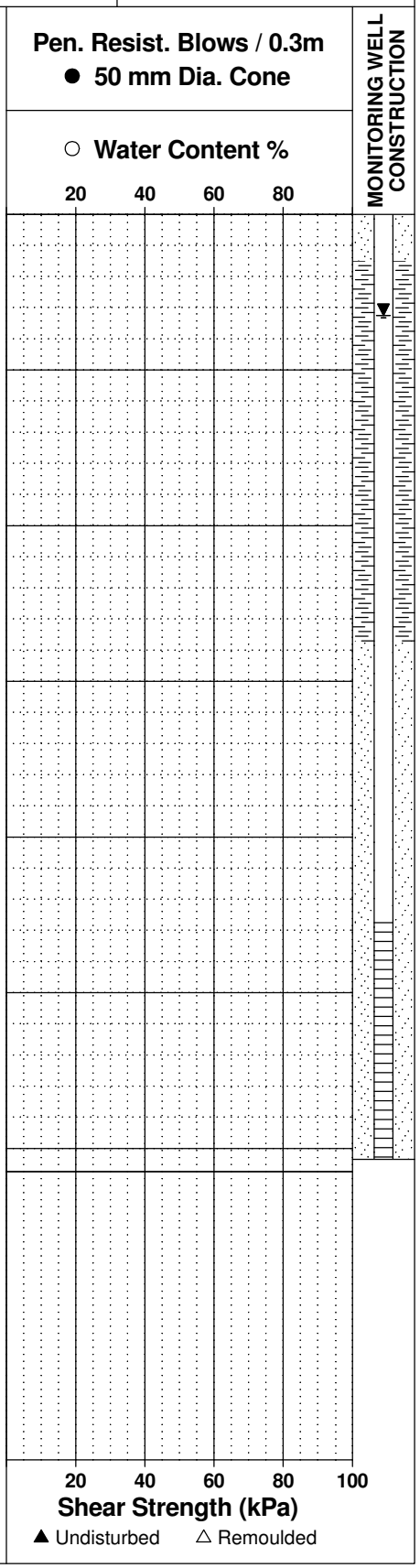
SOIL PROFILE AND TEST DATA

Geotechnical Investigation
Prop. Residential Dev. - 800 Cedarview Road
Ottawa, Ontario

EASTING: 359561.736 **NORTHING:** 5016749.605 **ELEVATION:** 112.93
DATUM: Geodetic
REMARKS:
BORINGS BY: CME 55 Mechanical Earth Auger on Track **DATE:** 2024 April 1

FILE NO. PG5600
HOLE NO. BH 7-24

SAMPLE DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)
GROUND SURFACE						0	112.93
TOPSOIL with organics 0.20		SS	1	50	+50		
GLACIAL TILL: Very dense, brown silty sand with gravel and cobbles 0.28		RC	1	100	42	1	111.93
BEDROCK: Fair to good quality, grey sandstone bedrock - Vertical fractures from 0.8m to 1.1m depth and from 1.3m to 2.1m depth		RC	2	100	81	2	110.93
		RC	3	100	90	3	109.93
4.17						4	108.93
BEDROCK: Good to excellent quality, grey limestone bedrock		RC	4	100	64	5	107.93
		RC	5	100	94	6	106.93
6.15							
End of Borehole (GWL @ 0.65m - April 15, 2024)							



MONITORING WELL CONSTRUCTION

patersongroup Consulting Engineers

9 Auriga Drive, Ottawa, Ontario K2E 7T9

SOIL PROFILE AND TEST DATA

Geotechnical Investigation
Prop. Residential Dev. - 800 Cedarview Road
Ottawa, Ontario

EASTING: 359686.062 **NORTHING:** 5016930.791 **ELEVATION:** 110.77
DATUM: Geodetic
REMARKS:
BORINGS BY: CME 55 Mechanical Earth Auger on Track **DATE:** 2024 April 1

FILE NO. PG5600
HOLE NO. BH 8-24

SAMPLE DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)
GROUND SURFACE							
TOPSOIL with organics 0.10		SS	1	100	+50	0	110.77
GLACIAL TILL: Very dense, brown silty sand with gravel 0.30							
BEDROCK: Good quality, grey sandstone bedrock		RC	1	100	71	1	109.77
		RC	2	100	86	2	108.77
		RC	3	100	80	3	107.77
4.29						4	106.77
BEDROCK: Good to excellent quality, grey limestone bedrock		RC	4	100	78	5	105.77
		RC	5	100	100	6	104.77
6.17							
End of Borehole							
(GWL @ 0.33m - April 15, 2024)							

Pen. Resist. Blows / 0.3m
● 50 mm Dia. Cone
○ Water Content %
20 40 60 80

MONITORING WELL CONSTRUCTION

20 40 60 80 100
Shear Strength (kPa)
▲ Undisturbed △ Remoulded

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

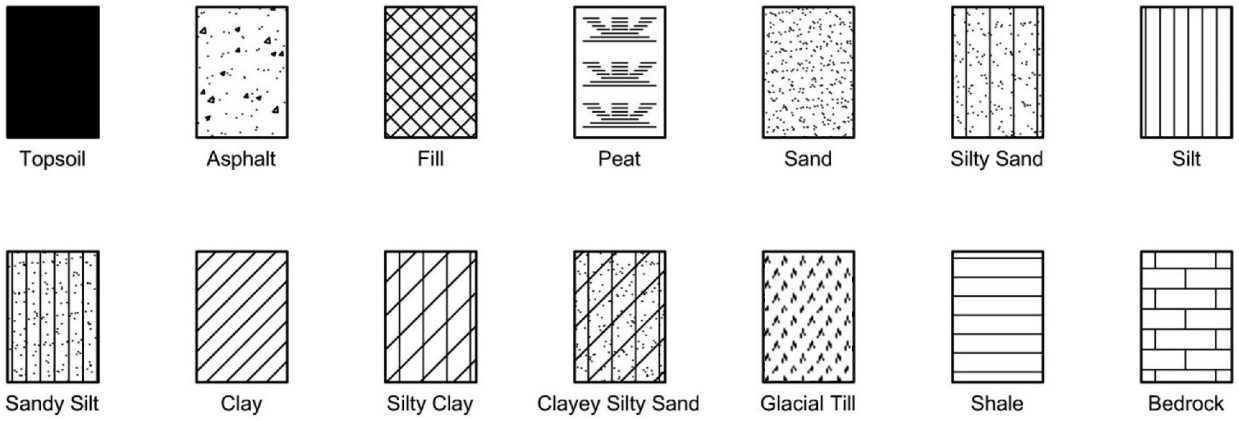
p'_o	-	Present effective overburden pressure at sample depth
p'_c	-	Preconsolidation pressure of (maximum past pressure on) sample
Ccr	-	Recompression index (in effect at pressures below p'_c)
Cc	-	Compression index (in effect at pressures above p'_c)
OC Ratio		Overconsolidaton ratio = p'_c / p'_o
Void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

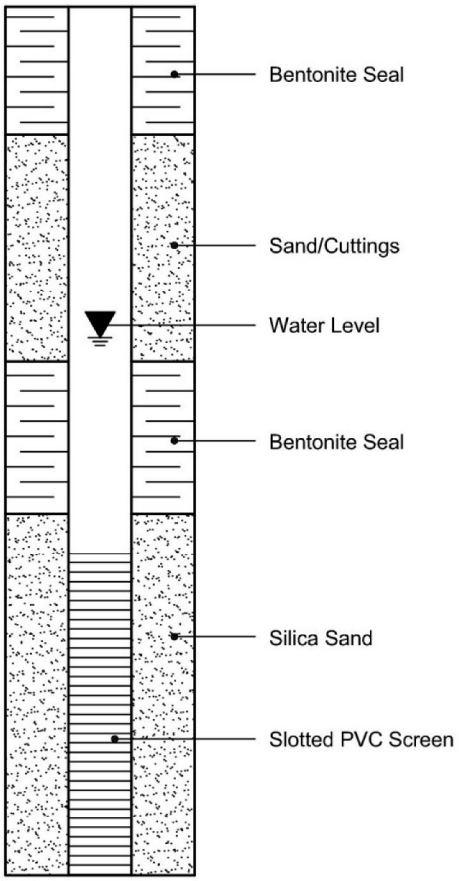
SYMBOLS AND TERMS (continued)

STRATA PLOT

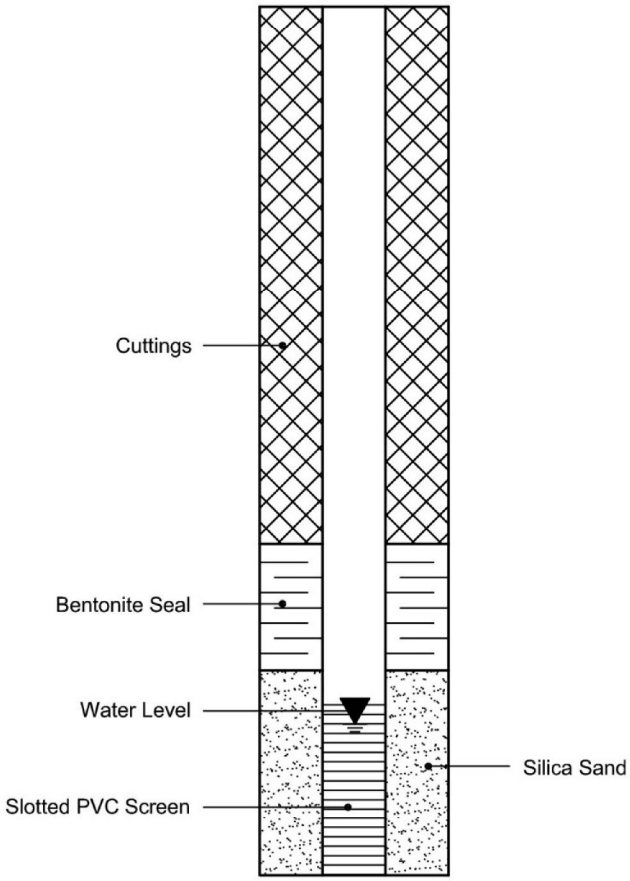


MONITORING WELL AND PIEZOMETER CONSTRUCTION

MONITORING WELL CONSTRUCTION



PIEZOMETER CONSTRUCTION



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Certificate of Analysis

Paterson Group Consulting Engineers (Ottawa)
9 Auriga Drive
Ottawa, ON K2E 7T9
Attn: Mark Bujaki

Client PO: 61142
Project: PE6605
Custody:

Report Date: 3-Sep-2024
Order Date: 28-Aug-2024

Order #: 2435337

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

Paracel ID	Client ID
2435337-01	TP1-24 G1
2435337-02	TP2-24 G1
2435337-03	TP3-24 G1
2435337-04	TP4-24 G1
2435337-05	TP5-24 G1
2435337-06	TP6-24 G1
2435337-07	TP7-24 G1
2435337-08	TP8-24 G1

Approved By:

Mark Foto, M.Sc.
Lab Supervisor

Analysis Summary Table

Analysis	Method Reference/Description	Extraction Date	Analysis Date
BTEX by P&T GC-MS	EPA 8260 - P&T GC-MS	30-Aug-24	30-Aug-24
PHC F1	CWS Tier 1 - P&T GC-FID	30-Aug-24	30-Aug-24
PHCs F2 to F4	CWS Tier 1 - GC-FID, extraction	30-Aug-24	31-Aug-24
REG 153: Metals by ICP/MS, soil	EPA 6020 - Digestion - ICP-MS	30-Aug-24	30-Aug-24
REG 153: PAHs by GC-MS	EPA 8270 - GC-MS, extraction	30-Aug-24	31-Aug-24
Solids, %	CWS Tier 1 - Gravimetric	29-Aug-24	30-Aug-24

Certificate of Analysis

Report Date: 03-Sep-2024

Client: **Paterson Group Consulting Engineers (Ottawa)**

Order Date: 28-Aug-2024

Client PO: **61142**

Project Description: PE6605

	Client ID:	TP1-24 G1	TP2-24 G1	TP3-24 G1	TP4-24 G1	-	-
	Sample Date:	27-Aug-24 00:00	27-Aug-24 00:00	27-Aug-24 00:00	27-Aug-24 00:00		
	Sample ID:	2435337-01	2435337-02	2435337-03	2435337-04		
	Matrix:	Soil	Soil	Soil	Soil		
	MDL/Units						
Physical Characteristics							
% Solids	0.1 % by Wt.	79.3	77.4	84.7	82.7	-	-
Metals							
Antimony	1.0 ug/g	<1.0	<1.0	<1.0	<1.0	-	-
Arsenic	1.0 ug/g	3.1	3.1	3.2	2.8	-	-
Barium	1.0 ug/g	312	271	244	220	-	-
Beryllium	0.5 ug/g	0.7	0.7	0.7	0.6	-	-
Boron	5.0 ug/g	5.2	<5.0	6.0	5.9	-	-
Cadmium	0.5 ug/g	<0.5	<0.5	<0.5	<0.5	-	-
Chromium	5.0 ug/g	64.4	63.2	49.6	47.4	-	-
Cobalt	1.0 ug/g	15.4	15.7	13.1	12.7	-	-
Copper	5.0 ug/g	29.4	30.2	27.6	25.6	-	-
Lead	1.0 ug/g	6.5	6.2	5.9	5.8	-	-
Molybdenum	1.0 ug/g	1.1	<1.0	<1.0	<1.0	-	-
Nickel	5.0 ug/g	35.4	35.1	28.1	26.8	-	-
Selenium	1.0 ug/g	<1.0	<1.0	<1.0	<1.0	-	-
Silver	0.3 ug/g	<0.3	<0.3	<0.3	<0.3	-	-
Thallium	1.0 ug/g	<1.0	<1.0	<1.0	<1.0	-	-
Uranium	1.0 ug/g	<1.0	<1.0	<1.0	1.1	-	-
Vanadium	10.0 ug/g	77.3	78.9	65.8	63.7	-	-
Zinc	20.0 ug/g	94.1	92.1	78.3	72.2	-	-
Volatiles							
Benzene	0.02 ug/g	<0.02	<0.02	<0.02	<0.02	-	-
Ethylbenzene	0.05 ug/g	<0.05	<0.05	<0.05	<0.05	-	-
Toluene	0.05 ug/g	<0.05	<0.05	<0.05	<0.05	-	-
m,p-Xylenes	0.05 ug/g	<0.05	<0.05	<0.05	<0.05	-	-

Certificate of Analysis

Report Date: 03-Sep-2024

Client: **Paterson Group Consulting Engineers (Ottawa)**

Order Date: 28-Aug-2024

Client PO: **61142**

Project Description: **PE6605**

	Client ID:	TP1-24 G1	TP2-24 G1	TP3-24 G1	TP4-24 G1	-	-
	Sample Date:	27-Aug-24 00:00	27-Aug-24 00:00	27-Aug-24 00:00	27-Aug-24 00:00		
	Sample ID:	2435337-01	2435337-02	2435337-03	2435337-04		
	Matrix:	Soil	Soil	Soil	Soil		
	MDL/Units						
Volatiles							
o-Xylene	0.05 ug/g	<0.05	<0.05	<0.05	<0.05	-	-
Xylenes, total	0.05 ug/g	<0.05	<0.05	<0.05	<0.05	-	-
Toluene-d8	Surrogate	114%	116%	117%	117%	-	-
Hydrocarbons							
F1 PHCs (C6-C10)	7 ug/g	<7	<7	<7	<7	-	-
F2 PHCs (C10-C16)	4 ug/g	<4	<4	<4	<4	-	-
F3 PHCs (C16-C34)	8 ug/g	11	<8	22	29	-	-
F4 PHCs (C34-C50)	6 ug/g	16	<6	16	23	-	-
Semi-Volatiles							
Acenaphthene	0.02 ug/g	<0.02	<0.02	<0.02	<0.02	-	-
Acenaphthylene	0.02 ug/g	<0.02	<0.02	<0.02	<0.02	-	-
Anthracene	0.02 ug/g	<0.02	<0.02	<0.02	<0.02	-	-
Benzo [a] anthracene	0.02 ug/g	<0.02	<0.02	<0.02	<0.02	-	-
Benzo [a] pyrene	0.02 ug/g	<0.02	<0.02	<0.02	<0.02	-	-
Benzo [b] fluoranthene	0.02 ug/g	<0.02	<0.02	<0.02	<0.02	-	-
Benzo [g,h,i] perylene	0.02 ug/g	<0.02	<0.02	<0.02	<0.02	-	-
Benzo [k] fluoranthene	0.02 ug/g	<0.02	<0.02	<0.02	<0.02	-	-
Chrysene	0.02 ug/g	<0.02	<0.02	<0.02	<0.02	-	-
Dibenzo [a,h] anthracene	0.02 ug/g	<0.02	<0.02	<0.02	<0.02	-	-
Fluoranthene	0.02 ug/g	<0.02	<0.02	0.03	<0.02	-	-
Fluorene	0.02 ug/g	<0.02	<0.02	<0.02	<0.02	-	-
Indeno [1,2,3-cd] pyrene	0.02 ug/g	<0.02	<0.02	<0.02	<0.02	-	-
1-Methylnaphthalene	0.02 ug/g	<0.02	<0.02	<0.02	<0.02	-	-
2-Methylnaphthalene	0.02 ug/g	<0.02	<0.02	<0.02	<0.02	-	-
Methylnaphthalene (1&2)	0.04 ug/g	<0.04	<0.04	<0.04	<0.04	-	-

	Client ID:	TP1-24 G1	TP2-24 G1	TP3-24 G1	TP4-24 G1	-	-
	Sample Date:	27-Aug-24 00:00	27-Aug-24 00:00	27-Aug-24 00:00	27-Aug-24 00:00		
	Sample ID:	2435337-01	2435337-02	2435337-03	2435337-04		
	Matrix:	Soil	Soil	Soil	Soil		
	MDL/Units						
Semi-Volatiles							
Naphthalene	0.01 ug/g	<0.01	<0.01	<0.01	<0.01	-	-
Phenanthrene	0.02 ug/g	<0.02	<0.02	<0.02	<0.02	-	-
Pyrene	0.02 ug/g	<0.02	<0.02	0.02	<0.02	-	-
2-Fluorobiphenyl	Surrogate	65.1%	59.8%	60.7%	56.8%	-	-
Terphenyl-d14	Surrogate	92.5%	97.4%	95.0%	75.2%	-	-

	Client ID:	TP5-24 G1	TP6-24 G1	TP7-24 G1	TP8-24 G1	-	-
	Sample Date:	27-Aug-24 00:00	27-Aug-24 00:00	27-Aug-24 00:00	27-Aug-24 00:00		
	Sample ID:	2435337-05	2435337-06	2435337-07	2435337-08		
	Matrix:	Soil	Soil	Soil	Soil		
	MDL/Units						
Physical Characteristics							
% Solids	0.1 % by Wt.	89.3	81.2	81.7	80.3	-	-
Metals							
Antimony	1.0 ug/g	<1.0	<1.0	<1.0	<1.0	-	-
Arsenic	1.0 ug/g	2.9	3.1	2.8	2.7	-	-
Barium	1.0 ug/g	199	266	212	185	-	-
Beryllium	0.5 ug/g	0.6	0.7	0.6	0.6	-	-
Boron	5.0 ug/g	<5.0	<5.0	<5.0	<5.0	-	-
Cadmium	0.5 ug/g	<0.5	<0.5	<0.5	<0.5	-	-
Chromium	5.0 ug/g	43.6	55.0	48.5	43.1	-	-
Cobalt	1.0 ug/g	12.7	14.8	12.4	11.3	-	-
Copper	5.0 ug/g	30.3	29.2	26.2	23.7	-	-
Lead	1.0 ug/g	5.6	6.1	5.2	4.5	-	-
Molybdenum	1.0 ug/g	<1.0	<1.0	<1.0	<1.0	-	-
Nickel	5.0 ug/g	25.6	31.1	27.4	24.5	-	-
Selenium	1.0 ug/g	<1.0	<1.0	<1.0	<1.0	-	-
Silver	0.3 ug/g	<0.3	<0.3	<0.3	<0.3	-	-
Thallium	1.0 ug/g	<1.0	<1.0	<1.0	<1.0	-	-
Uranium	1.0 ug/g	<1.0	<1.0	<1.0	<1.0	-	-
Vanadium	10.0 ug/g	62.0	70.2	62.9	59.2	-	-
Zinc	20.0 ug/g	65.8	79.4	71.1	64.7	-	-
Volatiles							
Benzene	0.02 ug/g	<0.02	<0.02	<0.02	<0.02	-	-
Ethylbenzene	0.05 ug/g	<0.05	<0.05	<0.05	<0.05	-	-
Toluene	0.05 ug/g	<0.05	<0.05	<0.05	<0.05	-	-
m,p-Xylenes	0.05 ug/g	<0.05	<0.05	<0.05	<0.05	-	-

	Client ID:	TP5-24 G1	TP6-24 G1	TP7-24 G1	TP8-24 G1	-	-
	Sample Date:	27-Aug-24 00:00	27-Aug-24 00:00	27-Aug-24 00:00	27-Aug-24 00:00		
	Sample ID:	2435337-05	2435337-06	2435337-07	2435337-08		
	Matrix:	Soil	Soil	Soil	Soil		
	MDL/Units						
Volatiles							
o-Xylene	0.05 ug/g	<0.05	<0.05	<0.05	<0.05	-	-
Xylenes, total	0.05 ug/g	<0.05	<0.05	<0.05	<0.05	-	-
Toluene-d8	Surrogate	110%	117%	114%	116%	-	-
Hydrocarbons							
F1 PHCs (C6-C10)	7 ug/g	<7	<7	<7	<7	-	-
F2 PHCs (C10-C16)	4 ug/g	<4	<4	<4	<4	-	-
F3 PHCs (C16-C34)	8 ug/g	<8	11	21	<8	-	-
F4 PHCs (C34-C50)	6 ug/g	<6	10	10	<6	-	-
Semi-Volatiles							
Acenaphthene	0.02 ug/g	<0.02	<0.02	<0.02	<0.02	-	-
Acenaphthylene	0.02 ug/g	<0.02	<0.02	<0.02	<0.02	-	-
Anthracene	0.02 ug/g	<0.02	<0.02	<0.02	<0.02	-	-
Benzo [a] anthracene	0.02 ug/g	<0.02	<0.02	<0.02	<0.02	-	-
Benzo [a] pyrene	0.02 ug/g	<0.02	<0.02	<0.02	<0.02	-	-
Benzo [b] fluoranthene	0.02 ug/g	<0.02	<0.02	<0.02	<0.02	-	-
Benzo [g,h,i] perylene	0.02 ug/g	<0.02	<0.02	<0.02	<0.02	-	-
Benzo [k] fluoranthene	0.02 ug/g	<0.02	<0.02	<0.02	<0.02	-	-
Chrysene	0.02 ug/g	<0.02	<0.02	<0.02	<0.02	-	-
Dibenzo [a,h] anthracene	0.02 ug/g	<0.02	<0.02	<0.02	<0.02	-	-
Fluoranthene	0.02 ug/g	<0.02	<0.02	<0.02	<0.02	-	-
Fluorene	0.02 ug/g	<0.02	<0.02	<0.02	<0.02	-	-
Indeno [1,2,3-cd] pyrene	0.02 ug/g	<0.02	<0.02	<0.02	<0.02	-	-
1-Methylnaphthalene	0.02 ug/g	<0.02	<0.02	<0.02	<0.02	-	-
2-Methylnaphthalene	0.02 ug/g	<0.02	<0.02	<0.02	<0.02	-	-
Methylnaphthalene (1&2)	0.04 ug/g	<0.04	<0.04	<0.04	<0.04	-	-

	Client ID:	TP5-24 G1	TP6-24 G1	TP7-24 G1	TP8-24 G1	-	-
	Sample Date:	27-Aug-24 00:00	27-Aug-24 00:00	27-Aug-24 00:00	27-Aug-24 00:00		
	Sample ID:	2435337-05	2435337-06	2435337-07	2435337-08		
	Matrix:	Soil	Soil	Soil	Soil		
	MDL/Units						
Semi-Volatiles							
Naphthalene	0.01 ug/g	<0.01	<0.01	<0.01	<0.01	-	-
Phenanthrene	0.02 ug/g	<0.02	<0.02	<0.02	<0.02	-	-
Pyrene	0.02 ug/g	<0.02	<0.02	<0.02	<0.02	-	-
2-Fluorobiphenyl	Surrogate	62.3%	57.4%	59.4%	65.6%	-	-
Terphenyl-d14	Surrogate	87.5%	78.1%	94.3%	83.5%	-	-

Method Quality Control: Blank

Analyte	Result	Reporting Limit	Units	%REC	%REC Limit	RPD	RPD Limit	Notes
Hydrocarbons								
F1 PHCs (C6-C10)	ND	7	ug/g					
F2 PHCs (C10-C16)	ND	4	ug/g					
F3 PHCs (C16-C34)	ND	8	ug/g					
F4 PHCs (C34-C50)	ND	6	ug/g					
Metals								
Antimony	ND	1.0	ug/g					
Arsenic	ND	1.0	ug/g					
Barium	ND	1.0	ug/g					
Beryllium	ND	0.5	ug/g					
Boron	ND	5.0	ug/g					
Cadmium	ND	0.5	ug/g					
Chromium	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					

Method Quality Control: Blank

Analyte	Result	Reporting Limit	Units	%REC	%REC Limit	RPD	RPD Limit	Notes
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	*0.774*		*%*	*58.0*	*50-140*			
Surrogate: Terphenyl-d14	*1.12*		*%*	*84.3*	*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	*8.35*		*%*	*104*	*50-140*			

Method Quality Control: Duplicate

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Hydrocarbons									
F1 PHCs (C6-C10)	ND	7	ug/g	ND			NC	40	
F2 PHCs (C10-C16)	ND	4	ug/g	ND			NC	30	
F3 PHCs (C16-C34)	18	8	ug/g	14			25.9	30	
F4 PHCs (C34-C50)	49	6	ug/g	63			25.6	30	
Metals									
Antimony	ND	1.0	ug/g	ND			NC	30	
Arsenic	3.1	1.0	ug/g	3.1			0.9	30	
Barium	257	1.0	ug/g	266			3.2	30	
Beryllium	0.6	0.5	ug/g	0.7			10.8	30	
Boron	ND	5.0	ug/g	ND			NC	30	
Cadmium	ND	0.5	ug/g	ND			NC	30	
Chromium	50.0	5.0	ug/g	55.0			9.5	30	
Cobalt	13.6	1.0	ug/g	14.8			8.5	30	
Copper	26.6	5.0	ug/g	29.2			9.2	30	
Lead	5.5	1.0	ug/g	6.1			9.9	30	
Molybdenum	ND	1.0	ug/g	ND			NC	30	
Nickel	27.7	5.0	ug/g	31.1			11.7	30	
Selenium	ND	1.0	ug/g	ND			NC	30	
Silver	ND	0.3	ug/g	ND			NC	30	
Thallium	ND	1.0	ug/g	ND			NC	30	
Uranium	ND	1.0	ug/g	ND			NC	30	
Vanadium	64.2	10.0	ug/g	70.2			8.9	30	
Zinc	73.9	20.0	ug/g	79.4			7.1	30	
Physical Characteristics									
% Solids	78.9	0.1	% by Wt.	77.4			1.8	25	
Semi-Volatiles									
Acenaphthene	ND	0.02	ug/g	ND			NC	40	
Acenaphthylene	ND	0.02	ug/g	ND			NC	40	
Anthracene	ND	0.02	ug/g	ND			NC	40	
Benzo [a] anthracene	0.039	0.02	ug/g	ND			NC	40	

Method Quality Control: Duplicate

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Benzo [a] pyrene	0.032	0.02	ug/g	ND			NC	40	
Benzo [b] fluoranthene	0.033	0.02	ug/g	ND			NC	40	
Benzo [g,h,i] perylene	0.025	0.02	ug/g	ND			NC	40	
Benzo [k] fluoranthene	0.022	0.02	ug/g	ND			NC	40	
Chrysene	0.042	0.02	ug/g	ND			NC	40	
Dibenzo [a,h] anthracene	ND	0.02	ug/g	ND			NC	40	
Fluoranthene	0.116	0.02	ug/g	ND			NC	40	
Fluorene	ND	0.02	ug/g	ND			NC	40	
Indeno [1,2,3-cd] pyrene	0.021	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	0.048	0.02	ug/g	ND			NC	40	
Pyrene	0.092	0.02	ug/g	ND			NC	40	
Surrogate: 2-Fluorobiphenyl	*0.913*		*%*		*58.9*	*50-140*			
Surrogate: Terphenyl-d14	*1.25*		*%*		*80.6*	*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	
o-Xylene	ND	0.05	ug/g	ND			NC	50	
Surrogate: Toluene-d8	*10.5*		*%*		*111*	*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)	178	7	ug/g	ND	88.9	85-115			
F2 PHCs (C10-C16)	105	4	ug/g	ND	118	60-140			
F3 PHCs (C16-C34)	290	8	ug/g	14	126	60-140			
F4 PHCs (C34-C50)	222	6	ug/g	63	115	60-140			
Metals									
Arsenic	49.8	1.0	ug/g	1.2	97.1	70-130			
Barium	166	1.0	ug/g	106	119	70-130			
Beryllium	48.6	0.5	ug/g	ND	96.7	70-130			
Boron	48.9	5.0	ug/g	ND	94.5	70-130			
Cadmium	49.8	0.5	ug/g	ND	99.5	70-130			
Chromium	72.1	5.0	ug/g	22.0	100	70-130			
Cobalt	54.4	1.0	ug/g	5.9	97.0	70-130			
Copper	57.0	5.0	ug/g	11.7	90.6	70-130			
Lead	48.0	1.0	ug/g	2.4	91.1	70-130			
Molybdenum	48.1	1.0	ug/g	ND	95.8	70-130			
Nickel	59.5	5.0	ug/g	12.5	94.1	70-130			
Selenium	47.2	1.0	ug/g	ND	94.2	70-130			
Silver	45.7	0.3	ug/g	ND	91.3	70-130			
Thallium	48.4	1.0	ug/g	ND	96.5	70-130			
Uranium	53.6	1.0	ug/g	ND	106	70-130			
Vanadium	79.3	10.0	ug/g	28.1	102	70-130			
Zinc	75.4	20.0	ug/g	31.7	87.4	70-130			
Semi-Volatiles									
Acenaphthene	0.158	0.02	ug/g	ND	81.5	50-140			
Acenaphthylene	0.178	0.02	ug/g	ND	91.9	50-140			
Anthracene	0.158	0.02	ug/g	ND	81.4	50-140			
Benzo [a] anthracene	0.148	0.02	ug/g	ND	76.6	50-140			
Benzo [a] pyrene	0.118	0.02	ug/g	ND	60.8	50-140			
Benzo [b] fluoranthene	0.133	0.02	ug/g	ND	68.5	50-140			
Benzo [g,h,i] perylene	0.120	0.02	ug/g	ND	61.8	50-140			

Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Benzo [k] fluoranthene	0.118	0.02	ug/g	ND	60.9	50-140			
Chrysene	0.177	0.02	ug/g	ND	91.3	50-140			
Dibenzo [a,h] anthracene	0.102	0.02	ug/g	ND	52.9	50-140			
Fluoranthene	0.236	0.02	ug/g	ND	122	50-140			
Fluorene	0.152	0.02	ug/g	ND	78.3	50-140			
Indeno [1,2,3-cd] pyrene	0.117	0.02	ug/g	ND	60.6	50-140			
1-Methylnaphthalene	0.126	0.02	ug/g	ND	65.2	50-140			
2-Methylnaphthalene	0.129	0.02	ug/g	ND	66.4	50-140			
Naphthalene	0.164	0.01	ug/g	ND	84.7	50-140			
Phenanthrene	0.193	0.02	ug/g	ND	99.8	50-140			
Pyrene	0.217	0.02	ug/g	ND	112	50-140			
Surrogate: 2-Fluorobiphenyl	*0.827*		*%*		*53.4*	*50-140*			
Surrogate: Terphenyl-d14	*1.42*		*%*		*91.6*	*50-140*			
Volatiles									
Benzene	4.19	0.02	ug/g	ND	105	60-130			
Ethylbenzene	3.45	0.05	ug/g	ND	86.4	60-130			
Toluene	3.86	0.05	ug/g	ND	96.6	60-130			
m,p-Xylenes	7.22	0.05	ug/g	ND	90.2	60-130			
o-Xylene	3.50	0.05	ug/g	ND	87.5	60-130			
Surrogate: Toluene-d8	*7.92*		*%*		*99.0*	*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 unlesss otherwise noted.

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

CCME PHC additional information:

- The method for the analysis of PHCs complies with the Reference Method for the CWS PHC and is validated for use in the laboratory. All prescribed quality criteria identified in the method has been met.

- F1 range corrected for BTEX.

- F2 to F3 ranges corrected for appropriate PAHs where available.

- The gravimetric heavy hydrocarbons (F4G) are not to be added to C6 to C50 hydrocarbons.

- In the case where F4 and F4G are both reported, the greater of the two results is to be used for comparison to CWS PHC criteria.

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

PARACEL LABORATORIES LTD. | T R R

Paracel ID: 2435337

Paracel Order Number (Lab Use Only)	Chain Of Custody (Lab Use Only)
2435337 - Soil 2435346 - GW	

Client Name: Paterson | Project Ref: PE6665 | Page 1 of 1

Contact Name: Mark Bajaki | Quote #:

Address: 9 Auriga Drive | PO #: 61142 | **Turnaround Time**: ☐ 1 day ☐ 3 day ☐ 2 day ☒ Regular

E-mail: mbajaki@patersongrp.ca, mdavis@patersongrp.ca

Telephone: 613-226-7381 | Date Required:

☐ REG 153/04 ☐ REG 406/19

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

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

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

	Sample ID/Location Name	Matrix	Air Volume	# of Containers	Sample Taken: Date	Sample Taken: Time	PHCs F1-F4+BTEX	VOCs	PAHs	Metals by ICP	Hg	CrVI	B (HWS)					
1	TP1 - 24 G1	S		2	Aug 27 2024		X		X	X								
2	TP2 - 24 G1	S		2			X		X	X								
3	TP3 - 24 G1	S		2			X		X	X								
4	TP4 - 24 G1	S		2			X		X	X								
5	TP5 - 24 G1	S		2			X		X	X								
6	TP6 - 24 G1	S		1			X		X	X								
7	TP7 - 24 G1	S		1			X		X	X								
8	TP8 - 24 G1	S		1			X		X	X								
9	BH6 - 24	GW			Aug 28 2024		X		X	X								
10																		

Comments:

Method of Delivery: Drop P. Courier

Relinquished By (Sign): Mark Bajaki	Received at Depot:	Received at Lab: [illegible] 28	Verified By: SS
Relinquished By (Print): Mark Bajaki	Date/Time:	Date/Time: Aug 28	Date/Time: 29 Aug 24 1151
Date/Time: Aug 28th. 2024	Temperature: °C	Temperature: 16.9	pH Verified: ☐ By:

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Certificate of Analysis

Paterson Group Consulting Engineers (Ottawa)
9 Auriga Drive
Ottawa, ON K2E 7T9
Attn: Mark Bujaki

Client PO: 61142
Project: PE6605
Custody:

Report Date: 4-Sep-2024
Order Date: 28-Aug-2024

Order #: 2435346

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

Paracel ID	Client ID
2435346-01	BH6-24

Approved By:

Mark Foto, M.Sc.
Lab Supervisor

Analysis Summary Table

Analysis	Method Reference/Description	Extraction Date	Analysis Date
BTEX by P&T GC-MS	EPA 624 - P&T GC-MS	30-Aug-24	30-Aug-24
Metals, ICP-MS	EPA 200.8 - ICP-MS	29-Aug-24	30-Aug-24
PHC F1	CWS Tier 1 - P&T GC-FID	29-Aug-24	30-Aug-24
PHCs F2 to F4	CWS Tier 1 - GC-FID, extraction	30-Aug-24	30-Aug-24
REG 153: PAHs by GC-MS	EPA 625 - GC-MS, extraction	3-Sep-24	3-Sep-24

	Client ID:	BH6-24	-	-	-	-	-
	Sample Date:	28-Aug-24 00:00	-	-	-		
	Sample ID:	2435346-01	-	-	-		
	Matrix:	Ground Water	-	-	-		
	MDL/Units						
Metals							
Antimony	0.5 ug/L	0.5	-	-	-	-	-
Arsenic	1 ug/L	6	-	-	-	-	-
Barium	1 ug/L	119	-	-	-	-	-
Beryllium	0.5 ug/L	<0.5	-	-	-	-	-
Boron	10 ug/L	41	-	-	-	-	-
Cadmium	0.1 ug/L	<0.1	-	-	-	-	-
Chromium	1 ug/L	<1	-	-	-	-	-
Cobalt	0.5 ug/L	2.7	-	-	-	-	-
Copper	0.5 ug/L	0.9	-	-	-	-	-
Lead	0.1 ug/L	0.2	-	-	-	-	-
Molybdenum	0.5 ug/L	16.3	-	-	-	-	-
Nickel	1 ug/L	15	-	-	-	-	-
Selenium	1 ug/L	<1	-	-	-	-	-
Silver	0.1 ug/L	<0.1	-	-	-	-	-
Sodium	200 ug/L	35100	-	-	-	-	-
Thallium	0.1 ug/L	<0.1	-	-	-	-	-
Uranium	0.1 ug/L	16.5	-	-	-	-	-
Vanadium	0.5 ug/L	1.8	-	-	-	-	-
Zinc	5 ug/L	43	-	-	-	-	-
Volatiles							
Benzene	0.5 ug/L	<0.5	-	-	-	-	-
Ethylbenzene	0.5 ug/L	<0.5	-	-	-	-	-
Toluene	0.5 ug/L	<0.5	-	-	-	-	-
m,p-Xylenes	0.5 ug/L	<0.5	-	-	-	-	-
o-Xylene	0.5 ug/L	<0.5	-	-	-	-	-

Certificate of Analysis

Report Date: 04-Sep-2024

Client: **Paterson Group Consulting Engineers (Ottawa)**

Order Date: 28-Aug-2024

Client PO: **61142**

Project Description: **PE6605**

	Client ID:	BH6-24	-	-	-		
	Sample Date:	28-Aug-24 00:00	-	-	-	-	-
	Sample ID:	2435346-01	-	-	-		
	Matrix:	Ground Water	-	-	-		
	MDL/Units						
Volatiles							
Xylenes, total	0.5 ug/L	<0.5	-	-	-	-	-
Toluene-d8	Surrogate	103%	-	-	-	-	-
Hydrocarbons							
F1 PHCs (C6-C10)	25 ug/L	<25	-	-	-	-	-
F2 PHCs (C10-C16)	100 ug/L	<100	-	-	-	-	-
F3 PHCs (C16-C34)	100 ug/L	<100	-	-	-	-	-
F4 PHCs (C34-C50)	100 ug/L	<100	-	-	-	-	-
Semi-Volatiles							
Acenaphthene	0.05 ug/L	<0.05	-	-	-	-	-
Acenaphthylene	0.05 ug/L	<0.05	-	-	-	-	-
Anthracene	0.01 ug/L	<0.01	-	-	-	-	-
Benzo [a] anthracene	0.01 ug/L	<0.01	-	-	-	-	-
Benzo [a] pyrene	0.01 ug/L	<0.01	-	-	-	-	-
Benzo [b] fluoranthene	0.05 ug/L	<0.05	-	-	-	-	-
Benzo [g,h,i] perylene	0.05 ug/L	<0.05	-	-	-	-	-
Benzo [k] fluoranthene	0.05 ug/L	<0.05	-	-	-	-	-
Chrysene	0.05 ug/L	<0.05	-	-	-	-	-
Dibenzo [a,h] anthracene	0.05 ug/L	<0.05	-	-	-	-	-
Fluoranthene	0.01 ug/L	<0.01	-	-	-	-	-
Fluorene	0.05 ug/L	<0.05	-	-	-	-	-
Indeno [1,2,3-cd] pyrene	0.05 ug/L	<0.05	-	-	-	-	-
1-Methylnaphthalene	0.05 ug/L	<0.05	-	-	-	-	-
2-Methylnaphthalene	0.05 ug/L	<0.05	-	-	-	-	-
Methylnaphthalene (1&2)	0.10 ug/L	<0.10	-	-	-	-	-
Naphthalene	0.05 ug/L	<0.05	-	-	-	-	-

	Client ID:	BH6-24	-	-	-		
	Sample Date:	28-Aug-24 00:00	-	-	-	-	-
	Sample ID:	2435346-01	-	-	-		
	Matrix:	Ground Water	-	-	-		
	MDL/Units						
Semi-Volatiles							
Phenanthrene	0.05 ug/L	<0.05	-	-	-	-	-
Pyrene	0.01 ug/L	<0.01	-	-	-	-	-
2-Fluorobiphenyl	Surrogate	71.0%	-	-	-	-	-
Terphenyl-d14	Surrogate	105%	-	-	-	-	-

Method Quality Control: Blank

Analyte	Result	Reporting Limit	Units	%REC	%REC Limit	RPD	RPD Limit	Notes
Hydrocarbons								
F1 PHCs (C6-C10)	ND	25	ug/L					
F2 PHCs (C10-C16)	ND	100	ug/L					
F3 PHCs (C16-C34)	ND	100	ug/L					
F4 PHCs (C34-C50)	ND	100	ug/L					
Metals								
Antimony	ND	0.5	ug/L					
Arsenic	ND	1	ug/L					
Barium	ND	1	ug/L					
Beryllium	ND	0.5	ug/L					
Boron	ND	10	ug/L					
Cadmium	ND	0.1	ug/L					
Chromium	ND	1	ug/L					
Cobalt	ND	0.5	ug/L					
Copper	ND	0.5	ug/L					
Lead	ND	0.1	ug/L					
Molybdenum	ND	0.5	ug/L					
Nickel	ND	1	ug/L					
Selenium	ND	1	ug/L					
Silver	ND	0.1	ug/L					
Sodium	ND	200	ug/L					
Thallium	ND	0.1	ug/L					
Uranium	ND	0.1	ug/L					
Vanadium	ND	0.5	ug/L					
Zinc	ND	5	ug/L					
Semi-Volatiles								
Acenaphthene	ND	0.05	ug/L					
Acenaphthylene	ND	0.05	ug/L					
Anthracene	ND	0.01	ug/L					
Benzo [a] anthracene	ND	0.01	ug/L					
Benzo [a] pyrene	ND	0.01	ug/L					
Benzo [b] fluoranthene	ND	0.05	ug/L					
Benzo [g,h,i] perylene	ND	0.05	ug/L					

Method Quality Control: Blank

Analyte	Result	Reporting Limit	Units	%REC	%REC Limit	RPD	RPD Limit	Notes
Benzo [k] fluoranthene	ND	0.05	ug/L					
Chrysene	ND	0.05	ug/L					
Dibenzo [a,h] anthracene	ND	0.05	ug/L					
Fluoranthene	ND	0.01	ug/L					
Fluorene	ND	0.05	ug/L					
Indeno [1,2,3-cd] pyrene	ND	0.05	ug/L					
1-Methylnaphthalene	ND	0.05	ug/L					
2-Methylnaphthalene	ND	0.05	ug/L					
Methylnaphthalene (1&2)	ND	0.10	ug/L					
Naphthalene	ND	0.05	ug/L					
Phenanthrene	ND	0.05	ug/L					
Pyrene	ND	0.01	ug/L					
Surrogate: 2-Fluorobiphenyl	*13.5*		*%*	*67.7*	*50-140*			
Surrogate: Terphenyl-d14	*18.8*		*%*	*94.0*	*50-140*			
Volatiles								
Benzene	ND	0.5	ug/L					
Ethylbenzene	ND	0.5	ug/L					
Toluene	ND	0.5	ug/L					
m,p-Xylenes	ND	0.5	ug/L					
o-Xylene	ND	0.5	ug/L					
Xylenes, total	ND	0.5	ug/L					
Surrogate: Toluene-d8	*81.2*		*%*	*102*	*50-140*			

Method Quality Control: Duplicate

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Hydrocarbons									
F1 PHCs (C6-C10)	ND	25	ug/L	ND			NC	30	
Metals									
Antimony	ND	0.5	ug/L	ND			NC	20	
Arsenic	ND	1	ug/L	ND			NC	20	
Barium	22.8	1	ug/L	22.2			2.8	20	
Beryllium	ND	0.5	ug/L	ND			NC	20	
Boron	20	10	ug/L	21			1.9	20	
Cadmium	ND	0.1	ug/L	ND			NC	20	
Chromium	ND	1	ug/L	ND			NC	20	
Cobalt	ND	0.5	ug/L	ND			NC	20	
Copper	3.24	0.5	ug/L	3.36			3.5	20	
Lead	ND	0.1	ug/L	ND			NC	20	
Molybdenum	1.02	0.5	ug/L	0.95			7.3	20	
Nickel	ND	1	ug/L	ND			NC	20	
Selenium	ND	1	ug/L	ND			NC	20	
Silver	ND	0.1	ug/L	ND			NC	20	
Sodium	17100	200	ug/L	17400			1.8	20	
Thallium	ND	0.1	ug/L	ND			NC	20	
Uranium	ND	0.1	ug/L	ND			NC	20	
Vanadium	ND	0.5	ug/L	ND			NC	20	
Zinc	7	5	ug/L	7			0.9	20	
Volatiles									
Benzene	ND	0.5	ug/L	ND			NC	30	
Ethylbenzene	ND	0.5	ug/L	ND			NC	30	
Toluene	ND	0.5	ug/L	ND			NC	30	
m,p-Xylenes	ND	0.5	ug/L	ND			NC	30	
o-Xylene	ND	0.5	ug/L	ND			NC	30	
Surrogate: Toluene-d8	*83.2*		*%*		*104*	*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)	1800	25	ug/L	ND	90.0	85-115			
F2 PHCs (C10-C16)	2050	100	ug/L	ND	128	60-140			
F3 PHCs (C16-C34)	4950	100	ug/L	ND	126	60-140			
F4 PHCs (C34-C50)	2320	100	ug/L	ND	93.7	60-140			
Metals									
Arsenic	50.9	1	ug/L	ND	101	80-120			
Barium	69.8	1	ug/L	22.2	95.3	80-120			
Beryllium	51.5	0.5	ug/L	ND	103	80-120			
Boron	66	10	ug/L	21	89.7	80-120			
Cadmium	48.6	0.1	ug/L	ND	97.3	80-120			
Chromium	52.7	1	ug/L	ND	105	80-120			
Cobalt	50.8	0.5	ug/L	ND	102	80-120			
Copper	50.8	0.5	ug/L	3.36	94.8	80-120			
Lead	43.9	0.1	ug/L	ND	87.8	80-120			
Molybdenum	46.5	0.5	ug/L	0.95	91.2	80-120			
Nickel	50.2	1	ug/L	ND	99.1	80-120			
Selenium	47.7	1	ug/L	ND	95.2	80-120			
Silver	50.4	0.1	ug/L	ND	101	80-120			
Sodium	25500	200	ug/L	17400	80.6	80-120			
Thallium	48.3	0.1	ug/L	ND	96.6	80-120			
Uranium	48.5	0.1	ug/L	ND	97.0	80-120			
Vanadium	53.1	0.5	ug/L	ND	106	80-120			
Zinc	52	5	ug/L	7	90.8	80-120			
Semi-Volatiles									
Acenaphthene	4.21	0.05	ug/L	ND	84.2	50-140			
Acenaphthylene	4.18	0.05	ug/L	ND	83.6	50-140			
Anthracene	3.61	0.01	ug/L	ND	72.3	50-140			
Benzo [a] anthracene	4.32	0.01	ug/L	ND	86.4	50-140			
Benzo [a] pyrene	4.13	0.01	ug/L	ND	82.5	50-140			
Benzo [b] fluoranthene	4.07	0.05	ug/L	ND	81.4	50-140			

Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Benzo [g,h,i] perylene	4.18	0.05	ug/L	ND	83.7	50-140			
Benzo [k] fluoranthene	4.13	0.05	ug/L	ND	82.5	50-140			
Chrysene	4.21	0.05	ug/L	ND	84.2	50-140			
Dibenzo [a,h] anthracene	4.52	0.05	ug/L	ND	90.5	50-140			
Fluoranthene	3.77	0.01	ug/L	ND	75.5	50-140			
Fluorene	3.67	0.05	ug/L	ND	73.4	50-140			
Indeno [1,2,3-cd] pyrene	4.69	0.05	ug/L	ND	93.8	50-140			
1-Methylnaphthalene	3.48	0.05	ug/L	ND	69.5	50-140			
2-Methylnaphthalene	3.70	0.05	ug/L	ND	74.1	50-140			
Naphthalene	4.01	0.05	ug/L	ND	80.2	50-140			
Phenanthrene	3.80	0.05	ug/L	ND	76.0	50-140			
Pyrene	3.63	0.01	ug/L	ND	72.6	50-140			
Surrogate: 2-Fluorobiphenyl	*13.4*		*%*		*67.0*	*50-140*			
Surrogate: Terphenyl-d14	*18.5*		*%*		*92.6*	*50-140*			
Volatiles									
Benzene	36.8	0.5	ug/L	ND	91.9	60-130			
Ethylbenzene	32.9	0.5	ug/L	ND	82.3	60-130			
Toluene	36.3	0.5	ug/L	ND	90.8	60-130			
m,p-Xylenes	69.3	0.5	ug/L	ND	86.6	60-130			
o-Xylene	33.8	0.5	ug/L	ND	84.4	60-130			
Surrogate: Toluene-d8	*79.0*		*%*		*98.8*	*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

CCME PHC additional information:

- The method for the analysis of PHCs complies with the Reference Method for the CWS PHC and is validated for use in the laboratory. All prescribed quality criteria identified in the method has been met.

- F1 range corrected for BTEX.

- F2 to F3 ranges corrected for appropriate PAHs where available.

- The gravimetric heavy hydrocarbons (F4G) are not to be added to C6 to C50 hydrocarbons.

- In the case where F4 and F4G are both reported, the greater of the two results is to be used for comparison to CWS PHC criteria.

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

PARACEL LABORATORIES LTD. | TRI RI

Paracel ID: 2435346

Paracel Order Number (Lab Use Only)	Chain Of Custody (Lab Use Only)
2435337 - Soil 2435346 - GW	

Client Name: Paterson | Project Ref: PE6605 | Page 1 of 1

Contact Name: Mark Bjaki | Quote #:

Address: 9 Auriga Drive | PO #: 61142

E-mail: mbjaki@patersongroup.ca; mdacey@patersongroup.ca

Telephone: 613-226-7381

Turnaround Time

☐ 1 day ☐ 3 day ☐ 2 day ☒ Regular

Date Required:

☐ REG 153/04 ☐ REG 406/19

☐ Table 1 ☐ Res/Park ☐ Med/Fine

☐ Table 2 ☐ Ind/Comm ☐ Coarse

☐ Table 3 ☐ Agri/Other

☐ Table

For RSC: ☐ Yes ☐ No

Other Regulation

☐ REG 558 ☐ PWQO

☐ CCME ☐ MISA

☐ SU - Sani ☐ SU - Storm

Mun:

☐ Other:

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

	Sample ID/Location Name	Matrix	Air Volume	# of Containers	Sample Taken: Date	Sample Taken: Time	PHCs F1-F4+BTEX	VOCs	PAHs	Metals by ICP	Hg	CrVI	B (HWS)					
1	TP1-24 G1	S		2	Aug 27 2024		X		X	X								
2	TP2-24G1	S		2			X		X	X								
3	TP3-24 G1	S		2			X		X	X								
4	TP4-24G1	S		2			X		X	X								
5	TP5-24G1	S		2			X		X	X								
6	TP6-24 G1	S		1			X		X	X								
7	TP7-24 G1	S		1			X		X	X								
8	TP8-24 G1	S		1			X		X	X								
9	BH6-24	GW			Aug 28 2024		X		X	X								
10																		

Comments:

Method of Delivery: Walk-in Courier

Relinquished By (Sign):	Received at Depot:	Received at Lab:	Verified By:
Relinquished By (Print): Mark Bjaki	Date/Time:	Date/Time: Aug 28 1609	Date/Time: 29 Aug 24 1151
Date/Time: Aug 28th 2024	Temperature: °C	Temperature:	pH Verified: ☐ By:

Chain of Custody (Blank).xlsx Revision 5.0

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Certificate of Analysis

Paterson Group Consulting Engineers (Ottawa)
9 Auriga Drive
Ottawa, ON K2E 7T9
Attn: Mark Bujaki

Client PO: 61190
Project: PE6605
Custody:

Report Date: 10-Sep-2024
Order Date: 4-Sep-2024

Order #: 2436205

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

Paracel ID	Client ID
2436205-01	DUP

Approved By:

Dale Robertson, BSc
Laboratory Director

Analysis Summary Table

Analysis	Method Reference/Description	Extraction Date	Analysis Date
REG 153: Metals by ICP/MS, soil	EPA 6020 - Digestion - ICP-MS	9-Sep-24	9-Sep-24
REG 153: PAHs by GC-MS	EPA 8270 - GC-MS, extraction	9-Sep-24	9-Sep-24
Solids, %	CWS Tier 1 - Gravimetric	5-Sep-24	6-Sep-24

	Client ID:	DUP	-	-	-		
	Sample Date:	27-Aug-24 09:00	-	-	-	-	-
	Sample ID:	2436205-01	-	-	-		
	Matrix:	Soil	-	-	-		
	MDL/Units						
Physical Characteristics							
% Solids	0.1 % by Wt.	83.7	-	-	-	-	-
Metals							
Antimony	1.0 ug/g	<1.0	-	-	-	-	-
Arsenic	1.0 ug/g	2.9	-	-	-	-	-
Barium	1.0 ug/g	241	-	-	-	-	-
Beryllium	0.5 ug/g	0.6	-	-	-	-	-
Boron	5.0 ug/g	5.8	-	-	-	-	-
Cadmium	0.5 ug/g	<0.5	-	-	-	-	-
Chromium	5.0 ug/g	51.3	-	-	-	-	-
Cobalt	1.0 ug/g	13.3	-	-	-	-	-
Copper	5.0 ug/g	25.6	-	-	-	-	-
Lead	1.0 ug/g	5.9	-	-	-	-	-
Molybdenum	1.0 ug/g	<1.0	-	-	-	-	-
Nickel	5.0 ug/g	28.6	-	-	-	-	-
Selenium	1.0 ug/g	<1.0	-	-	-	-	-
Silver	0.3 ug/g	<0.3	-	-	-	-	-
Thallium	1.0 ug/g	<1.0	-	-	-	-	-
Uranium	1.0 ug/g	<1.0	-	-	-	-	-
Vanadium	10.0 ug/g	67.3	-	-	-	-	-
Zinc	20.0 ug/g	76.9	-	-	-	-	-
Semi-Volatiles							
Acenaphthene	0.02 ug/g	<0.02	-	-	-	-	-
Acenaphthylene	0.02 ug/g	<0.02	-	-	-	-	-
Anthracene	0.02 ug/g	<0.02	-	-	-	-	-
Benzo [a] anthracene	0.02 ug/g	<0.02	-	-	-	-	-

	Client ID:	DUP	-	-	-		
	Sample Date:	27-Aug-24 09:00	-	-	-	-	-
	Sample ID:	2436205-01	-	-	-		
	Matrix:	Soil	-	-	-		
	MDL/Units						
Semi-Volatiles							
Benzo [a] pyrene	0.02 ug/g	<0.02	-	-	-	-	-
Benzo [b] fluoranthene	0.02 ug/g	<0.02	-	-	-	-	-
Benzo [g,h,i] perylene	0.02 ug/g	<0.02	-	-	-	-	-
Benzo [k] fluoranthene	0.02 ug/g	<0.02	-	-	-	-	-
Chrysene	0.02 ug/g	<0.02	-	-	-	-	-
Dibenzo [a,h] anthracene	0.02 ug/g	<0.02	-	-	-	-	-
Fluoranthene	0.02 ug/g	<0.02	-	-	-	-	-
Fluorene	0.02 ug/g	<0.02	-	-	-	-	-
Indeno [1,2,3-cd] pyrene	0.02 ug/g	<0.02	-	-	-	-	-
1-Methylnaphthalene	0.02 ug/g	<0.02	-	-	-	-	-
2-Methylnaphthalene	0.02 ug/g	<0.02	-	-	-	-	-
Methylnaphthalene (1&2)	0.04 ug/g	<0.04	-	-	-	-	-
Naphthalene	0.01 ug/g	<0.01	-	-	-	-	-
Phenanthrene	0.02 ug/g	<0.02	-	-	-	-	-
Pyrene	0.02 ug/g	<0.02	-	-	-	-	-
2-Fluorobiphenyl	Surrogate	56.8%	-	-	-	-	-
Terphenyl-d14	Surrogate	86.1%	-	-	-	-	-

Method Quality Control: Blank

Analyte	Result	Reporting Limit	Units	%REC	%REC Limit	RPD	RPD Limit	Notes
Metals								
Antimony	ND	1.0	ug/g					
Arsenic	ND	1.0	ug/g					
Barium	ND	1.0	ug/g					
Beryllium	ND	0.5	ug/g					
Boron	ND	5.0	ug/g					
Cadmium	ND	0.5	ug/g					
Chromium	ND	5.0	ug/g					
Cobalt	ND	1.0	ug/g					
Copper	ND	5.0	ug/g					
Lead	ND	1.0	ug/g					
Molybdenum	ND	1.0	ug/g					
Nickel	ND	5.0	ug/g					
Selenium	ND	1.0	ug/g					
Silver	ND	0.3	ug/g					
Thallium	ND	1.0	ug/g					
Uranium	ND	1.0	ug/g					
Vanadium	ND	10.0	ug/g					
Zinc	ND	20.0	ug/g					
Semi-Volatiles								
Acenaphthene	ND	0.02	ug/g					
Acenaphthylene	ND	0.02	ug/g					
Anthracene	ND	0.02	ug/g					
Benzo [a] anthracene	ND	0.02	ug/g					
Benzo [a] pyrene	ND	0.02	ug/g					
Benzo [b] fluoranthene	ND	0.02	ug/g					
Benzo [g,h,i] perylene	ND	0.02	ug/g					
Benzo [k] fluoranthene	ND	0.02	ug/g					
Chrysene	ND	0.02	ug/g					
Dibenzo [a,h] anthracene	ND	0.02	ug/g					
Fluoranthene	ND	0.02	ug/g					
Fluorene	ND	0.02	ug/g					
Indeno [1,2,3-cd] pyrene	ND	0.02	ug/g					

Method Quality Control: Blank

Analyte	Result	Reporting Limit	Units	%REC	%REC Limit	RPD	RPD Limit	Notes
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	*0.712*		*%*	*53.4*	*50-140*			
Surrogate: Terphenyl-d14	*0.919*		*%*	*68.9*	*50-140*			

Method Quality Control: Duplicate

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Metals									
Antimony	2.2	1.0	ug/g	2.4			6.3	30	
Arsenic	13.0	1.0	ug/g	13.4			2.8	30	
Barium	109	1.0	ug/g	114			4.0	30	
Beryllium	0.6	0.5	ug/g	0.6			7.1	30	
Boron	7.6	5.0	ug/g	8.0			5.4	30	
Cadmium	0.6	0.5	ug/g	0.7			10.6	30	
Chromium	23.9	5.0	ug/g	24.0			0.5	30	
Cobalt	5.8	1.0	ug/g	5.8			0.3	30	
Copper	28.0	5.0	ug/g	28.0			0.1	30	
Lead	179	1.0	ug/g	214			17.8	30	
Molybdenum	1.6	1.0	ug/g	1.6			3.3	30	
Nickel	16.2	5.0	ug/g	15.8			2.1	30	
Selenium	ND	1.0	ug/g	1.1			NC	30	
Silver	ND	0.3	ug/g	ND			NC	30	
Thallium	ND	1.0	ug/g	ND			NC	30	
Uranium	ND	1.0	ug/g	ND			NC	30	
Vanadium	38.2	10.0	ug/g	37.8			1.1	30	
Zinc	185	20.0	ug/g	186			0.6	30	
Physical Characteristics									
% Solids	83.7	0.1	% by Wt.	83.7			0.0	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	

Method Quality Control: Duplicate

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
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	*0.742*		*%*		*52.4*	*50-140*			
Surrogate: Terphenyl-d14	*0.956*		*%*		*67.5*	*50-140*			

Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Metals									
Arsenic	57.2	1.0	ug/g	5.4	104	70-130			
Barium	96.9	1.0	ug/g	45.5	103	70-130			
Beryllium	53.9	0.5	ug/g	ND	107	70-130			
Boron	53.3	5.0	ug/g	ND	100	70-130			
Cadmium	47.6	0.5	ug/g	ND	94.7	70-130			
Chromium	62.8	5.0	ug/g	9.6	106	70-130			
Cobalt	54.0	1.0	ug/g	2.3	103	70-130			
Copper	59.5	5.0	ug/g	11.2	96.6	70-130			
Lead	121	1.0	ug/g	85.4	71.0	70-130			
Molybdenum	53.0	1.0	ug/g	ND	105	70-130			
Nickel	56.7	5.0	ug/g	6.3	101	70-130			
Selenium	50.5	1.0	ug/g	ND	100	70-130			
Silver	41.8	0.3	ug/g	ND	83.3	70-130			
Thallium	46.9	1.0	ug/g	ND	93.6	70-130			
Uranium	51.1	1.0	ug/g	ND	102	70-130			
Vanadium	67.2	10.0	ug/g	15.1	104	70-130			
Zinc	120	20.0	ug/g	74.5	91.6	70-130			
Semi-Volatiles									
Acenaphthene	0.146	0.02	ug/g	ND	82.6	50-140			
Acenaphthylene	0.151	0.02	ug/g	ND	85.5	50-140			
Anthracene	0.145	0.02	ug/g	ND	82.1	50-140			
Benzo [a] anthracene	0.111	0.02	ug/g	ND	62.9	50-140			
Benzo [a] pyrene	0.095	0.02	ug/g	ND	53.8	50-140			
Benzo [b] fluoranthene	0.109	0.02	ug/g	ND	61.8	50-140			
Benzo [g,h,i] perylene	0.102	0.02	ug/g	ND	57.8	50-140			
Benzo [k] fluoranthene	0.110	0.02	ug/g	ND	62.1	50-140			
Chrysene	0.130	0.02	ug/g	ND	73.3	50-140			
Dibenzo [a,h] anthracene	0.099	0.02	ug/g	ND	56.2	50-140			
Fluoranthene	0.147	0.02	ug/g	ND	82.9	50-140			
Fluorene	0.125	0.02	ug/g	ND	70.9	50-140			

Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Indeno [1,2,3-cd] pyrene	0.101	0.02	ug/g	ND	57.2	50-140			
1-Methylnaphthalene	0.111	0.02	ug/g	ND	62.8	50-140			
2-Methylnaphthalene	0.119	0.02	ug/g	ND	67.5	50-140			
Naphthalene	0.147	0.01	ug/g	ND	83.0	50-140			
Phenanthrene	0.155	0.02	ug/g	ND	87.6	50-140			
Pyrene	0.154	0.02	ug/g	ND	86.7	50-140			
Surrogate: 2-Fluorobiphenyl	*0.824*		*%*		*58.2*	*50-140*			
Surrogate: Terphenyl-d14	*1.05*		*%*		*74.2*	*50-140*			

Certificate of Analysis

Report Date: 10-Sep-2024

Client: **Paterson Group Consulting Engineers (Ottawa)**

Order Date: 4-Sep-2024

Client PO: 61190

Project Description: PE6605

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 unlesss otherwise noted.

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

PARACEL LABORATORIES LTD.

Paracel ID: 2436205

Paracel Order Number (Lab Use Only)	Chain Of Custody (Lab Use Only)
2436205	

Client Name: Paterson
Contact Name: Mark Bjaki
Address: 9 Auriga Dr.
Telephone: 613 - 226 - 7381

Project Ref: PE6605
Quote #:
PO #: 61190
E-mail: mbjaki@patersongroup.ca
mdarcy@patersongroup.ca

Page 1 of 1

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

☒ REG 153/04 ☐ REG 406/19

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

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

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

	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	DUP	S		2	Aug 27 2024		☐	☐	X	X	☐	☐	☐	☐	☐	☐	☐	☐
2							☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
3							☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
4							☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
5							☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
6							☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
7							☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
8							☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
9							☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
10							☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐

Comments:

Method of Delivery: SWIFT

Relinquished By (Sign):	Received at Depot:	Received at Lab:	Verified By:
Relinquished By (Print): Mark Bjaki	Date/Time:	Date/Time: Sept 4th 16:44	Date/Time: Sept 5, 2024 9:02am
Date/Time: Sept 4/2024	Temperature: °C	Temperature: 7.5	pH Verified: ☐ By:

Chain of Custody (Env) xlsx Revision 5.0