

Phase II-Environmental Site Assessment 4497A & 4497B O'Keefe Court Ottawa, Ontario

Prepared For: Mattamy Homes

Report: PE6605-2 Date: September 18, 2024



TABLE OF CONTENTS

EXEC	UTIVI	E SUMMARYiii
1.0	INTR	ODUCTION1
	1.1	Site Description1
	1.2	Property Ownership1
	1.3	Current and Proposed Future Uses1
	1.4	Applicable Site Condition Standard2
2.0	BAC	GROUND INFORMATION2
	2.1	Physical Setting
3.0	SCO	PE OF INVESTIGATION
	3.1	Overview of Site Investigation
	3.2	Media Investigated
	3.3	Phase I Conceptual Site Model 3
	3.4	Deviations from Sampling and Analysis Plan6
	3.5	Impediments 6
4.0	INVE	STIGATION METHOD7
	4.1	Subsurface Investigation7
	4.2	Soil Sampling7
	4.3	Field Screening Measurements7
	4.4	Groundwater Monitoring Well Installation8
	4.5	Field Measurement of Water Quality Parameters 8
	4.6	Groundwater Sampling9
	4.7	Analytical Testing9
	4.8	Residue Management10
	4.9	Elevation Surveying10
	4.10	Quality Assurance and Quality Control Measures11
5.0	REVI	EW AND EVALUATION 11
	5.1	Geology11
	5.2	Groundwater Elevations, Flow Direction, and Hydraulic Gradient11
	5.3	Fine-Coarse Soil Texture12
	5.4	Soil: Field Screening12
	5.5	Soil Quality
	5.6	Groundwater Quality14
	5.7	Quality Assurance and Quality Control Results
	5.8	Phase II Conceptual Site Model16
6.0	CON	CLUSIONS
7.0	STAT	EMENT OF LIMITATIONS



List of 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 – Analytical Testing Plan – Soil and Groundwater

List of Tables

Table 1 – Analytical Test Results – Soil – Metals, BTEX, PHCs, VOCs, ABNs, pH – MECP Table 8 Comparison

Table 2 – Analytical Test Results – Groundwater – Metals, PHCs, VOCs, ABNs – MECP Table 8 Comparison

List of Appendices

Appendix 1 Sampling and Analysis Plan Soil Profile and Test Data Sheets Symbols and Terms Laboratory Certificate of Analysis



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, F₁-F₄), 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		

1.2 Property Ownership

Area:

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.

71.99 ha (approximate)

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



Il 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				
рН	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								
		Р	arameter	Analyze	d			
Sample ID	Screened Interval/ Stratigraphic Unit	Metals ¹	HYd	втех	PHCs F ₁ -F ₄	Rationale		
TP1-24 G1	0.58 – 0.64m Fill	х	х	х	х	Assess APEC 1 (Fill Material of Unknown Quality)		
TP2-24 G1	0.51 – 0.56m Fill	х	х	х	х	Assess APEC 1 (Fill Material of Unknown Quality)		
TP3-24 G1	0.46 – 0.51m Fill	Х	Х	Х	х	Assess APEC 1 (Fill Material of Unknown Quality)		
TP4-24 G1	0.46 – 0.51m Fill	Х	Х	Х	Х	Assess APEC 1 (Fill Material of Unknown Quality)		
TP5-24 G1	0.58 – 0.64m Fill	Х	Х	Х	х	Assess APEC 2 (Historical Concrete Plant)		



Table 4 - Soil Samples Submitted									
		Р	arameter	Analyze	d				
Sample ID	Screened Interval/ Stratigraphic Unit	Metals ¹	РАН	ВТЕХ	PHCs F ₁ -F ₄	Rationale			
TP6-24 G1	0.58 – 0.64m Fill	х	х	х	Х	Assess APEC 2 (Historical Concrete Plant)			
TP7-24 G1	0.48 – 0.53m Fill	Х	х	х	х	Assess APEC 1 (Fill Material of Unknown Quality)			
TP8-24 G1	0.58 – 0.64m Fill	Х	Х	Х	х	Assess APEC 1 (Fill Material of Unknown Quality)			
DUP ¹	0.46 – 0.51m Fill	Х	Х			Duplicate soil sample for QA/QC purposes			
Notes: ● 1 – D	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	Table 5 - Groundwater Samples Submitted							
		Р	arameter	[·] Analyze				
Sample ID	Screened Interval/ Stratigraphic Unit	PHCs F ₁ -F ₄	ВТЕХ	РАН	Metals	Rationale		
BH6-24	4.91 – 6.43m Fill	х	х	х	х	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 (F₁-F₄)

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 (F₁-F₄).

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 F₁-F₄)
- □ 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 F₁-F₄)
- □ 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, F₁-F₄), 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 (F₁-F₄), 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., QPESA

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







A			POTENTIALLY CONTAMINATING ACTIVITIES :						
4		19.5	D #	PCA ID)	DESCRIPTION	<u>ı</u>		
	aller .	1		30		IMPORTETION UNKNOWN QI AREA OF FILL SITE.	N OF FILL MAT JALITY ASSO . ON THE WES	TERIAL OF CIATED WITH AN ST PORTION OF T	HE
0	String in which	2	2	12		CONCRETE, (MANUFACTUI SUSPECTED	CEMENT AND RING ASSOCI CONCRETE P	LIME ATED WITH A PLANT.	
2		1 Contraction	3	48		SALT MANUFA BULK STORA SALT APPLICA	ACTURING, PI GE ASSOCIAT ATION TO HIG	ROCESSING AND IED WITH ROAD GHWAY 416.	
X			1	11		COMMERCIAL TERMINALS A TRUCKING AN 985 MOODIE I GENERATION SLUDGES, IN ORGANIC CH	TRUCKING A SSOCIATED ND WAREHOL DRIVE RESUL OF OIL SKIM DRGANIC CHI EMICALS.	AND CONTAINER WITH THE FED EX JSE OPERATING A TING IN THE MINGS AND EMICALS AND	τ ΛΤ
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2 . 6		7	7 .	39		PAINTS MANU BULK STORAG HYDRO OTTA DIBBLEE ROA	IFACTURING, GE ASSOCIAT WA OPERATI D.	, PROCESSING AN TED WITH IONS AT 201	ID
	1000 Chick	8	3.	55		TRANSFORM PROCESSING HYDRO OTTA STORAGE AT	ER MANUFAC AND USE AS WA TRANSFC 201 DIBBLEE	TURING, SOCIATED WITH DRMER ROAD.	
	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	S	)	N/A		STORAGE, M REPAIR OF EU MATERIAL US TRANSPORT/ ASSOCIATED OPERATIONS RESULTING II SOLUTIONS ( WASTE OILS/ GASSES AND	AINTENANCE, QUIPMENT, V ED TO MAINT ATION SYSTE WITH HYDRC AT 201 DIBBI N THE PRODU CONTAINING H SLUDGES, W/ OTHER INOR	, FUELING AND EHICLES, AND FAIN MS O OTTAWA LEE ROAD JOTION OF ALKAL HEAVY METALS, ASTE COMPRESS GANIC SULDGES	INE ED
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		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 - SoilMetals, 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)			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		Reg 153/04-Table 8 Residential/Industrial, Potable	27-Aug-2024	27-Aug-2024							
Physical Characteristics								_//			_,
% Solids	% by \A/+		70.2	77 /	917	<del>ر دە</del>	80.2	91.7	01 7	<u>د ۵۵</u>	7 29
Metals	70 DY VVL.		13.3	//.4	04./	02.7	07.3	01.2	01./	00.5	03.7
Antimony	ug/g dov	1 3		ND (1 0)		ND (1 0)			ND (1 0)	ND (1 0)	ND (1 0)
Arconic	ug/g dry	1.5	2 1	2 1	2.2	2.8	2.9	2 1	2.8	2.7	2.9
Parium	ug/g dry	18	212	3.1	3.2	2.0	2.9	3.1	2.0	195	2.9
Bandlium	ug/g dry	220	0.7	0.7	244	220	199	200	212	165	241
Beron	ug/g dry	2.5	5.2	0.7 ND (5.0)	6	5.0	0.0 ND (5.0)	0.7 ND (5.0)	0.0 ND (5.0)	0.0 ND (E 0)	0.0
Cadmium	ug/g dry	30	5.2 ND (0.5)	ND (5.0)		5.9 ND (0.5)	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)	5.0 ND (0.5)
Cadmium	ug/g dry	1.2	ND (0.5)	(0.5)	ND (0.5)	UD (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	12.1	ND (0.5)
Cobalt	ug/g dry	70 22	04.4 15 <i>/</i>	15 7	45.0	47.4	43.0	55 1/1 R	40.5 17 <i>/</i>	45.1 11 2	31.3
Copper		<u> </u>	13.4 20 /	10.7	27.6	25.6	30.3	14.0 70 7	12.4 26.2	22.2	13.3
Lead		120	23. <del>4</del> 6.5	50.2 6.7	5.0	<u>د ک</u> ۲ ۵	5.6	6.1	5 7	23.7 A 5	5 0
Molybdenum	ug/g dry	2.0	1 1	ND (1 0)	5.5 ND (1.0)	ND (1 0)	5.0 ND (1.0)	ND (1 0)	ND (1 0)		ND (1 0)
Nickel	ug/g dry	82	35 /	35.1	28.1	26.8	25.6	31.1	27 /	24.5	28.6
Selenium	ug/g dry	1 5	ND (1 0)	ND (1 0)	ND (1 0)	ND (1 0)	23.0 ND (1 0)	ND (1 0)	ND (1 0)	ND (1 0)	20.0 ND (1 0)
Silver	ug/g drv	0.5	ND (0.3)	ND (1.0)	ND (0.3)	ND (1.0)	ND (0.3)	ND (0.3)	ND (1.0)	ND (1.0)	ND (1.0)
Thallium	ug/g dry	1.0	ND (0.3)	ND (0.3)							
	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
BTEY	ug/g ui y	250	54.1	52.1	70.5	72.2	05.0	75.4	/1.1	04.7	70.5
Benzene	ug/g dry	0.02	ND (0.02)	N/A							
Ethylbenzene	ug/g dry	0.05	ND (0.05)	N/A							
Toluene	ug/g dry	0.2	ND (0.05)	N/A							
m/n-Xvlene	ug/g dry	0.05	ND (0.05)	N/A							
o-Xvlene	ug/g dry	0.05	ND (0.05)	N/A							
Xylenes total	ug/g dry	0.05	ND (0.05)	N/A							
Hydrocarbons	ug/g ui y	0.05	ND (0.03)	ND (0.03)	ND (0.03)	140 (0.05)	ND (0.03)	ND (0.05)	ND (0.03)	140 (0.05)	N/A
	ug/g dry	25	ND (7)	N/A							
E2 PHCs (C10-C16)	ug/g dry	10	ND (4)	ND (7)	ND (4)	ND (4)	N/A				
E3 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	0 <u>8</u> /8 0. }		10	112 (0)	10	20	112 (0)	10	10	115 (0)	,,,
Acenaphthene	ug/g dry	0.072	ND (0.02)	ND (0.02)							
Acenaphthylene	ug/g drv	0.093	ND (0.02)	ND (0.02)							
Anthracene	ug/g drv	0.22	ND (0.02)	ND (0.02)							
Benzo[a]anthracene	ug/g drv	0.36	ND (0.02)	ND (0.02)							
Benzo[a]pyrene	ug/g drv	0.3	ND (0.02)	ND (0.02)							
Benzo[b]fluoranthene	ug/g drv	0.47	ND (0.02)	ND (0.02)							
Benzo[g,h,i]pervlene	ug/g drv	0.68	ND (0.02)	ND (0.02)							
Benzo[k]fluoranthene	ug/g drv	0.48	ND (0.02)	ND (0.02)							
Chrysene	ug/g drv	2.8	ND (0.02)	ND (0.02)							
Dibenzo[a,h]anthracene	ug/g drv	0.1	ND (0.02)	ND (0.02)							
Fluoranthene	ug/g drv	0.69	ND (0.02)	ND (0.02)	0.03	ND (0.02)	ND (0.02)				
Fluorene	ug/g drv	0.19	ND (0.02)	ND (0.02)							
Indeno [1,2,3-cd] pyrene	ug/g dry	0.23	ND (0.02)	ND (0.02)							
1-Methylnaphthalene	ug/g drv	0.59	ND (0.02)	ND (0.02)							
2-Methylnaphthalene	ug/g drv	0.59	ND (0.02)	ND (0.02)							
Methylnaphthalene (1&2)	ug/g dry	0.59	ND (0.04)	ND (0.04)							
Naphthalene	ug/g drv	0.09	ND (0.01)	ND (0.01)							
Phenanthrene	ug/g drv	0.69	ND (0.02)	ND (0.02)							
Pvrene	ug/g drv	1.0	ND (0.02)	ND (0.02)	0.02	ND (0.02)	ND (0.02)				
Pyrene ug/g dry		2.0			0.02					(3.02)	(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)			4.85 - 6.39
Sample Date		Reg 153/04-Table 8 Groundwater	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



# Sampling and Analysis Plan

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

Prepared for Mattamy Corporation

Report: PE6605-SAP Date: August 26, 2024



## TABLE OF CONTENTS

1.0	SAMPLING PROGRAM	1
2.0	ANALYTICAL TESTING PROGRAM	3
3.0	STANDARD OPERATING PROCEDURES	4
	3.1 Environmental Drilling Procedure	4
	3.2 Monitoring Well Installation Procedure	6
	3.3 Monitoring Well Sampling Procedure	7
4.0	QUALITY ASSURANCE/QUALITY CONTROL (QA/QC)	9
5.0	DATA QUALITY OBJECTIVES	10
6.0	PHYSICAL IMPEDIMENTS TO SAMPLING & ANALYSIS PLAN	



## 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 waterbearing.
- 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
- d 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 F₁, a soil core from each soil sample, which may be analyzed, must be taken and placed in the laboratory-provided methanol vial.
- □ Note all and any odours or discolouration of samples.
- □ Split spoon samplers must be washed between samples.
- If obvious contamination is encountered, continue sampling until vertical extent of contamination is delineated.
- As a general rule, environmental boreholes should be deep enough to intercept the groundwater table (unless this is impossible/impractical - call project manager to discuss).
- If at all possible, soil samples should be submitted to a preliminary screening procedure on site, either using a RKI Eagle, PID, etc. depending on type of suspected contamination.

## Spoon Washing Procedure

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

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

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

#### Screening Procedure

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



Vapour results obtained from the RKI Eagle and the PID are relative and must be interpreted.

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

- Samples should be brought to room temperature; this is specifically important in colder weather. Soil must not be frozen.
- **T** 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 laboratoryprovided 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
- D 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
- **O** 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

COORD. SYS.: MTM ZONE 9 EASTING: 359	IG: 5015957.32		ELEVA	TION: 117.03							
PROJECT: Phase II Environmental Site Assessm	ent							FILE NO	DECCENT PE6605		
BORINGS BY: REMARKS:					DATE: A	ugust 27, 2024		HOLE N	O.: TP 1-24		
					SAMP	PLE		GASTE	CH (ppm)		
								GASTE	CH (% LEL)	z	
SAMPLE DESCRIPTION	ГОТ	_	ON O	۲ (%)	go	٩٢	5	50 100	150 200	CTIO	(m) N
	TA P	m) H	AND	VER	ORF	YTIC S			(ppm)	OMET	ATIO
GROUND SURFACE	STR4	DEP1	ТҮРЕ	RECO	N, Nc	ANAL	2	20 40	60 80	PIEZ	ELEV
FILL: Brown silty clay, some sand, occasional cobbles		0 _									117
		-									
0.64m [116.39m] End of Test Pit		-	<u>م</u>				t i				
		- 1—									116-
		-									
		-									
		-									
		2_									115-
		-									
		-									
		-									
		3-									114-
		-									
		-									
		1									440
		-									113-
		-									
		-									
		5-									112-
		-									
		-									
		-									
		6-									111-
		-									
		-									
		7-									110-
		-									
		-									
		8 -									
DISCLAIMER: THE DATA PRESENTED IN THIS LOG IS THE	PROPE	RTY O		SON	GROUP AN			WAS PRODU	JCED. THIS LOG SH	OULD BE	
READ IN CONJUNCTION WITH ITS COORESPONDING REF	YURT. P.	ALERS	JN GRC	OP IS	5 NUT RESP	PONSIBLE FOR THE	JNAUTH	URIZED US	e of this data.	PAGE:	1/1



# SOIL PROFILE AND TEST DATA

COORD. SYS.: MTM ZONE 9 EASTING: 359	D. SYS.: MTM ZONE 9 EASTING: 359728.92 NORTHING: 5015920.48										
PROJECT: Phase II Environmental Site Assessm	ent							FILE NO.	PE6605		
BORINGS BY:											
REMARKS:					DATE: A	ugust 27, 2024		HOLE NO	·· IP Z-Z4		
					SAMP	PLE	_ •	GASTECH	H (ppm)		
								GASTECH	H (% LEL)	z	
SAMPLE DESCRIPTION	LOT		S S	۲ (%)	gD	AL	Ę	50 100	150 200	CTIO	(m) N
	TA P	E H	AND	VER	ORF	S		▲ PID (p	pm)	SMET STRU	ATIO
	STRA	) EPT	ΓΥΡΕ	SECC	d, Nc	ANAL		△ PID (%	6 LEL)		
GROUND SURFACE		0 -		-	-		4	20 40	60 80		-
		-									
0.56m [ 114.22m ]	<u>XXXX</u>	-					<b>A</b>				
											114-
		1-									
		-									
		-									
		-									113-
		2-									
		-									
		-									112-
		3-									
		-									
											111-
		4-									
		-									
											110-
		5-									
		-									
		_									109-
		0									
		-									
		- - 7_									108-
											407
		8 -									107-
DISCLAIMER: THE DATA PRESENTED IN THIS LOG IS THE	PROPE	RTY O	PATER	SON	GROUP AN	ID THE CLIENT FOR		WAS PRODUC	ED. THIS LOG SH	OULD BE	
READ IN CONJUNCTION WITH ITS COORESPONDING REF	Port. P	ATERS	ON GRO	UP IS	NOT RESP	PONSIBLE FOR THE	UNAUTH	IORIZED USE	of this data.	PAGE:	1/1



# SOIL PROFILE AND TEST DATA

COORD. SYS.: MTM ZONE 9 EASTING: 35	IG: 5015836.29	<b>ELEVATION:</b> 118.94						
PROJECT: Phase II Environmental Site Assessm	nent						FILE NO. : <b>PE6605</b>	
BORINGS BY:								
REMARKS:	_				DATE: A	ugust 27, 2024	HOLE NO.: 1P 3-24	
					SAMF	PLE	GASTECH (ppm)	
							GASTECH (% LEL)	
SAMPLE DESCRIPTION	LOT		ON O	۲ (%)	gg	AL	50 100 150 200 <b>E C</b>	Ē
	₽	ш Н	AND	VER	ORF	SIT S	▲ PID (ppm)	ATIO
	TRA	EPT	ΥPE	ECO	l, Nc	EST!		ΕK
GROUND SURFACE		0 -			2	4 -		<u> </u>
FILL. BIOWIT Silly Clay, Some Sand, Occasional Cobbles		-						
0.51m [118.43m]		-					<b>▲</b>	
		-						
		1_					11	18-
		-						
		-						
		2_					11	17-
		-						
		3-					11	16-
		-						
		4-					11	15-
		-						
								•
		5-					11	4-
		-						
		-						
		6-					11	13-
		-						•
		-						
		7-					11	12-
		8 -					11	11-
DISCLAIMER: THE DATA PRESENTED IN THIS LOG IS THE	PROPE	RTY O		SON	GROUP AN	ID THE CLIENT FOR	WHO IT WAS PRODUCED. THIS LOG SHOULD BE	
READ IN CONJUNCTION WITH ITS COORESPONDING REI	Port. P	ATERS	UN GRC	UP IS	NOT RES	PONSIBLE FOR THE	UNAUTHORIZED USE OF THIS DATA. PAGE: 1/1	1



# SOIL PROFILE AND TEST DATA

COORD. SYS.: MTM ZONE 9 EASTING: 35	9684.0	4			NORTHIN	<b>G:</b> 5015756.15	<b>ELEVATION:</b> 116.19						
PROJECT: Phase II Environmental Site Assessm	nent							FILE NO.: F	PE6605				
BORINGS BY:					D	107 0004			Б 1-51				
REMARKS:					DAIE: A	ugust 27, 2024			F 4-24		1		
					SAMP	LE		GASTECH (ppm	1) FL \				
	L		ö		_			GASIECH (% L	200	N	- -		
SAMPLE DESCRIPTION	PLOT	Ê	ž Q	RY (%	RQD	CAL			200	UCTIC	L NC		
	ATA	표 고	EAN	OVE	c OR	TS		▲ PID (ppm) △ PID (% LEL)		COME	VATIC		
GROUND SURFACE	STR	EP	ΤYΡ	REC	N, N	ANA TES		20 40 60	80	PIEZ	ELE		
FILL: Brown silty clay, some sand, occasional cobbles		0 -									116-		
0.51m [ 115.68m ]		-											
End of Test Pit		1 -	0				<b>1</b>				-		
		- 1									115-		
		-											
		-											
											114-		
		-											
		3-											
											113-		
											-		
		-									-		
		4-											
		-									112-		
		-											
		5-											
		-									111-		
		=											
											-		
		6-									-		
		-									110-		
		-											
		=									-		
		7-											
		-									109-		
		-											
		-											
		8 -											
DISCLAIMER: THE DATA PRESENTED IN THIS LOG IS THE READ IN CONJUNCTION WITH ITS COORESPONDING REI	PROPE	ERTY O	F PATER	SON		D THE CLIENT FOR V	VHO IT \ JNALITH	WAS PRODUCED. TH	HIS LOG SHO	OULD BE			
	0.0.1									PAGE:	1/1		



# SOIL PROFILE AND TEST DATA

COORD. SYS.: MTM ZONE 9 EASTING: 35	<b>G:</b> 5016375.22	ELEVATION: 113.70									
PROJECT: Phase II Environmental Site Assessm	nent							FILE NO. :	PE6605		
BORINGS BY:									TD 6 04		
REMARKS:					DATE: A	ugust 27, 2024		HOLE NO. :	IP 5-24		
					SAMP	LE		GASTECH (	ppm)		
								GASTECH (	% LEL)	z	
SAMPLE DESCRIPTION	LOT		S S	۲ (%)	gD	AL	5	0 100 1	50 200	C10	E N
	TA P	ш Н	AND	VER	ORI	S		▲ PID (ppr	n)	OMET	ATIO
	STRA	DEPT	ΓYPE	SEC	d, Nc	ANAL			.EL)		
FILL: Brown silty clay with some sand trace gravel		0 -	·		_		2	<u>0 40 t</u>	0 80		-
and organics		-									
0.64m [113.06m ]		-	= 5								
End of Test Pit		-									113-
		1-									
		-									
		-									
		-									112-
		2-									-
		-									
		-									-
		-									111-
		3-									
		-									
		-									-
		-									110-
		4-									
		-									
		-									400
		-									109-
		5-									
		-									-
		-									100
		-									100
		6-									-
		-									
		-									107_
		-									-
		7-									
		-									.
		-									106.
		- 8									- 001
											1
READ IN CONJUNCTION WITH ITS COORESPONDING RE	PORT. P	ATERS	ON GRC	UP IS	NOT RESP	PONSIBLE FOR THE	UNAUTH	ORIZED USE OF	THIS DATA.		1/1
										.,	., .



# SOIL PROFILE AND TEST DATA

COORD. SYS.: MTM ZONE 9 EASTING: 35	<b>G:</b> 5016435.37		ELEVATIO	<b>DN:</b> 113.50							
PROJECT: Phase II Environmental Site Assessm	nent							FILE NO. :	PE6605		
BORINGS BY:											
REMARKS:					DATE: A	ugust 27, 2024		HULE NU.	IP 0-24		
					SAMP	LE		GASTECH	(ppm)		
								GASTECH	(% LEL)	z	
SAMPLE DESCRIPTION	LOT		NO NO	۲ (%)	gD	AL	5	50 100 ⁻	150 200	CTIO	(E)
	∎ T T P	E H	AND	VER	ORF	S YTIC		▲ PID (pp	m)	MET	ATIOI
	STRA	DEPT	LYPE	SECC	V, Nc	ANAL			LEL)		
GROUND SURFACE		0 -		-	~		2	20 40	60 80	<b>E</b> 0	
TILL. Drown sandy day, with trace graver		-									
0.64m [ 112.86m ]		-	<u> </u>								113-
End of Test Pit		_					T				
		1_									
		-									
		-									112-
		-									
		2-									
		-									
		-									111-
		-									
		3-									
		-									
		-									110-
		4-									
		-									
											109-
		_									
		5-									
		-									
											108-
		-									100
		-									107
											107-
		_									
		-									106-
		- 8									
											1
READ IN CONJUNCTION WITH ITS COORESPONDING RE	PORT. P	ATERS	ON GRC	UP IS	NOT RESP	PONSIBLE FOR THE	UNAUTH	ORIZED USE O	F THIS DATA.		1/1
										PAGE:	1/1



# SOIL PROFILE AND TEST DATA

COORD. SYS.: MTM ZONE 9 EASTING: 35	<b>G:</b> 5015834.15		ELEVAT	<b>TION:</b> 118.97										
PROJECT: Phase II Environmental Site Assessm	nent							FILE NO. : <b>PE6605</b>						
BORINGS BY:									TD 7 04					
REMARKS:					DATE: A	ugust 27, 2024		HOLE NO	): IP /-24					
					SAMP	LE		GASTEC						
								GASTEC	H (% LEL)	z				
SAMPLE DESCRIPTION	LOT	_	N N	۲ (%)	gD	AL	Ę	50 100	150 200	CTIO	(m) N			
	A P	E H	AND	VER	OR F	S		▲ PID (	ppm)	OMET	ATIO			
	STRA	DEPT	LYPE	SECC	V, Nc	ANAL			% LEL)					
FILL: Brown silty clay with some sand, occasional		0 -		-			2	20 40	60 80					
cobbles		-												
0.53m [118.44m]		-	- 5				<b>†</b>							
		-												
		1									118-			
		-												
		-												
		-									447			
		2-									11/-			
		-												
		-												
		-									116_			
		3-												
		-												
		-												
											115-			
		4												
		-												
		-												
		5									114-			
		-												
		-												
		-												
		6-									113-			
		-												
		-												
		-												
		7-									112-			
		-												
		-												
		-												
		8 -									111_			
DISCLAIMER: THE DATA PRESENTED IN THIS LOG IS THE		RTY O		SON				WAS PRODUC	CED. THIS LOG SHO	OULD BE				
	ruki. F	AIEKS		15	NUT RESP		UNAUTH			PAGE:	1/1			



# SOIL PROFILE AND TEST DATA

Phase II Environmental Site Assessment

4497 A&B O'Keefe Court, Ottawa ON

COORD. SYS.: MTM ZONE 9 EASTING: 359		ELEVATIO	<b>N:</b> 113.91											
PROJECT: Phase II Environmental Site Assessm	ent							FILE NO. : <b>PE6605</b>						
BORINGS BY:					п	ATE /	Vuguet 27, 2024		HOLE NO. :	TP 8-24				
							-ugust 27, 2024							
						SAM			GASTECH (	opm) % LEL)				
	片		ġ		(%)	0		5	50 100 15	50 200	NOI	Ê		
SAMPLE DESCRIPTION	<b>PLC</b>	(m)	Q		ERV	r rq	ICAL		▲ PID (nom	n)	RUCT	) NOI		
	RATA	PTH	PE A			Nc O	IALY1 STS		△ PID (% L	., EL)		EVAT		
GROUND SURFACE	ST	B	۲		2	ź	AN	2	20 40 6	0 80	E S	<u> </u>		
FILL: Brown silty clay, occasional cobbles		0 -										-		
0.64m [ 113.27m ]		-		_								-		
End of Test Pit	****	-		פ				•				-		
		1-										113—		
		-										-		
		-										-		
		-										- - 112—		
		2										-		
		-										-		
		-										-		
		3-										111-		
		-										-		
		-										-		
		-										-		
		4_										110-		
		-										-		
		-										-		
		-										- - 109—		
		5-										-		
		-										-		
		-										-		
		6-										108-		
		-										-		
		-										-		
		-										-		
		7_										107-		
		-										-		
		-										-		
		- - 0 -										106-		
												100-		
READ IN CONJUNCTION WITH ITS COORESPONDING REF	PORT. P	ATERS	ON GR	OUF	PIS N	OT RES	PONSIBLE FOR THE U	NAUTH	ORIZED USE OF	THIS DATA.		1/1		
											PAGE:	1/1		

natersonar		In	Con	sulting	3	SOIL	- PRO	FILE AN	ND TEST	DATA		
9 Auriga Drive, Ottawa, Ontario K2E 7T	9		Eng	ineers	G Pi O	Geotechnical Investigation Prop. Residential Dev 800 Cedarview Road Ottawa, Ontario						
EASTING: 360042.722 NORTHING	i: 50	15631	1.119	ELEV		: 104.96	6		FILE NO.	PG5600		
REMARKS:									HOLE NO.			
BORINGS BY: CME 55 Mechanical Ear	th Au ↓ .	ger on	Trac	k I	DATE	2024	March 27			BH 1-24		
SAMPLE DESCRIPTION	PLOT		SAN			DEPTH	ELEV.	Pen. Ro ● 50	esist. Blows 0 mm Dia. C	s/0.3m ຟັດ cone ຫຼັງ		
	RATA	ГУРЕ	MBER	% SOVER'	VALUE r RQD		(,	• <b>N</b>	/ater Conter			
GROUND SURFACE	ST		N	REC	z °	0.	104.06	20	40 60	80		
<b>TOPSOIL</b> with organics        0.2 <b>GLACIAL TILL</b> : Compact, brown silty sand to sandy silt with clay	B	AU	1				104.96					
and gravel, occasional cobbles		ss	2	100	8	1-	-103.96					
2.2	1 <u></u>	ss	3	50	14	2-	-102.96					
GLACIAL TILL: Compact to dense, grey silty sand with gravel, cobbles and boulders		ss	4	100	28							
<u>3.3</u>	0 0 0 0 0 0 0 0 0 0 0 0 0	ss	5	80	+50	3-	-101.96					
limestone bedrock - Good to excellent quality by 3.6m depth		RC	1	100	60	4-	-100.96					
		RC	2	100	100	5-	-99.96					
<u>6.4</u>	B	RC	3	100	100	6-	-98.96					
End of Borehole (GWL at surface - April 17, 2024)												
								20 Shea ▲ Undist	<b>40 60</b> ar <b>Strength (</b> urbed △ Re	80 100 ( <b>kPa)</b> moulded		

natersond	ır <i>c</i>	ור	In	Con	sulting		SOIL	_ PROI	FILE AN	ND TEST	DATA	
9 Auriga Drive, Ottawa, Ontario K2E	Е 7T9		<b>~</b> P	Eng	ineers	Geotechnical Investigation Prop. Residential Dev 800 Cedarview Road Ottawa, Ontario						
EASTING: 359831.302 NORTH DATUM: Geodetic	HING:	50	15735	5.647	ELEVA		l: 108.74	4		FILE NO.	PG560	0
REMARKS:										HOLE NO.		
BORINGS BY: CME 55 Mechanical	Earth	Aug	er on	Track	K [	DATE	2024	March 27			BH 2-2	4
SAMPLE DESCRIPTION		2LOT		SAN	IPLE		DEPTH ELEV.		Pen. Re ● 50	esist. Blow 0 mm Dia. (	s / 0.3m Cone	A WELL
		TAF	ш	ËR	ſΕRΥ	В	(m)	(m)				DRING
		STR∕				0 W	/ater Conte	nt %	ONITC			
TOPSOIL with organics	0.05				ш		- 0-	108.74				≥
Compact, brown SILTY SAND	0.25		× AU	1								<u>         </u> ₩ 
<b>GLACIAL TILL</b> : Very dense, brown silty sand with gravel, cobbles and boulders	<u>0.00</u>		ss	2	83	36	1-	-107.74				
	<u>1.63</u>		∐ ≍ ss	3	100	+50						<u>իրիկիրի</u>
<b>BEDROCK</b> : Excellent quality, grey limestone bedrock			BC	1	100	97	2-	-106.74				<u>դիդիդի</u> դրդիդի
			_			01						
							3-	105.74				
			RC	2	100	95						
			_				4-	-104.74				
			RC	3	100	100	5-	-103.74				
	6.32		RC	4	100	92	6-	-102.74				
End of Borehole (GWL @ 0.45m - April 17, 2024)												
									20 Shea ▲ Undistr	40 60 ar Strength urbed △ Re	80 1 (kPa) emoulded	⊣ 00

natersonar		ır	Con	sulting		SOIL	- PRO	FILE AI	ND TES	T DATA	
9 Auriga Drive, Ottawa, Ontario K2E 7T	9		Eng	ineers	G P O	eotechnic rop. Resic ttawa, Or	al Invest Jential De Itario	igation ev 800 C	edarview F	Road	
EASTING: 359838.455 NORTHING DATUM: Geodetic	i: 50	15502	2.999	ELEVA		<b>N:</b> 110.78	3		FILE NO.	PG5600	)
REMARKS:									HOLE NO.	<b>D</b> U A A	-
BORINGS BY: CME 55 Mechanical Ear	th Aug	ger on	Trac	K D	DATE	: 2024 N	March 27			BH 3-24	4  !
SAMPLE DESCRIPTION	PLOT		SAN			DEPTH	ELEV.	Pen. R ● 5	esist. Blow 0 mm Dia.	/s / 0.3m Cone	G WEL
	TRATA	ТҮРЕ	UMBER	COVER	I VALUE or RQD		()	• <b>N</b>	/ater Conte	ent %	
GROUND SURFACE	ى: N		z	RE	z	- 0-	-110.78	20	40 60	80	§° ₽°
<b>TOPSOIL</b> with organics $0.24$	8	~									<b>. ⊻</b>
FILL: Brown silty sand to sandy silt with clay	<b>9</b>	B AU	1								
GLACIAL TILL: Dense to very		∦ ss	2	62	+50	1-	109.78				լլլլլ
gravel, cobbles and boulders											<u>ինինինին։</u> Որինինինին
		RC	1	32		2-	-108 78				
							100.70				
		<u>_</u>									իրի
						3-	107.78				
		BC	2	29							
							100 70				
- Grey by 4.1m depth		ss	3	55	+50	4-	-100.70				
		× SS	4	80	+50						
		2				5-	-105.78				
						6-	104.78				
6.32	2	ss	5	0	+50						
(GWL @ 0.18m - April 15, 2024)											
								20 Shea ▲ Undist	40 60 ar Strength urbed △ R	80 10 ( <b>kPa)</b> emoulded	1 00

natersonar		ır	Con	sulting	1	SOIL	_ PROI	FILE AI	ND TEST	DATA		
9 Auriga Drive, Ottawa, Ontario K2E 7T			Eng	ineers	G Pi O	Geotechnical Investigation Prop. Residential Dev 800 Cedarview Road Ottawa, Ontario						
EASTING: 359856.182 NORTHING DATUM: Geodetic	: 50	15913	3.238	ELEV	ATION	I: 109.95	5		FILE NO.	PG5600	D	
REMARKS:			<b>-</b> .						HOLE NO.			
BORINGS BY: CME 55 Mechanical Ear	th Aug	ger on	Iraci	< [	DATE	2024 1	March 28			BH 4-24	4	
SAMPLE DESCRIPTION	PLOJ		SAN	IPLE		DEPTH	ELEV.	Pen. R ● 5	esist. Blows 0 mm Dia. C	; / 0.3m ;one	IG WEL	
	TRATA	ТҮРЕ	UMBER	% COVER	I VALUE or RQD		(,	0 <b>N</b>	/ater Conter	nt %	NITORIN	
GROUND SURFACE	Ω.		z	R	z	- 0-	109.95	20	40 60	80	မ္ခင	
TOPSOIL with organics       0.25         Brown SILTY SAND, trace       0.25         gravel       0.05	5	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	1				100.00					
GLACIAL TILL: Very dense, 0.86 brown silty sand with gravel, cobbles and boulders		≊ SS _ RC	2 1	0 100	+50 100	1-	-108.95					
<b>BEDROCK</b> : Excellent quality, grey limestone bedrock		RC	2	100	64						<u>ինընդնիր</u> ննոնդների	
2.3m depth						2-	-107.95				իրիկիրիկի լիկիկիկի	
						3-	-106.95				րդիրդիրի Սղորդիրը	
		RC	3	100	86	4-	-105.95				<u>երիներին կեր</u>	
		BC	1	100	100							
		110		100	100	5-	-104.95	· · · · · · · · · · · · · · · · · · ·				
6.30	$\left( \begin{array}{c} \begin{array}{c} & & & & & & & \\ & & & & & & & \\ & & & & & & & \\ & & & & & & & \\ & & & & & & & \\ & & & & & & & \\ & & & & & & & \\ & & & & & & & \\ & & & & & & & \\ & & & & & & & \\ & & & & & & & \\ & & & & & & & \\ & & & & & & & \\ & & & & & & & \\ & & & & & & & \\ \end{array} \right)$	RC	5	100	100	6-	-103.95					
End of Borehole (GWL @ 1.21m - April 17, 2024)												
								20 Shea ▲ Undist	40 $60ar Strength (urbed \triangle Ref$	80 10 kPa) moulded	1 00	

natersonar		Ir	Con	sulting		SOIL	_ PRO	FILE AI	ND TEST	DATA		
9 Auriga Drive, Ottawa, Ontario K2E 7T	9	٩P	Eng	ineers	G Pi O	eotechnic rop. Resic ttawa. Or	cal Invest dential De ntario	igation ev 800 C	edarview R	oad		
EASTING: 359634.713 NORTHING	i: 50	15846	6.98	ELEVA		I: 116.50	)		FILE NO.	PG5600	)	
REMARKS:									HOLE NO.			
BORINGS BY: CME 55 Mechanical Ear	th Au	ger on	Trac	k D	ATE:	2024	March 28			BH 5-24	4	
SAMPLE DESCRIPTION	PLOT		SAN	IPLE		DEPTH	ELEV.	Pen. R	esist. Blow 0 mm Dia. (	s / 0.3m Cone	G WEL	
	ATA	Ы	IBER	ABER % DVER		(11)	(11)		lator Conto	er Content % 0 60 80 00 0000000000000000000000000000		
GROUND SURFACE	STR	È	NUN	RECO	N S I S		110 50	20	40 60	80 80		
<b>TOPSOIL</b> with organics0.0	5	×				- 0-	-116.50					
topsoil and organics		₩ AU	1									
		ss	2	58	6	1 -	115.50					
1 4	5				-							
FILL: Brown silty clay with		17										
organics		∬ SS	3	50	11		44450					
2.2	1	*/				2-	-114.50					
FILL: Brown silty clay with sand, gravel and cobbles, trace		Ss	4	100	±50							
organics and crushed stone					100							
2.9	7					3-	113.50					
FILL: Brown silty sand with		∦ ss	5	50	39							
trace crushed stone		$\mathbb{N}$			00							
		x ss	6	60	+50							
						4-	-112.50					
		*										
		ss	7	80	+50							
		×				5-	111.50					
		×										
<u>5.6</u>	1	×										
End of Borehole												
Practical refusal to augering at 5.61m depth												
(GWL @ 4.25m - April 17, 2024)												
								20 Shea	40 60 ar Strength	80 10 (kPa)	JÜ	
								▲ Undist	urbed $\Delta Re$	emoulded		

natersonar		In	Con	sulting		SOIL	- PRO	FILE AI	ND TEST	DATA
9 Auriga Drive, Ottawa, Ontario K2E 7T			Eng	ineers	Go Pr Ot	eotechnic op. Resic tawa. Or	al Invest dential De ntario	igation ev 800 C	edarview Ro	bad
EASTING: 359420.374 NORTHING DATUM: Geodetic	: 50	16406	6.742	ELEVA	ATION	: 113.36	6		FILE NO.	PG5600
REMARKS:	ι <b>ω</b> Λ		Trad			0004	1 اند م		HOLE NO.	
BORINGS BY: CME 55 Mechanical Ear	th Aug	ger on			DATE:	2024 /	April 1	D D		
SAMPLE DESCRIPTION	A PLO					DEPTH (m)	ELEV. (m)	• 50 Pen. R	o mm Dia. C	
	<b>TAT</b>	түре	JMBEF	% COVEF	VALUI Nr RQD			• <b>N</b>	/ater Conter	nt %
	S	•	ž	ЯË	z	0-	-113.36	20	40 60	80 <u>Ş</u> ŭ
TOPSOIL with organics0.13	B		4	75	7					
GLACIAL TILL: Compact, brown silty sand with gravel, trace clay,				/3	1					
cobbles and boulders		ss	2	67	+50	1-	-112 36			
		<u>/</u>					112.00			
		17								
		ss	3	17	9	2-	-111 36			
		Ľ				2	111.50			
		ss	4	48	15					
2.95	5	<u>A</u>				0	110.00			
BEDROCK: Fair quality, grey						3-	-110.30			
limestone bedrock		RC	1	100	63					
							100.00			
		_				4-	-109.36			
		RC	2	100	46	_	400.00			
						5-	-108.36			
		_								
		BC	3	100	67		107.00			
					0.	6-	-107.36			
6.43	3	_							· · · · · · · · · · · · · · · · · · ·	
(GWL @ 1.47m - April 15, 2024)										
								20 Shore	40 60	80 100
								Undist	urbed $\triangle$ Ref	moulded

natersono	ır <i>c</i>	ור	In	Con	sulting		SOIL	- PRO	FILE AI	ND TEST	DATA	
9 Auriga Drive, Ottawa, Ontario K2	E 7T9			Engi	ineers	Ge Pr	eotechnic op. Resid	al Invest Jential De	igation ev 800 C	edarview R	oad	
EASTING: 359561.736 NORT	'HING:	501	6749	9.605	ELEV		112.93	3		FILE NO.	PG5600	)
REMARKS:										HOLE NO.		
BORINGS BY: CME 55 Mechanical	Earth	Aug	er on	Track	< [	DATE:	2024 /	April 1			BH 7-24	1
SAMPLE DESCRIPTION		PLOT		SAM	IPLE		DEPTH	ELEV.	Pen. R	esist. Blows 0 mm Dia. C	s / 0.3m Cone	G WEL CTION
		RATA	ΥΡΕ	MBER	% OVERY	/ALUE RQD	(11)	(m)	• <b>N</b>	/ater Conte	nt %	ITORIN
GROUND SURFACE		STI	F	NN	REC	Σ ^δ	0	110.00	20	40 60	80	MON MON
TOPSOIL with organics GLACIAL TILL: Very dense, brown silty sand with gravel and cobbles	0.20		⟨ss -	1	50	+50	- 0-	-112.93				
<b>BEDROCK</b> : Fair to good quality, grey sandstone bedrock - Vertical fractures from 0.8m to			RC -	1	100	42	1-	-111.93				րիկորիրիկիրի Ռիլորիրինի
2.1m depth and from 1.3m to			RC	2	100	81	2-	-110.93				րիներիներիներիներ Աներներիներիներ
			RC	3	100	90	3-	-109.93				
	4.17		_				4-	-108.93				
quality, grey limestone bedrock			RC	4	100	64	5-	-107.93				
End of Borehole	6.15		RC	5	100	94	6-	-106.93				
(GWL @ 0.65m - April 15, 2024)									20 Shea ▲ Undist	40 60 ar Strength urbed △ Re	80 10 ( <b>kPa)</b> moulded	00

natersona	101	Ir	Con	sulting		SOIL	- PRO	FILE AN	ND TEST	<b>DATA</b>	
9 Auriga Drive, Ottawa, Ontario K2E 7	Г9		Eng	ineers	Ge Pr Ot	eotechnic op. Resic ttawa, Or	cal Invest dential De ntario	igation ev 800 C	edarview R	load	
EASTING: 359686.062 NORTHIN DATUM: Geodetic	<b>G</b> : 50	)1693(	0.791	ELEV	ATION	110.77	7		FILE NO.	PG5600	D
REMARKS:	orth Aug	nor on	Trad		<b></b>	2024	April 1		HOLE NO.	BH 8-2	4
			SAN		JATE:	20247		Pen, B	esist. Blow	s / 0.3m	
SAMPLE DESCRIPTION	A PLO		~			DEPTH (m)	ELEV. (m)	• 5	0 mm Dia. (	Cone	NG WI
	TRAT/	ТҮРЕ	UMBEF	ECOVEF	N VALUI or RQD			• <b>N</b>	/ater Conte	ent %	ONITORI
GROUND SURFACE	0 0	× ss	1	<b>œ</b> 100	+50	- 0-	110.77	20	40 60	80	ž
GLACIAL TILL: Very dense, 0.3 brown silty sand with gravel BEDROCK: Good quality, grey sandstone bedrock	$30 \frac{4}{1} \frac$	RC	1	100	71	1-	-109.77				<u>14114141414145</u> ▲ 441444444445
		RC	2	100	86	2-	-108.77				ուներիներիների Արերերերերին
		RC	3	100	80	3-	-107.77				
BEDROCK: Good to excellent quality, grey limestone bedrock	29					4-	-106.77				
		RC	4	100	78	5-	-105.77				
End of Borehole	17 <u></u>	RC	5	100	100	6-	-104.77				
(GWL @ 0.33m - April 15, 2024)								20 Shea ▲ Undist	40 60 ar Strength urbed △ Ru	80 10 ( <b>kPa</b> ) emoulded	00

## 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, St, 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:

St < 2
$2 < S_t < 4$
$4 < S_t < 8$
8 < St < 16
St > 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
Сс	-	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 > 4Well-graded sands have: 1 < Cc < 3 and Cu > 6Sands 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)
Сс	-	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





Paterson Group Consulting Engineers (Ottawa)	
9 Auriga Drive	
Ottawa, ON K2E 7T9	
Attn: Mark Bujaki	
	Report Date: 3-Sep-2024
Client PO: 61142	Order Date: 28-Aug-2024
Project: PE6605	
Custody:	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

Mark Foto, M.Sc.

Lab Supervisor



BTEX by P&T GC-MS

## Client: Paterson Group Consulting Engineers (Ottawa)

Client PO: 61142

PHCs F2 to F4

Analysis

PHC F1

Solids, %

## Analysis Summary Table

REG 153: Metals by ICP/MS, soil

REG 153: PAHs by GC-MS

Extraction Date

30-Aug-24

30-Aug-24

30-Aug-24

30-Aug-24

30-Aug-24

29-Aug-24

Report Date: 03-Sep-2024

Order Date: 28-Aug-2024

Analysis Date

30-Aug-24

30-Aug-24

31-Aug-24

30-Aug-24

31-Aug-24

30-Aug-24

Project Description: PE6605

OTTAWA •	MISSISSAUGA	<ul> <li>HAMILTON</li> </ul>	KINGSTON	<ul> <li>LONDON</li> </ul>	NIAGARA	WINDSOR	<ul> <li>RICHMOND</li> </ul>	HIL
----------	-------------	------------------------------	----------	----------------------------	---------	---------	------------------------------	-----

Method Reference/Description

CWS Tier 1 - GC-FID, extraction

EPA 6020 - Digestion - ICP-MS

EPA 8270 - GC-MS, extraction

EPA 8260 - P&T GC-MS

CWS Tier 1 - P&T GC-FID

CWS Tier 1 - Gravimetric



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

Client PO: 61142

Report Date: 03-Sep-2024

Order Date: 28-Aug-2024

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	-	-



## Client: Paterson Group Consulting Engineers (Ottawa)

#### Client PO: 61142

Report Date: 03-Sep-2024

Order Date: 28-Aug-2024

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: Paterson Group Consulting Engineers (Ottawa)

#### Client PO: 61142

Report Date: 03-Sep-2024

Order Date: 28-Aug-2024

	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: Paterson Group Consulting Engineers (Ottawa)

Client PO: 61142

Report Date: 03-Sep-2024

Order Date: 28-Aug-2024

Project Description: PE6605

	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: Paterson Group Consulting Engineers (Ottawa)

#### Client PO: 61142

Report Date: 03-Sep-2024

Order Date: 28-Aug-2024

Project Description: PE6605

	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: Paterson Group Consulting Engineers (Ottawa)

#### Client PO: 61142

Report Date: 03-Sep-2024

Order Date: 28-Aug-2024

	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%	-	-



## Client: Paterson Group Consulting Engineers (Ottawa)

Client PO: 61142

# Method Quality Control: Blank

Order #: 2435337
Report Date: 03-Sep-2024

Order Date: 28-Aug-2024

Project Description: PE6605

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					



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

Client PO: 61142

# Method Quality Control: Blank

Report Date: 03-Sep-2024

Order Date: 28-Aug-2024

Project Description: PE6605

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			



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

Client PO: 61142

# Method Quality Control: Duplicate

Report Date: 03-Sep-2024

Order Date: 28-Aug-2024

Project Description: PE6605

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	



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

Client PO: 61142

# Method Quality Control: Duplicate

Report Date: 03-Sep-2024

Order Date: 28-Aug-2024

Project Description: PE6605

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			



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

Client PO: 61142

## 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			

Report Date: 03-Sep-2024

Order Date: 28-Aug-2024



Client: Paterson Group Consulting Engineers (Ottawa)

Client PO: 61142

# 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			

Report Date: 03-Sep-2024

Order Date: 28-Aug-2024



Client: Paterson Group Consulting Engineers (Ottawa)

Client PO: 61142

#### **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.

Any use of these results implies your agreement that our total liability in connection with this work, however arising, shall be limited to the amount paid by you for this work, and that our employees or agents shall not under any circumstances be liable to you in connection with this work.

OTTAWA - MISSISSAUGA - HAMILTON - KINGSTON - LONDON - NIAGARA - WINDSOR - RICHMOND HILL

## Order #: 2435337

Report Date: 03-Sep-2024

Order Date: 28-Aug-2024

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Intact Name: Mark Bynki,		Quote	#:									т	urnar	ound	Tim	e		
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J -		E-mail	mi	wjaki@ pate	rsagray							2 day				🛱 Re	gular	
Alephone: 613 . 226 - 7381		1	md	sury e pater	Sengrap						Date	Requi	red:					
REG 153/04 REG 406/19 Other Regulation	Τ.	Antrix 7		(Sail/Sad) GW/G	round Water	Τ												
] Table 1 Res/Park Med/Fine REG 558 PWQO	1	SW (Su	rface W	Vater) SS (Storm/Sar	nitary Sewer)					Re	quirec	Anah	ysis					
] Table 2 Ind/Comm Coarse CCME MISA			Р (Р	aint) A (Air) O (Oth	er)	Ă												
] Table 3 Agri/Other SU - Sani SU - Storm			ers			181			L									
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3 TP3 - 24 CI	5		2			Κ		X	X									
4 774 - 24161	5		2			X		$\leq$	$\times$									
5 TPS - 2461	5		1			X		X	×									
6 TP6 - 24 61	5		1			X		$\times$	X									
7 147-2461	5		1			X		×	×									1
8 TP8 - 24 61	S		1_	V V		X		X	X									
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Paterson Group Consulting Engineers (Ottawa)	
9 Auriga Drive	
Ottawa, ON K2E 7T9	
Attn: Mark Bujaki	
	Report Date: 4-Sep-2024
Client PO: 61142	Order Date: 28-Aug-2024
Project: PE6605	Ordor #: 2425246
Custody:	Order #: 2435346
This Certificate of Analysis contains analytical data applicable to the following samples as submitted:	
Paracel ID Client ID	

Approved By:

2435346-01

BH6-24

Mark Foto

Mark Foto, M.Sc.



BTEX by P&T GC-MS

REG 153: PAHs by GC-MS

Metals, ICP-MS

PHCs F2 to F4

## Client: Paterson Group Consulting Engineers (Ottawa)

Client PO: 61142

Analysis

PHC F1

## **Analysis Summary Table**

Extraction Date

30-Aug-24

29-Aug-24

29-Aug-24

30-Aug-24

3-Sep-24

Report Date: 04-Sep-2024

Order Date: 28-Aug-2024

Analysis Date

30-Aug-24

30-Aug-24

30-Aug-24

30-Aug-24

3-Sep-24

Project Description: PE6605

Method Reference/Description

EPA 624 - P&T GC-MS

CWS Tier 1 - P&T GC-FID

CWS Tier 1 - GC-FID, extraction

EPA 625 - GC-MS, extraction

EPA 200.8 - ICP-MS



## Client: Paterson Group Consulting Engineers (Ottawa)

Client PO: 61142

Report Date: 04-Sep-2024

Order Date: 28-Aug-2024

Project Description: PE6605

	Client ID:		-	-	-		
	Sample Date:	28-Aug-24 00:00	-	-	-	-	-
	Sample ID:	2435346-01 Cround Water	-	-	-		
	watrix:	Giouria 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	-	-	-	-	-



## Client: Paterson Group Consulting Engineers (Ottawa)

Client PO: 61142

Report Date: 04-Sep-2024

Order Date: 28-Aug-2024

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: Paterson Group Consulting Engineers (Ottawa)

#### Client PO: 61142

Report Date: 04-Sep-2024

Order Date: 28-Aug-2024

Project Description: PE6605

	_						
	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%	-	-	-	-	-



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

Result

ND

Client PO: 61142

Hydrocarbons F1 PHCs (C6-C10)

F2 PHCs (C10-C16)

F3 PHCs (C16-C34)

F4 PHCs (C34-C50)

Analyte

Metals

Antimony

Arsenic

Barium

Boron

Cobalt

Copper

Lead

Nickel

Silver

Sodium

Thallium

Uranium

Vanadium

Semi-Volatiles

Acenaphthene

Anthracene

Acenaphthylene

Benzo [a] pyrene

Benzo [a] anthracene

Benzo [b] fluoranthene

Benzo [g,h,i] perylene

Zinc

Selenium

Beryllium

Cadmium

Chromium

Molybdenum

## Method Quality Control: Blank

						Order Date: 28-Aug-2024
						Project Description: PE660
Reporting Limit	Units	%REC	%REC	RPD	RPD Limit	Notes
25	ug/L					

Report Date: 04-Sep-2024

ug/L

100

100

100

0.5

1

1

0.5

10

0.1

1

0.5

0.5

0.1

0.5

1

1

0.1

200

0.1

0.1

0.5

5

0.05

0.05

0.01

0.01

0.01

0.05

0.05



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

Client PO: 61142

# Method Quality Control: Blank

Report Date: 04-Sep-2024

Order Date: 28-Aug-2024

Project Description: PE6605

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			



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

Client PO: 61142

Hydrocarbons F1 PHCs (C6-C10)

Analyte

Metals

## Method Quality Control: Duplicate

Report Date: 04-Sep-2024

Order Date: 28-Aug-2024

Project Description: PE6605

Notes

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			

Source

Result

ND

Units

ug/L

Reporting

Limit

25

Result

ND

%REC

Limit

%REC

RPD

Limit

30

RPD

NC



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

Client PO: 61142

# 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			

Report Date: 04-Sep-2024

Order Date: 28-Aug-2024

Project Description: PE6605



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

Client PO: 61142

# 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			

Report Date: 04-Sep-2024

Order Date: 28-Aug-2024



Client: Paterson Group Consulting Engineers (Ottawa)

Client PO: 61142

#### **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.

Any use of these results implies your agreement that our total liability in connection with this work, however arising, shall be limited to the amount paid by you for this work, and that our employees or agents shall not under any circumstances be liable to you in connection with this work.

Order #: 2435346

Report Date: 04-Sep-2024

Order Date: 28-Aug-2024

Paracel ID: 2435346							Paracel Order Number (Lab Use Only) 2435337 - So 2435346 - GW				Chain Of Custody (Lab Use Only)					
Client Name: Paterson	Project	t Ref:	PE6605								Page (of )					
Contact Name: Mark Byaki,	Quote	#:								Turnaround Time						
Address: 9 Auricia Orive	PO #:	61	142							1 0	1 day			[	3 0	day
	E-mail:	ml	alaki@ Det	erson group							2 day			ł	A Re	gular
Telephone: 613.226-7381		md	eviny @ pate	Sugrap						Date	Requi	ed:			,	-
REG 153/04 REG 406/19 Other Regulation	Matrix T		(Soil/Sod ) CHUC		Γ					I						
Table 1 Res/Park Med/Fine REG 558 PWQO	SW (Sur	W (Surface Water) SS (Storm/Sanitary Sewer)				quired	l Analy	sis								
Table 2 Ind/Comm Coarse CCME MISA		<b>P</b> (P	aint) A (Air) O (Oti	ner)	X								Τ			
Table 3 Agri/Other SU - Sani SU - Storm		ers			+BT			٩								
TableMun:	ae	tain	Sample Taken					Š			_					
For RSC: Yes No Other:	Volu					S	۲°	tals t		-	SWF					1
Sample ID/Location Name	Air	ik a Date Time			F	2	PA	Me	ĥ	ų	B (I					
1 7 p1 - 24 C1 5	>	9	Aug272024		$\times$		$\times$	Х								
2 1 P2 - 2461 5		2	5)		${}^{\times}$		$\times$	$\times$								
3 TP3 - 24 CI S		2			ĸ		×	X								
4 TP4 - 24161 S		2			×		$\leq$	$\times$		$\square$						
5 TPS - 2461 S		2				$\square$	$\times$	$\times$		$\square$						
6 TP6-2461 5		1			×		×	×	F				Ť			
7 177-2461 5		1			X	H	$\mathbf{x}$		H	H	H		Ť			
8 TP8-24 GI		1_	V		N	$\square$	X	$\mathbf{x}$	H	H	H		Ť	=†		
9 BHG-24 Gu	-		A-a 282024			H	$\overline{X}$	$\mathbf{X}$	H	H		╡	╡	=#	-	
10	++		ingere i		H	님	Ê	H	H	片		╡	╡	=#		
Comments:									Metho	d of Del	ivery:		╡			
					-					TV	X	W.	D	[]	11	10
Relinquished By (Sign): Accord B-1 - Received at Depot:				Received at Lab:	a		40	X	Verifie	d By:	<u>Ad</u>	14		4	JU	U.K
Relinquished By (Print): March B K				Date/Time:			$\sum_{n=1}^{\infty}$		Date/T	45	5			11-	1	
Date/Time: 1 2 4 22711 Temperature:			00	Temporaturd	ЦC	10	X	2	2	91	tig	24	Ļ	115		
Alog Z & fl. 702 9	pH					pH Ver	ified: L		By:							



Paterson Group Consulting Engineers (Ottawa)			
9 Auriga Drive			
Ottawa, ON K2E 7T9			
Attn: Mark Bujaki			
	Report Date: 10-Sep-2024 Order Date: 4-Sep-2024		
Client PO: 61190			
Project: PE6605	Onden #2 0400005		
Custody:	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:

Naza

Dale Robertson, BSc

Laboratory Director



## Client: Paterson Group Consulting Engineers (Ottawa)

Client PO: 61190

Analysis

Solids, %

# **Analysis Summary Table**

REG 153: Metals by ICP/MS, soil

REG 153: PAHs by GC-MS

Extraction Date

9-Sep-24

9-Sep-24

5-Sep-24

Report Date: 10-Sep-2024

Order Date: 4-Sep-2024

Analysis Date

9-Sep-24

9-Sep-24

6-Sep-24

Project Description: PE6605

OTTAWA • MISSISSAUGA • HAMILTON • KINGSTON • LONDON • NIAGARA • WINDSOR • RICHMOND HIL
----------------------------------------------------------------------------------------

Method Reference/Description

EPA 6020 - Digestion - ICP-MS

EPA 8270 - GC-MS, extraction

CWS Tier 1 - Gravimetric



## Client: Paterson Group Consulting Engineers (Ottawa)

Client PO: 61190

Report Date: 10-Sep-2024

Order Date: 4-Sep-2024

Project Description: PE6605

	_											
	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: Paterson Group Consulting Engineers (Ottawa)

Client PO: 61190

Report Date: 10-Sep-2024

Order Date: 4-Sep-2024

	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%	-	-	-	-	-



## Client: Paterson Group Consulting Engineers (Ottawa)

Client PO: 61190

# 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					

Report Date: 10-Sep-2024

Order Date: 4-Sep-2024



## Client: Paterson Group Consulting Engineers (Ottawa)

Client PO: 61190

# Method Quality Control: Blank

Report Date: 10-Sep-2024

Order Date: 4-Sep-2024

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			



Client: Paterson Group Consulting Engineers (Ottawa)

Client PO: 61190

## Method Quality Control: Duplicate

Report Date: 10-Sep-2024

Order Date: 4-Sep-2024

Project Description: PE6605

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	


Dibenzo [a,h] anthracene

Indeno [1,2,3-cd] pyrene

Surrogate: 2-Fluorobiphenyl

Surrogate: Terphenyl-d14

1-Methylnaphthalene

2-Methylnaphthalene

Client: Paterson Group Consulting Engineers (Ottawa)

Reporting

Limit

0.02

0.02

0.02

0.02

0.02

0.02

0.01

0.02

0.02

Result

ND

ND

ND

ND

ND

ND

ND

ND

ND

0.742

0.956

Client PO: 61190

Fluoranthene

Naphthalene

Phenanthrene

Pyrene

Fluorene

Analyte

## Method Quality Control: Duplicate

Report Date: 10-Sep-2024

Order Date: 4-Sep-2024

Project Description: PE6605

Notes

OTTAWA = MISSISSAUGA =	HAMILTON	KINGSTON	<ul> <li>LONDON</li> </ul>	NIAGARA	<ul> <li>WINDSOR</li> </ul>	<ul> <li>RICHMOND</li> </ul>	HILL
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Source

Result

ND

ND

ND

ND

ND

ND

ND

ND

ND

Units

ug/g

ug/g

ug/g

ug/g

ug/g

ug/g

ug/g

ug/g

ug/g

%

%

%REC

Limit

50-140

50-140

%REC

52.4

67.5

RPD

Limit

40

40

40

40

40

40

40

40

40

RPD

NC

NC

NC

NC

NC

NC

NC

NC

NC



## Client: Paterson Group Consulting Engineers (Ottawa)

Client PO: 61190

# 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			

Report Date: 10-Sep-2024

Order Date: 4-Sep-2024

Project Description: PE6605

OTTAWA - MISSISSAUGA - HAMILTON - KINGSTON - LONDON - NIAGARA - WINDSOR - RICHMOND HILL



## Client: Paterson Group Consulting Engineers (Ottawa)

Client PO: 61190

## 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			

Order #: 2436205

Report Date: 10-Sep-2024

Order Date: 4-Sep-2024

Project Description: PE6605



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

Client PO: 61190

## **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.

Any use of these results implies your agreement that our total liability in connection with this work, however arising, shall be limited to the amount paid by you for this work, and that our employees or agents shall not under any circumstances be liable to you in connection with this work.

Order #: 2436205

Report Date: 10-Sep-2024

Order Date: 4-Sep-2024

Project Description: PE6605

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Client Name: Paterson	Proje	ect Ref:	PÉ6605	, <u>, , , , , , , , , , , , , , , , , , </u>						Page / of												
Contact Name: Mark Bjak;	Quot	te #:								Turnaround Time												
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		E-ma	E-mail: Mbyakiepatersongroppia												[	Re	gular					
Telephone: 613 - 226 - 7381			m	darcy Epate	Date Required:																	
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