

**Phase II – Environmental Site Investigation**  
1740, 1746 and 1754 Carling Avenue, 828 Boyd Avenue  
and 1755 Kerr Avenue

Ottawa, Ontario

Prepared for: The Properties Group

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## **EXECUTIVE SUMMARY**

### **Assessment**

A Phase II ESA was carried out for the properties addressed 1740, 1746 and 1754 Carling Avenue, 828 Boyd Avenue and 1755 Kerr Avenue, in the City of Ottawa, Ontario. The purpose of the Phase II ESA was to address potentially contaminating activities (PCAs) that were identified during the Phase I ESA and considered to result in areas of potential environmental concern (APECs) on the Phase II Property.

The subsurface investigations were conducted in stages between November 2014 and May 2022. A total of 21 boreholes were drilled to depths ranging from approximately 1.04m to 10.26m below ground surface (bgs). Eighteen (18) of the boreholes were instrumented with groundwater monitoring wells upon their completion.

The soil profile generally consists of a surficial layer of asphaltic concrete, gravel or concrete, followed by fill material consisting of brown silty sand with gravel, brown silty clay, brown sandy silt, crushed stone and cobbles. The fill layer extended to a maximum depth of 2.23m. Limestone bedrock was encountered at a maximum depth of 2.33 m below the existing ground surface.

### Soil

Based on the findings of the field screening in combination with sample depth and location, 12 soil samples were submitted for analysis of metals, BTEX and/or PHCs (F1-F4).

All of the analyzed metal parameters are in compliance with the applicable MECP Table 7 Standards, with the exception of lead in soil Sample BH4-SS1 which was submitted during the May 2015 assessment on 1746 Carling Avenue and PHC F2 parameter in soil sample BH8-SS3. All the detected PHC concentrations in the analysed soil samples comply with the selected MECP Table 7 Standards. No BTEX parameters were identified in the samples analysed. As such, the results comply with the MECP Table 7 standards.

### Groundwater

Twenty-seven (27) groundwater samples from the past investigations were submitted for laboratory analysis of BTEX, PHCs and VOCs, with one groundwater sample submitted for laboratory analysis of PAHs.

One or more hydrocarbon parameters were identified in all samples except for samples recovered from BH1 located at 1740 Carling Avenue, BH8 and BH9 located at 1746

Carling Avenue, MW201 and MW801 located at the alley way on the western portion of the Phase II Property.

Groundwater from BH3 and BH7 (1755 Kerr Avenue) was resampled and submitted for analytical testing of BTEX and PHCs. All the analytical test results from the second groundwater sampling event complied with the selected MECP Table 7 standards.

Groundwater from BH6 (1746 Carling Avenue) was resampled and submitted for analytical testing of BTEX and PHCs. All the analytical test results from the second groundwater sampling event complied with the selected MECP Table 7 standards.

The second groundwater sampling events for the remaining boreholes still identified hydrocarbon parameters that exceed the MECP Table 7 standards.

One or more BTEX/VOC parameters that exceed the MECP Table 7 standards have been identified in groundwater samples obtained from BH1-14 on the northeastern portion of the Phase II Property, BH1 on the southeastern portion of the Phase II Property, BH3 on the northern portion of the Phase II Property, BH5 on the western portion of the Phase II Property and BH1 on the northwestern portion of the Phase II Property.

The chloroform in the groundwater samples resulted from the use of municipally treated water for the bedrock coring process required for installation of monitoring wells. This is not considered to be a COC.

## **Recommendations**

Based on the findings of this assessment, lead impacted fill was identified in the central portion of the Phase II Property. Given the low solubility of lead, the impacts are expected to be confined to the fill layer. There is no risk to the current use of the Phase II Property.

It is our understanding that the Phase II Property will be redeveloped in the future. As such, the contaminated soil should be delineated and remediated in conjunction with site redevelopment. This contaminated soil will require disposal at a licensed waste disposal facility. Prior to off-site disposal of impacted soil at a licensed waste disposal facility, a leachate analysis of a representative sample of contaminated soil must be conducted in accordance with Ontario Regulation 347/558.

Groundwater impacted by PHCs, BTEX and/or VOCs was identified across the entirety of the Phase II Property. It is our opinion that the contaminated groundwater does not pose a risk to the current use of the subject buildings.

Remediation of the groundwater to meet the generic MECP standards, would be feasible on the southern portion of the property, although further testing will be required to confirm this. Where the groundwater has higher contaminant concentrations or the contamination is coming from off-site, it may not be practical to meet generic standards. In lieu of a generic remediation, a due diligence risk assessment should be completed to assess the risk to the future development and any required risk mitigation measures that would be required to be implemented. Further information can be provided upon request.

## 1.0 INTRODUCTION

At the request of Kerr Broadview Properties Ltd., Paterson Group (Paterson) carried out a Phase II-Environmental Site Assessment (Phase II-ESA) for the properties addressed 1740, 1746 and 1754 Carling Avenue, 828 Boyd Avenue and 1755 Kerr Avenue, in the City of Ottawa, Ontario, herein referred to as the Phase II Property.

The purpose of this Phase II ESA has been to address areas of potential environmental concern (APECs) identified on the Phase II Property and address APECs identified in our Phase I ESA. The report also includes findings of previous field investigations.

### 1.1 Site Description

Address: 1740, 1746 and 1754 Carling Avenue, 828 Boyd Avenue and 1755 Kerr Avenue, Ottawa, Ontario.

Location: The Phase I Property is located at the southwestern corner of the Carling and Boyd Avenues intersection in the City of Ottawa, Ontario. Refer to Figure 1 - Key Plan in the Figures section following the text.

Latitude and Longitude: 45° 22' 39.0036" N, 75° 45' 8.9568" W

#### **Site Description:**

Configuration: Irregular

Site Area: 1.04 ha (approximately)

Zoning: AM10 – Arterial Mainstreet Zone

### 1.2 Property Ownership

Paterson was engaged to conduct this Phase II-ESA by Mr. Andrew Glass with Kerr Broadview Properties Ltd., the current property owner. The Kerr Broadview Properties Ltd. head office is located at 236 Metcalfe St, Ottawa, Ontario K2P 1R3, Canada. Mr. Glass can be reached by email at [info@prpgrp.com](mailto:info@prpgrp.com).

### **1.3 Current and Proposed Future Uses**

The Phase II Property is currently used for commercial purposes on 1740 and 1754 Carling Avenue while the remainder of the Phase II Property is vacant. It is our understanding that the Phase II Property will be redeveloped with a three multi-storey residential buildings with underground parking.

### **1.4 Applicable Site Condition Standard**

The site condition standards for the property were obtained from Table 7 of the document entitled “Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act”, prepared by the Ontario Ministry of Environment, Conservation and Parks (MECP), April 2011. The MECP selected Table 7 Standards are based on the following considerations:

- Coarse-grained soil conditions
- Generic site conditions for shallow soils
- Non-potable groundwater conditions
- Residential land use

Section 35 of O.Reg. 153/04 applies to the Phase II Property as the Phase II Property and neighbouring properties are all serviced by the municipality.

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

Section 43.1 of O.Reg. 153/04 applies to the Phase II Property in that the property is a Shallow Soil property.

Coarse-grained soil standards were chosen as a conservative approach. Grain size analysis was not completed.

## **2.0 BACKGROUND INFORMATION**

### **2.1 Physical Setting**

The Phase I Property is located at the southwestern corner of the Carling Avenue and Boyd Avenues intersection in the City of Ottawa, Ontario. According to the City of Ottawa website, the Phase II Property is situated in an Arterial Mainstreet Zone with surrounding properties consisting of commercial and residential land use.

The parcel of land addressed 1740 Carling Avenue is occupied by a one-storey slab-on-grade building occupied by Valiquette's Source for Sports, a sporting goods store.

The parcels of land addressed 1746 Carling Avenue and 828 Boyd Avenue consist of two (2) attached vacant parcels of land. These parcels are currently vacant and used as a surface parking lot. The majority of the 1746 Carling Avenue is covered with a concrete slab, which is the floor slab from the former on-site warehouse building. The remainder of 1746 Carling Avenue and 828 Boyd Avenue is gravel covered.

The parcel of land addressed 1754 Carling Avenue is occupied by a one-storey slab-on-grade multi-unit commercial building that consists of two auto repair garages and one auto detailing and glass replacement shop. The building is of concrete block construction with exterior brick and metal siding finishes and a flat, tar-and-gravel style roof.

The parcel of land addressed 1755 Kerr Avenue is a paved parking lot, with an attached laneway running north to Carling Avenue and a laneway running west to Broadview Avenue. Concrete retaining walls are present on the north side of the parking lot, in part on the west side of the attached laneway heading north and in part on the north side of the laneway heading west.

The Phase II Property is relatively flat and at grade with adjacent streets. The regional topography slopes down to the northwest towards the Ottawa River. Site drainage occurs primarily through sheet flow to catch basins on the adjacent streets with infiltration occurring over the gravelled areas.

## **2.2 Past Investigations**

As discussed in the Phase I-ESA, the following reports were reviewed as part of this assessment:

- Phase I-II Environmental Site Assessment, 1740 Carling Avenue, Existing Commercial Property, Ottawa, Ontario, prepared by Paterson Group, dated January 2014.
- Supplemental Phase II Environmental Site Assessment, 1740 Carling Avenue, Ottawa, Ontario, prepared by Paterson Group Inc., dated August 29, 2014.

- ❑ Phase II Environmental Site Assessment, 1746 Carling Avenue and 828 Boyd Avenue, Ottawa, Ontario, prepared by Paterson Group Inc., dated May 27, 2015.
- ❑ Phase I-II Environmental Site Assessment, 1755 Kerr Avenue, Vacant Lot, Ottawa, Ontario, prepared by Paterson Group, dated July 24, 2015.
- ❑ Site Monitoring Report, 1755 Kerr Avenue, Ottawa, ON, prepared by Terrapex.

Environmental Site Assessment (ESA) programs and a site monitoring report have been previously completed by Paterson Group and Terrapex for multiple parcels located within the Phase II Property boundary. The scope of work covered Phase I and II ESAs, as well as a Phase II ESA supplemental investigation, and addressed both existing commercial properties and vacant land. The findings and conclusions of these investigations will be discussed in detail in the body of this report.

## **3.0 SCOPE OF INVESTIGATION**

### **3.1 Overview of Site Investigation**

The January 2014 investigation that was conducted on 1740 Carling Avenue consisted of drilling two (2) boreholes (BH1 and BH2), both boreholes were instrumented with groundwater monitoring wells. These boreholes were placed on the exterior to assess APECs identified during the Phase I-ESA.

The August 2014 investigation that was also conducted on 1740 Carling Avenue, consisted of drilling an additional two (2) boreholes (BH1-14 and BH2-14) inside the building, both boreholes were instrumented with groundwater monitoring wells.

The May 2015 investigation that was conducted on 1746 Carling Avenue and 828 Boyd Avenue consisted of drilling four (4) boreholes, three (3) of which (BH1, BH2 and BH3) were instrumented with groundwater monitoring wells.

The July 2015 field program, that was conducted on 1755 Kerr Avenue consisted of the placement of seven (7) boreholes, five (5) of which (BH1, BH3, BH5, BH6 and BH7) were instrumented with groundwater monitoring wells.

A drilling program was conducted on 1746 Carling Avenue on October 2018 and consisted of drilling two boreholes (BH8 and BH9) deep wells for vertical delineation, all of which were instrumented with groundwater monitoring wells.

Finally, Terrapex investigations consisted of drilling three (3) boreholes on the alley way on the western portion of the Phase II Property, all of which were instrumented with groundwater monitoring wells. This work was completed for the owner to the adjacent property to the north (1784 Carling Avenue), a garage and former retail fuel outlet.

### **3.2 Media Investigated**

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

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

- Benzene, Toluene, Ethylbenzene, Xylenes (BTEX)
- Petroleum Hydrocarbons (PHCs)
- Metals
- Polycyclic Aromatic Hydrocarbons (PAHs)
- Volatile Organic Compounds

### **3.3 Phase I Conceptual Site Model**

#### **Geological and Hydrogeological Setting**

The Geological Survey of Canada website on the Urban Geology of the National Capital Area was consulted as part of this assessment. Based on this information, the bedrock in the area of the Phase I Property consists of interbedded limestone and dolomite of the Gull River Formation. Overburden soils are shown as glacial till, with a drift thickness on the order of 2 to 10m.

Groundwater is anticipated to flow in a northwesterly direction, towards the Ottawa River.

#### **Existing Buildings and Structures**

The northern portion of the Phase I Property is occupied by a one-storey multi-unit commercial building and the northeastern portion is occupied by a one-storey commercial retail building.

## Water Bodies and Areas of Natural and Scientific Interest

No water bodies are present on the Phase I Property. The closest water body is the Ottawa River, located approximately 1.5km north of the Phase I Property.

No areas of natural scientific interest were identified within the Phase I Study Area.

## Water Well Records

Based on the availability of municipal services, no drinking water wells are expected to be currently in use within the Phase I Study Area.

## Neighbouring Land Use

The neighbouring lands within the Phase I Study Area are residential, commercial and community land use.

## Potentially Contaminating Activities and Areas of Potential Environmental Concern

Based on the findings of this Phase I ESA, four on-site and seven off-site potentially contaminating activities (PCAs), were deemed to result in areas of potential environmental concern (APECs) on the Phase I Property. These APECs and associated PCAs and CPCs are presented in Table 1 below.

<b>Area of Potential Environmental Concern</b>	<b>Location of Area of Potential Environmental Concern with respect to Phase I Property</b>	<b>Potentially Contaminating Activity</b>	<b>Location of PCA (on-site or off-site)</b>	<b>Contaminants of Potential Concern</b>	<b>Media Potentially Impacted (Groundwater, Soil, and/or Sediment)</b>
APEC 1 Importation of Fill Material of Unknown Quality	Entire Phase I Property	"Item 30 – Importation of Fill Material of Unknown Quality"	On-site	Metals Hg CrVI PAHs BTEX PHCs (F <sub>1</sub> –F <sub>4</sub> )	Soil
APEC 2 Application of road salt for snow removal and de-icing purposes	Entire Phase I Property	N/A	On-site	EC/SAR	Soil and Groundwater

**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 3 Former underground diesel storage tank	Northern portion of the Phase II Property	"Item 28 – Gasoline and Associated Products Storage in Fixed Tanks"	On-site	BTEX PHCs (F <sub>1</sub> – F <sub>4</sub> )	Soil Groundwater
APEC 4 Current on-site automotive service garages	Northwestern portion of the Phase II Property	"Item 52 – Storage, Maintenance, Fueling and Repair of Equipment Vehicles, and Material Used to Maintain Transportation Systems"	On-site	BTEX PHCs (F <sub>1</sub> – F <sub>4</sub> ) PAHs VOCs	Soil Groundwater
APEC 5 Current automotive service garage	Northeastern portion of the Phase I Property	"Item 52 – Storage, Maintenance, Fueling and Repair of Equipment Vehicles, and Material Used to Maintain Transportation Systems"	Off-site	BTEX PHCs (F <sub>1</sub> – F <sub>4</sub> ) PAHs VOCs	Soil Groundwater
APEC 6 Current Automotive Service Garage	Western portion of the Phase I Property	"Item 52 – Storage, Maintenance, Fueling and Repair of Equipment Vehicles, and Material Used to Maintain Transportation Systems"	North of the Phase I Property	BTEX PHCs (F <sub>1</sub> – F <sub>4</sub> ) PAHs VOCs	Soil Groundwater
APEC 7 Former Retail Fuel Outlet and Current Automotive Service Garage	Western portion of the Phase I Property	"Item 28 – Gasoline and Associated Products Storage in Fixed Tanks"  "Item 52 – Storage, Maintenance, Fueling and Repair of Equipment Vehicles, and Material Used to Maintain Transportation Systems"	North of the Phase I Property	VOCs PHCs (F <sub>1</sub> – F <sub>4</sub> ) PAHs	Soil Groundwater

**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 8 Former auto-service garage	Southeastern portion of the Phase I Property	"Item 52 – Storage, Maintenance, Fueling and Repair of Equipment Vehicles, and Material Used to Maintain Transportation Systems"	Southeast of the Phase I Property	PHCs BTEX VOCs	Soil and/or Groundwater
APEC 9 Former automotive service garage	Southern portion of the Phase I Property	"Item 52 – Storage, Maintenance, Fueling and Repair of Equipment Vehicles, and Material Used to Maintain Transportation Systems"	Off-site	BTEX PHCs (F <sub>1</sub> –F <sub>4</sub> ) PAHs VOCs	Soil Groundwater
APEC 10 The former use of halogenated solvent	Eastern portion of the Phase I Property	"Item 37 – Operation of Dry-Cleaning Equipment (where chemicals are used)"and other	Off-site	VOCs	Soil Groundwater
APEC 11 The former use of halogenated solvent	Eastern portion of the Phase I Property	"Item 37 – Operation of Dry-Cleaning Equipment (where chemicals are used)"and other	Off-site	VOCs	Soil Groundwater
1 – In accordance with Section 49.1 of O.Reg. 153/04 standards are deemed to be met if an applicable site condition standard is exceeded at a property solely because the qualified person has determined that a substance has been applied to surfaces for the safety of vehicular or pedestrian traffic under conditions of snow or ice or both. The exemption outlined in Section 49.1 is being relied up with respect to the RSC property.					

Based on the significant coverage of asphaltic concrete on the Phase I Property, the use of salt during conditions of snow and ice is highly probable. As such, an additional APEC was included to account for the use of salt on the property

## **Assessment of Uncertainty and/or Absence of Information**

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

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

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

### **3.4 Deviations from Sampling and Analysis Plan**

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

### **3.5 Impediments**

Physical impediments encountered during the Phase II ESA program include underground utilities, the former building foundation, and parked vehicles which limited the location of certain boreholes.

## **4.0 INVESTIGATION METHOD**

### **4.1 Subsurface Investigation**

The subsurface investigations were conducted in stages between January 2013 and May 2022.

A total of 21 boreholes were drilled to depths ranging from approximately 1.04m to 10.26m below ground surface (bgs). Eighteen (18) of the boreholes were instrumented with groundwater monitoring wells upon their completion.

The boreholes were drilled with a truck mounted drill rig and portable drill operated by George Downing Estate Drilling of Hawkesbury, Ontario, under full-time supervision of Paterson personnel. The borehole locations are indicated on the attached Drawing PE4425-3- Test Hole Location Plan.

## 4.2 Soil Sampling

A total of 34 soil samples were obtained from the boreholes by means of grab sampling from auger flights/auger samples and split spoon sampling.

Split spoon samples were taken at approximate 0.76 m intervals. Rock core samples were collected with the use of coring equipment.

The depths at which split spoon, auger flight and rock core samples were obtained from the boreholes are shown as “**SS**”, “**AU**” and “**RC**” respectively on the Soil Profile and Test Data Sheets provided in Appendix 2. Note that borehole logs from previous investigations are also included.

The borehole profiles generally consist of a surficial layer of asphaltic concrete or interlock brick, followed by a layer of crushed stone fill which was underlain by silty clay or sand with gravel fill material or was underlain by native sandy silt and glacial till followed by sandy silt, on limestone/shale bedrock.

Borehole locations are shown on Drawing PE4425-3 – Test Hole Location Plan.

## 4.3 Field Screening Measurements

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

To measure the soil vapours, the analyser probe is inserted into the nominal headspace above the soil sample. A photo ionization detector (PID) or Gastech was used to measure the 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 vapour readings were generally less than 50ppm. The vapour screening can not be relied upon to identify heavier petroleum products. Vapour readings are noted on the Soil Profile and Test Data Sheets in Appendix 1.

## 4.4 Groundwater Monitoring Well Installation

Eighteen environmental groundwater monitoring wells were installed on the Phase II Property as part of the subsurface investigations. Monitoring well construction details are listed in Table 2 and are also presented on the Soil Profile and Test Data Sheets provided in Appendix 1.

Well ID	Address	Ground Surface Elevation	Total Depth (m BGS)	Screened Interval (m BGS)	Sand Pack (m BGS)	Bentonite Seal (m BGS)	Casing Type
BH1	1740 Carling Avenue	98.94	5.79	2.30-5.70	2.0-5.79	0.0-2.0	Flushmount
BH2	1740 Carling Avenue	99.04	6.10	3.05-6.10	2.52-6.10	0.00-2.52	Flushmount
BH1-14	1740 Carling Avenue	99.27	5.00	1.52-5.00	3.08-5.00	0.00-3.08	Flushmount
BH2-14	1740 Carling Avenue	99.27	5.20	3.05-5.20	1.92-5.20	0.00-1.92	Flushmount
BH1	828 Boyd Avenue	98.66	6.12	3.08-6.12	2.76-6.12	0.00-2.76	Flushmount
BH2	1746 Carling Avenue	99.16	6.24	3.36-6.24	3.06-6.24	0.00-3.06	Flushmount
BH3	1746 Carling Avenue	99.25	7.16	4.12-7.16	3.36-7.16	0.00-3.36	Flushmount
BH8	1746 Carling Avenue	99.17	10.11	8.6-10.11	8.08-10.11	0.28-8.08	Flushmount
BH9	1746 Carling Avenue	99.20	10.26	8.52-10.26	8.08-10.26	0.28-8.08	Flushmount
BH1	1754 Carling Avenue	98.40	6.23	3.24-6.23	2.96-6.23	0.00-2.96	Flushmount
BH3	1755 Kerr Avenue	99.03	6.23	3.24-6.23	2.44-6.23	0.00-2.44	Flushmount
BH5	1755 Kerr Avenue	97.64	5.03	3.64-5.03	3.04-5.03	0.00-3.04	Flushmount
BH6	1755 Kerr Avenue	99.05	6.02	2.84-5.84	2.30-6.02	0.30-2.30	Flushmount
BH7	1755 Kerr Avenue	99.25	6.02	2.96-6.02	2.16-6.02	0.30-2.16	Flushmount
Monitoring Wells conducted by others							
MW201	1755 Kerr Avenue	100.99	5.5	3.35-5.5	2.9-5.5	0.00-2.9	Flushmount

MW202	1755 Kerr Avenue	100.92	5.52	3.4-5.52	3.1-5.52	0.00-3.1	Flushmount
MW801	1755 Kerr Avenue	77.50	5.5	2.4-5.5	3.2-5.5	0.2-2.3	Flushmount

#### **4.5 Groundwater Sampling**

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

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

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

#### **4.6 Analytical Testing**

Based on the guidelines outlined in the Sampling and Analysis Plan appended to this report, the following soil and groundwater samples, as well as analyzed parameters are presented in Tables 3 and 4, respectively.

**TABLE 3 – Analyzed Parameters for Submitted Soil Samples**

Sample ID	Address	Sample Depth & Stratigraphic Unit	Parameter			Rationale
			Metals <sup>1</sup>	BTEX	PHCs F <sub>1</sub> -F <sub>4</sub>	
BH1-SS1	1740 Carling Avenue	0.80 – 1.2 m Glacial Till		X	X	Assess fill material of unknown quality, assess potential soil impacts resulting from various off-site industries (northeastern portion of Phase II Property) Sample depth determined by CPC, location of APEC and associated medium.
BH2-SS1	1740 Carling Avenue	0.80 – 1.2 m Fill Material		X	X	Assess fill material of unknown quality, assess potential soil impacts resulting from various off-site industries (northeastern portion of Phase II Property) Sample depth determined by CPC, location of APEC and associated medium.
BH1-14-SS2	1740 Carling Avenue	0.60 – 1.2 m Fill Material		X	X	Assess fill material of unknown quality, assess potential soil impacts resulting from various off-site industries (northeastern portion of Phase II Property) Sample depth determined by CPC, location of APEC and associated medium.
BH2-14-SS3	1740 Carling Avenue	1.80 – 1.90 m Fill Material		X	X	Assess fill material of unknown quality, assess potential soil impacts resulting from various off-site industries (northeastern portion of Phase II Property) Sample depth determined by CPC, location of APEC and associated medium.
BH3-SS2	1746 Carling Avenue	1.1 – 1.4 m Native	X	X	X	Assess fill material of unknown quality, assess potential soil impacts resulting from various off-site industries (northern portion of Phase II Property) Sample depth determined by CPC, location of APEC and associated medium.
BH4-SS1	1746 Carling Avenue	1.0-1.45 m (Fill Material)	X	X	X	Assess fill material of unknown quality, assess potential soil impacts resulting from various off-site industries (central portion of Phase II Property) Sample depth determined by CPC, location of APEC and associated medium.
BH8-SS2	1746 Carling Avenue	0.72 – 1.36 m Fill Material	X			Assess fill material of unknown quality, assess potential soil impacts resulting from various off-site industries (northern portion of Phase II Property) Sample depth determined by CPC, location of APEC and associated medium.
BH8-SS3	1746 Carling Avenue	1.52 – 2.08 m Native		X	X	Assess fill material of unknown quality, assess potential soil impacts resulting from various off-site industries (northern portion of Phase II Property) Sample depth determined by CPC, location of APEC and associated medium.
BH9-AU1	1746 Carling Avenue	0.28 – 0.6 m Fill Material	X	X	X	Assess fill material of unknown quality, assess potential soil impacts resulting from various off-site industries (southern portion of Phase II Property) Sample depth determined by CPC, location of APEC and associated medium.
BH2-SS2	1754 Carling Avenue	1.0 – 1.45 m Native		X	X	Assess fill material of unknown quality, assess potential soil impacts resulting from the present automotive repair shops located on the northern portion of Phase II Property and general coverage. Sample depth determined by CPC, location of APEC and associated medium.
BH3-SS1	1755 Kerr Avenue	0.61 – 0.72 m Fill Material	X	X	X	Assess fill material of unknown quality, assess potential soil impacts resulting from the present automotive repair shops located on the northern portion of Phase II Property and general coverage. Sample depth determined by CPC, location of APEC and associated medium.
BH6-GR2	1755 Kerr Avenue	0.12 – 0.24 m Fill Material	X	X	X	Assess fill material of unknown quality, assess potential soil impacts resulting from various off-site industries (western portion of Phase II Property) Sample depth determined by CPC, location of APEC and associated medium.
BH7-GR2	1755 Kerr Avenue	0.18 – 0.23 m Fill Material	X	X	X	Assess fill material of unknown quality, assess potential soil impacts resulting from various off-site industries (southern portion of Phase II Property) Sample depth determined by CPC, location of APEC and associated medium.

The submitted soil samples were selected for analysis based on vapour screening and field observations, in combination with information obtained during previous investigations, to assess APECs and associated CPCs identified in the Phase I – ESA.

<b>TABLE 4- Testing Parameters for Submitted Groundwater Samples</b>						
Sample ID	Address	Screened Interval	Parameter			Rationale
			PHCs F <sub>1</sub> -F <sub>4</sub>	BTEX	VOCs	
BH1-GW1	1740 Carling Avenue	2.0-5.7m Bedrock	X	X	X	Assess potential groundwater impacts resulting from the former auto sales garage on the adjacent property to the east (northeastern portion of the Phase II Property)
BH2-GW1	1740 Carling Avenue	3.05-6.10m Bedrock	X	X	X	Assess potential groundwater impacts resulting from the present auto repair garage on the adjacent property to the south (northeastern portion of the Phase II Property)
BH2-GW2	1740 Carling Avenue	3.05-6.10m Bedrock	X	X	X	Assess potential groundwater impacts resulting from the present auto repair garage on the adjacent property to the south (northeastern portion of the Phase II Property)
BH1-14-GW1	1740 Carling Avenue	1.52-5.0m Bedrock	X	X	X	Assess potential groundwater impacts resulting from the former auto sales garage on the adjacent property to the east (northeastern portion of the Phase II Property)
BH2-14-GW1	1740 Carling Avenue	3.05-5.20m Bedrock	X	X	X	Assess potential groundwater impacts resulting from the present auto repair garage on the adjacent property to the south (northeastern portion of the Phase II Property)
BH1-GW1	828 Boyd Avenue	3.08-6.12m Bedrock	X	X	X	Assess potential groundwater impacts resulting from the present auto repair garage on the adjacent property to the south (northeastern portion of the Phase II Property)
BH1-GW	828 Boyd Avenue	3.08-6.12m Bedrock	X	X	X	Assess potential groundwater impacts resulting from the present auto repair garage on the adjacent property to the south (northeastern portion of the Phase II Property)
BH2-GW1	1746 Carling Avenue	3.36-4.24m Bedrock	X	X		Assess potential groundwater impacts resulting from the off-site APECs (southern portion of the Phase II Property)
BH2-GW	1746 Carling Avenue	3.36-4.24m Bedrock	X	X		Assess potential groundwater impacts resulting from the off-site APECs (southern portion of the Phase II Property)
BH3-GW1	1746 Carling Avenue	4.12-7.16m Bedrock	X	X	X	Assess potential groundwater impacts resulting from the former on-site presence of an UST (northern portion of the Phase II Property)
BH6-GW1	1746 Carling Avenue	4.12-7.16m Bedrock	X	X		Assess potential groundwater impacts resulting from the former on-site presence of an UST (northern portion of the Phase II Property)
BH6-GW	1746 Carling Avenue	4.12-7.16m Bedrock	X	X		Assess potential groundwater impacts resulting from the former on-site presence of an UST (northern portion of the Phase II Property)

BH8-GW1	1746 Carling Avenue	8.6-10.11m Bedrock	X	X	X	Assess potential groundwater impacts resulting from the former on-site presence of an UST (northern portion of the Phase II Property) and the present on-site auto repair garages (western portion of the Phase II ESA)
BH9-GW1	1746 Carling Avenue	8.5-10.26m Bedrock	X	X	X	Assess potential groundwater impacts resulting from the off-site APECs (southern portion of the Phase II Property)
BH1-GW1	1754 Carling Avenue	3.24-6.23m Bedrock	X	X	X	Assess potential groundwater impacts resulting from the present on-site auto repair garages (western portion of the Phase II ESA)
BH1-GW2	1754 Carling Avenue	3.24-6.23m Bedrock	X	X	X	Assess potential groundwater impacts resulting from the present on-site auto repair garages (western portion of the Phase II ESA)
BH3-GW1	1755 Kerr Avenue	3.24-6.23m Bedrock	X	X	X	Assess potential groundwater impacts resulting from the present on-site auto repair garages (southwestern portion of the Phase II ESA Property)
BH3-GW2	1755 Kerr Avenue	3.24-6.23m Bedrock	X	X	X	Assess potential groundwater impacts resulting from the present on-site auto repair garages (southwestern portion of the Phase II ESA Property)
BH3-GW	1755 Kerr Avenue	3.24-6.23m Bedrock	X	X		Assess potential groundwater impacts resulting from the present on-site auto repair garages (southwestern portion of the Phase II ESA Property)
BH5-GW1	1755 Kerr Avenue	3.64-5.03m Bedrock	X		X	Assess potential groundwater impacts resulting from the present off-site auto repair garage (western portion of the Phase II ESA Property)
BH5-GW	1755 Kerr Avenue	3.64-5.03m Bedrock	X	X		Assess potential groundwater impacts resulting from the present off-site auto repair garage (western portion of the Phase II ESA Property)
BH6-GW1	1755 Kerr Avenue	2.96-6.02m Bedrock	X		X	Assess potential groundwater impacts resulting from the present off-site auto repair garage (western portion of the Phase II ESA Property)
BH7-GW1	1755 Kerr Avenue	2.96-6.02m Bedrock	X		X	Assess potential groundwater impacts resulting from the off-site APECs (southern portion of the Phase II Property)

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

## 4.7 Residue Management

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

## 4.8 Quality Assurance and Quality Control Measures

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

## 5.0 REVIEW AND EVALUATION

### 5.1 Geology

The soil profile generally consists of a surficial layer of asphaltic concrete, followed by fill material consisting of brown silty sand with gravel, brown silty clay, brown sandy silt, gravel and cobbles. The fill layer extended to a maximum depth of 2.23m. Limestone bedrock was encountered at a maximum depth of 2.33 m below the existing ground surface.

Groundwater was measured at depths ranging from approximately 1.86 to 5.87 mbgs. Based on field observations, the overburden was not considered to be the water bearing unit. The groundwater is expected to be present within the bedrock.

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

### 5.2 Groundwater Elevations, Flow Direction, and Hydraulic Gradient

Groundwater levels were recorded from all monitoring wells on the Phase II Property. Groundwater levels are summarized below in Table 5.

<b>TABLE 6 - Groundwater Level Measurements</b>					
<b>Borehole Location</b>	<b>Address</b>	<b>Ground Surface Elevation (m)</b>	<b>Water Level Depth (m below grade)</b>	<b>Water Level Elevation (m ASL)</b>	<b>Date of Measurement</b>
BH1	1740 Carling Avenue	98.94	2.23	94.39	November 4, 2013
BH2	1740 Carling Avenue	99.04	2.43	96.61	November 4, 2013
BH1-14	1740 Carling Avenue	99.27	2.38	96.89	June 5, 2014
BH2-14	1740 Carling Avenue	99.27	2.06	97.21	June 5, 2014
BH1	828 Boyd Avenue	98.66	2.09	96.95	October 31, 2018
BH2	1746 Carling Avenue	99.16	2.21	97.20	October 31, 2018

BH3	1746 Carling Avenue	99.25	1.86	97.39	May 12, 2015
BH6	1746 Carling Avenue	98.60	2.52	96.08	October 31, 2018
BH8	1746 Carling Avenue	99.17	5.82	93.35	October 31, 2018
BH9	1746 Carling Avenue	99.20	5.0	94.20	October 31, 2018
BH1	1754 Carling Avenue	98.40	4.01	94.39	May 15, 2015
BH3	1755 Kerr Avenue	99.03	1.98	97.05	October 31, 2018
BH5	1755 Kerr Avenue	97.64	3.81	93.83	July 20, 2015
BH6	1755 Kerr Avenue	99.05	2.82	96.23	July 20, 2015
BH7	1755 Kerr Avenue	99.25	2.30	96.95	October 31, 2018

Based on the groundwater elevations measured, groundwater contour mapping was completed. Groundwater contours are shown on Drawing PE4425-3 – Test Hole Location Plan.

Regional groundwater flow is expected to be in a northwestern direction. It should be noted that groundwater levels are expected to fluctuate throughout the year with seasonal variations.

### 5.3 Fine-Coarse Soil Texture

Grain size analysis was not completed as part of this investigation. Coarse grained soil standards were chosen based on the nature of the recovered soil samples.

### 5.4 Soil: Field Screening

Field screening of the soil samples collected during drilling resulted in vapour readings generally less than 50 ppm. No noted odours or signs of contamination were observed within the recovered samples.

The field screening results of each individual soil sample are provided on the Soil Profile and Test Data Sheets appended to this report.

### 5.5 Soil Quality

Based on the findings of the field screening in combination with sample depth and location, 12 soil samples were submitted for analysis of metals, BTEX and/or PHCs (F1-F4). The results of the analytical testing completed on the Phase II Property (including past assessments) are presented in Table A1 appended to

this report. The laboratory Certificates of Analysis are also provided in the Appendix.

### Metals

All of the analyzed metal parameters are in compliance with the selected MECP Table 7 Standards, with the exception of lead in soil Sample BH4-SS1 which was submitted during the May 2015 assessment on 1746 Carling Avenue.

### PHCs (F<sub>1</sub>-F<sub>4</sub>)

All the detected PHC concentrations in the analysed soil samples comply with the selected MECP Table 7 Standards, except for the PHCs F2 parameter in soil sample BH8-SS3.

### BTEX

No BTEX parameters were identified in the samples analysed. As such, the results comply with the MECP Table 7 standards.

The maximum parameter concentrations identified within the soil samples are listed below in Table 7.

<b>TABLE 7: Maximum Concentrations – Soil</b>			
<b>Parameter</b>	<b>Maximum Concentration (µg/g)</b>	<b>Soil Sample</b>	<b>Depth Interval (m BGS)</b>
Arsenic	10	BH3-SS2	1.1-1.4
Barium	127	BH4-SS1	1.0-1.45
Boron	13.4	BH6-GR2	0.12-0.24
Cadmium	0.6	BH9-AU1	0.28-0.6
Chromium	22.9	BH3-SS2	1.1-1.4
Cobalt	6.8	BH3-SS2	1.1-1.4
Copper	17.4	BH9-AU1	0.8-1.4
Lead	<b><u>183</u></b>	BH4-SS1	1.0-1.45
Molybdenum	1.3	BH9-AU1	0.8-1.4
Nickel	13.5	BH9-AU1	0.8-1.4
Selenium	1.2	BH3-SS2	1.1-1.4
Vanadium	30.3	BH3-SS2	1.1-1.4
Zinc	152	BH4-SS1	1.0-1.45
F2 PHCs	149	BH8-SS3	0.80-1.2
F3 PHCs	180	BH8-SS3	0.80-1.2
F4 PHCs	458	BH2-SS2	0.61-0.72
Notes:			
▪ <b><u>Bold and Underlined</u></b> – Results exceed the selected MECP standards			

## 5.6 Groundwater Quality

Twenty-seven (27) groundwater samples from the past investigations were submitted for laboratory analysis of BTEX, PHCs and/or VOCs, with one groundwater sample submitted for laboratory analysis of PAHs.

Groundwater testing was carried out in stages between November 2013 and May 2024.

A second groundwater sampling event was carried out for BH2 (located at 1740 Carling Avenue) in November 6, 2013. A second groundwater sampling event was carried out for BH3 (located at 1755 Kerr Avenue) in July 20, 2015. A second groundwater sampling event was carried out for BH1 and BH5 (located at 1754 Carling Avenue) in April 11, 2024 and November 12, 2024, respectively.

A second groundwater sampling event was carried out for the following boreholes on October 31, 2025. BH1 (located at 828 Boyd Avenue), BH2 and BH6 (located at 1746 Carling Avenue), and BH3 and BH7 (located at 1755 Kerr Avenue). The groundwater samples were obtained from the screened intervals noted in Table 4.

Analytical testing results from the past investigations are presented in Table A2. The laboratory Certificates of Analysis are provided in Appendix 1.

### PHCs ( F<sub>1</sub>-F<sub>4</sub>)

One or more petroleum hydrocarbon parameters were identified in excess of the MECP standards in all samples except for samples recovered from BH1 located at 1740 Carling Avenue, BH8 and BH9 located at 1746 Carling Avenue, MW201 and MW801 located at the alley way on the western portion of the Phase II Property.

Groundwater from BH3 and BH7 on 1755 Kerr Avenue was resampled and submitted for analytical testing of BTEX and PHCs. All the analytical test results from the second groundwater sampling event complied with the selected MECP Table 7 standards.

Groundwater from BH6 on 1746 Carling Avenue was resampled and submitted for analytical testing of BTEX and PHCs. All the analytical test results from the second groundwater sampling event complied with the selected MECP Table 7 standards.

The second groundwater sampling events for the remaining boreholes still identified hydrocarbon parameters that exceed the MECP Table 7 standards.

The analytical results for groundwater tested are shown on Drawing PE4425-5– Analytical Testing Plan – Groundwater.

### BTEX/VOCs

One or more BTEX/VOCs parameters that exceed the MECP Table 7 standards have been identified in groundwater samples obtained from BH1-14 on the northeastern portion of the Phase II Property, BH1 on the southeastern portion of the Phase II Property, BH3 on the northern portion of the Phase II Property, BH5 on the western portion of the Phase II Property and BH1 on the northwestern portion of the Phase II Property.

Groundwater from BH5 (western portion of the Phase II Property) was resampled and submitted for analytical testing of BTEX and PHCs. The analytical test results from the second groundwater sampling event showed BTEX concentrations that exceed the MECP Table 7 standards.

The chloroform in the groundwater samples resulted from the use of municipally treated water for the bedrock coring process required for installation of monitoring wells.

The analytical results for BTEX and VOCs in groundwater are shown on Drawing PE4425-5– Analytical Testing Plan – Groundwater.

**TABLE 7: Maximum Concentrations – Groundwater**

Parameter	Maximum Concentration (µg/g)	Groundwater Sample	Depth Interval (m BGS)
Acetone	21.2	BH1-GW1	3.08-6.12
Benzene	<b><u>340</u></b>	BH5-GW	3.64-5.03
Chlorobenzene	<b><u>2</u></b>	BH9-GW1	8.52-10.26
Chloroform	<b><u>16.1</u></b>	BH1-GW1	3.08-6.12
Ethylbenzene	<b><u>613</u></b>	BH5-GW	3.64-5.03
Hexane	<b><u>97</u></b>	BH5-GW1	3.64-5.03
Toluene	<b><u>552</u></b>	BH5-GW	3.64-5.03
m/p-Xylene	<b><u>983</u></b>	BH5-GW	3.64-5.03
o-Xylene	<b><u>309</u></b>	BH5-GW	3.64-5.03
Xylenes, total	<b><u>1290</u></b>	BH5-GW	3.64-5.03
F1 PHCs (C6-C10)	<b><u>29700</u></b>	BH5-GW1	3.64-5.03
F2 PHCs (C10-C16)	<b><u>41100</u></b>	BH2-14-GW1	3.05-5.20
F3 PHCs (C16-C34)	<b><u>29800</u></b>	BH6-GW1	4.12-7.16

Notes:

- **Bold and Underlined** – Results exceed the selected MECP standards

## 5.7 Phase II Conceptual Site Model

The following section has been prepared in accordance with the requirements of O.Reg. 153/04, as amended by the Environmental Protection Act. Conclusions and recommendations are discussed in a subsequent section.

### Site Description

#### Potentially Contaminating Activity and Areas of Potential Environmental Concern

Based on the results of the Phase I ESA completed for the subject property, eleven (11) PCAs were considered to result in APECs on the Phase II Property. The identified APECs on the Phase II Property are presented in Table 1 in the Phase I CSM and are as follows:

- APEC 1: Resulting from the importation of fill material of unknown quality (PCA #30);
- APEC 2: Application of road salt for the removal of snow and de-icing purposes (PCA #NA)
- APEC 3: Resulting from the presence of a former on-site underground storage tank (UST) (PCA #28);

- APEC 4: Resulting from the presence of on-site automotive service garages (PCA #52);
- APEC 5: Resulting from the presence of off-site automotive service garage (PCA #52);
- APEC 6: Resulting from the presence of off-site automotive service garage (PCA #52);
- APEC 7: Resulting from the Former Retail Fuel Outlet and current Automotive Service Garage (PCAs #28 and #58);
- APEC 8: Resulting from the presence of a former automotive service garage (PCA#52);
- APEC 9: Resulting from the presence of off-site automotive service garage (PCA #52);
- APEC 10: Resulting from the former use of halogenated solvents on the property to the east (PCA #37);
- APEC 11: Resulting from the former use of halogenated solvents on the property to the southeast (PCA #37);

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

According to Section 49.1 of O.Reg. 153/04, if an applicable site condition standard is exceeded at a property solely because of the following reason, the applicable site condition standard is deemed not to be exceeded for the purpose of Part XV.1 of the Act: “The qualified person has determined, based on a phase one environmental site assessment or a phase two environmental site assessment, that a substance has been applied to surfaces for the safety of vehicular or pedestrian traffic under conditions of snow or ice or both.”

## **Contaminants of Potential Concern**

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

- Metals;
- Benzene, Toluene, Ethylbenzene, Xylenes (BTEX);
- Petroleum Hydrocarbons (PHCs);
- Polycyclic Aromatic Hydrocarbons (PAHs); and
- Volatile Organic Compounds (VOCs)

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

## **Subsurface Structures and Utilities**

The Phase I Property is situated in a municipally serviced area. Underground utility services identified on the subject land include natural gas, electrical, cable, sewer and water services.

No potable wells or private sewage systems were observed on the Phase I Property at the time of the site visit nor are they expected to be present. No other subsurface structures were identified at the time of the site visit.

## **Physical Setting**

### **Site Stratigraphy**

The stratigraphy of the Phase II Property generally consists of:

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

- Asphaltic concrete and concrete;
- Fill material consisting of brown silty sand with gravel, brown silty clay, brown sandy silt, crushed stone and cobbles; extending to a maximum depth of approximately 2.23 mbgs.
- limestone bedrock was encountered at a maximum depth of 2.33 mbgs.

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

## **Hydrogeological Characteristics**

Groundwater was encountered in the bedrock at depths ranging from 1.86 to 5.87 mbgs.

### **Approximate Depth to Bedrock**

Grey limestone bedrock was confirmed at each borehole location; depth to bedrock at the Phase II Property ranges from approximately 4.6 to 5.6m below grade.

### **Approximate Depth to Water Table**

The water table was measured at depths ranging from 1.86 to 5.87 mbgs.

### **Sections 41 and 43.1 of the Regulation**

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

Section 43.1 of the Regulation applies to the Phase II Property given the property is a shallow soil property.

### **Existing Buildings and Structures**

The Phase II Property is currently used for commercial purposes on 1740 and 1754 Carling Avenue while the remaining of the Phase II Property is vacant.

### **Proposed Buildings and Other Structures**

It is our understanding that the Phase II Property will be redeveloped with three multi-storey residential buildings with underground parking.

## **Environmental Condition**

### **Areas Where Contaminants are Present**

Based on the findings of the investigations, fill material impacted with lead was identified in the central portion of the site.

Groundwater impacted with PHCs, BTEX and/or VOCs was identified in boreholes across the Phase II Property. The groundwater impacts are expected to be present within the bedrock.

## **Types of Contaminants**

Contaminants include lead concentrations in the soil, as well as PHCs, BTEX and/or VOC concentrations in the groundwater.

## **Contaminated Media**

Based on the findings of this Phase II ESA, the fill material within the central portion of the site has been impacted with lead.

Groundwater across the majority of the site has been impacted with PHCs, BTEX and/or VOCs.

## **What Is Known About Areas Where Contaminants Are Present**

The impacted fill material is considered to have resulted from the importation of fill material of unknown quality, or from the past use of this part of the property.

Groundwater across the majority of the site is impacted with PHC, BTEX and/or VOC concentrations considered to have originated from the former UST on the northern portion of the Phase II Property, the present automotive repair garages, former presence of retail fuel outlet on the northwestern portion of the site and the current off-site automotive repair garages east and west of the Phase II Property.

## **Distribution and Migration of Contaminants**

The approximate horizontal distributions of soil and groundwater contaminants exceeding MECP Table 7 standards, are shown on the following figures:

- Drawing PE4425-4 - Analytical Testing Plan – Soil;
- Drawing PE4425-5 - Analytical Testing Plan – Groundwater

The approximate vertical distributions of soil and groundwater contaminants exceeding the MECP Table 7 standards are shown on the following figures:

- Drawing PE4425-4A - Cross-Section A-A' – Soil and
- Drawing PE4425 -5A - Cross-Section A-A' – Groundwater.

## **Discharge of Contaminants**

Based on the findings of this Phase II ESA, the shallow soil impacts on the central portion of the site are considered to have resulted from the importation of fill material of unknown quality or the past use of the site, or the past use of the site.

The PHC, BTEX and/or VOC concentrations identified in the groundwater across the majority of the Phase II Property are considered to have resulted from the former UST on the northern portion of the Phase II Property, the present automotive repair garages on the northwestern portion of the site, the former retail fuel outlet on the northwestern portion of the site and the current off-site automotive repair garages east and west of the Phase II Property.

### **Climatic and Meteorological Conditions**

In general, climatic and meteorological conditions have the potential to affect contaminant distribution. Two ways by which climatic and meteorological conditions may affect contaminant distribution include the downward leaching of contaminants by means of the infiltration of precipitation, and the migration of contaminants via groundwater levels and/or flow, which may fluctuate seasonally.

Given the site was covered with asphaltic concrete outside of the former and current building footprints, based on the quality of the soil, significant downward leaching of contaminants is not expected to have occurred.

The seasonal fluctuation of groundwater levels and/or flow is considered to have had the potential to impact contaminant migration at the Phase II Property.

### **Potential for Vapour Intrusion**

Based on the PHC F1 and F2 concentrations identified in the groundwater beneath the building addressed 1740 Carling Avenue on the northwestern portion of the Phase II Property, there is a potential for vapour intrusion within the building, although it is a slab-on-grade commercial building. Therefore, the risk is considered to be low.

## 6.0 CONCLUSIONS

### Assessment

A Phase II ESA was carried out for the properties addressed 1740, 1746 and 1754 Carling Avenue, 828 Boyd Avenue and 1755 Kerr Avenue, in the City of Ottawa, Ontario. The purpose of the Phase II ESA was to address potentially contaminating activities (PCAs) that were identified during the Phase I ESA and considered to result in areas of potential environmental concern (APECs) on the Phase II Property.

The subsurface investigations were conducted in stages between November 2014 and May 2022. A total of 21 boreholes were drilled to depths ranging from approximately 1.04m to 10.26m below ground surface (bgs). Eighteen (18) of the boreholes were instrumented with groundwater monitoring wells upon their completion.

The soil profile generally consists of a surficial layer of asphaltic concrete, gravel or concrete, followed by fill material consisting of brown silty sand with gravel, brown silty clay, brown sandy silt, crushed stone and cobbles. The fill layer extended to a maximum depth of 2.23m. Limestone bedrock was encountered at a maximum depth of 2.33 m below the existing ground surface.

### Soil

Based on the findings of the field screening in combination with sample depth and location, 12 soil samples were submitted for analysis of metals, BTEX and/or PHCs (F1-F4).

All of the analyzed metal parameters are in compliance with the applicable MECP Table 7 Standards, with the exception of lead in soil Sample BH4-SS1 which was submitted during the May 2015 assessment on 1746 Carling Avenue and PHC F2 parameter in soil sample BH8-SS3.. All the detected PHC concentrations in the analysed soil samples comply with the selected MECP Table 7 Standards. No BTEX parameters were identified in the samples analysed. As such, the results comply with the MECP Table 7 standards.

## Groundwater

Twenty-seven (27) groundwater samples from the past investigations were submitted for laboratory analysis of BTEX, PHCs and VOCs, with one groundwater sample submitted for laboratory analysis of PAHs.

One or more hydrocarbon parameters were identified in all samples except for samples recovered from BH1 located at 1740 Carling Avenue, BH8 and BH9 located at 1746 Carling Avenue, MW201 and MW801 located at the alley way on the western portion of the Phase II Property.

Groundwater from BH3 and BH7 (1755 Kerr Avenue) was resampled and submitted for analytical testing of BTEX and PHCs. All the analytical test results from the second groundwater sampling event complied with the selected MECP Table 7 standards.

Groundwater from BH6 (1746 Carling Avenue) was resampled and submitted for analytical testing of BTEX and PHCs. All the analytical test results from the second groundwater sampling event complied with the selected MECP Table 7 standards.

The second groundwater sampling events for the remaining boreholes still identified hydrocarbon parameters that exceed the MECP Table 7 standards.

One or more BTEX/VOC parameters that exceed the MECP Table 7 standards have been identified in groundwater samples obtained from BH1-14 on the northeastern portion of the Phase II Property, BH1 on the southeastern portion of the Phase II Property, BH3 on the northern portion of the Phase II Property, BH5 on the western portion of the Phase II Property and BH1 on the northwestern portion of the Phase II Property.

The chloroform in the groundwater samples resulted from the use of municipally treated water for the bedrock coring process required for installation of monitoring wells. This is not considered to be a COC.

## **Recommendations**

Based on the findings of this assessment, lead impacted fill was identified in the central portion of the Phase II Property. Given the low solubility of lead, the impacts are expected to be confined to the fill layer. There is no risk to the current use of the Phase II Property.

It is our understanding that the Phase II Property will be redeveloped in the future. As such, the contaminated soil should be delineated and remediated in conjunction with site redevelopment. This contaminated soil will require disposal at a licensed waste disposal facility. Prior to off-site disposal of impacted soil at a licensed waste disposal facility, a leachate analysis of a representative sample of contaminated soil must be conducted in accordance with Ontario Regulation 347/558.

Groundwater impacted by PHCs, BTEX and/or VOCs was identified across the entirety of the Phase II Property. It is our opinion that the contaminated groundwater does not pose a risk to the current use of the subject buildings.

Remediation of the groundwater to meet the generic MECP standards, would be feasible on the southern portion of the property, although further testing will be required to confirm this. Where the groundwater has higher contaminant concentrations or the contamination is coming from off-site, it may not be practical to meet generic standards. In lieu of a generic remediation, a due diligence risk assessment should be completed to assess the risk to the future development and any required risk mitigation measures that would be required to be implemented. Further information can be provided upon request.

## 7.0 STATEMENT OF LIMITATIONS

This Phase II - Environmental Site Assessment report has been prepared under the supervision of a Qualified Person, in general accordance with O. Reg 153/04. 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 Kerr Broadview Properties Ltd. Notification from Claridge Homes and Paterson Group will be required to release this report to any other party.

### **Paterson Group Inc.**



Mohammed Ramadan, B.Sc.



Mark D'Arcy, P.Eng., Q.P.ESA



### **Report Distribution:**

- Kerr Broadview Properties Ltd.
- Paterson Group

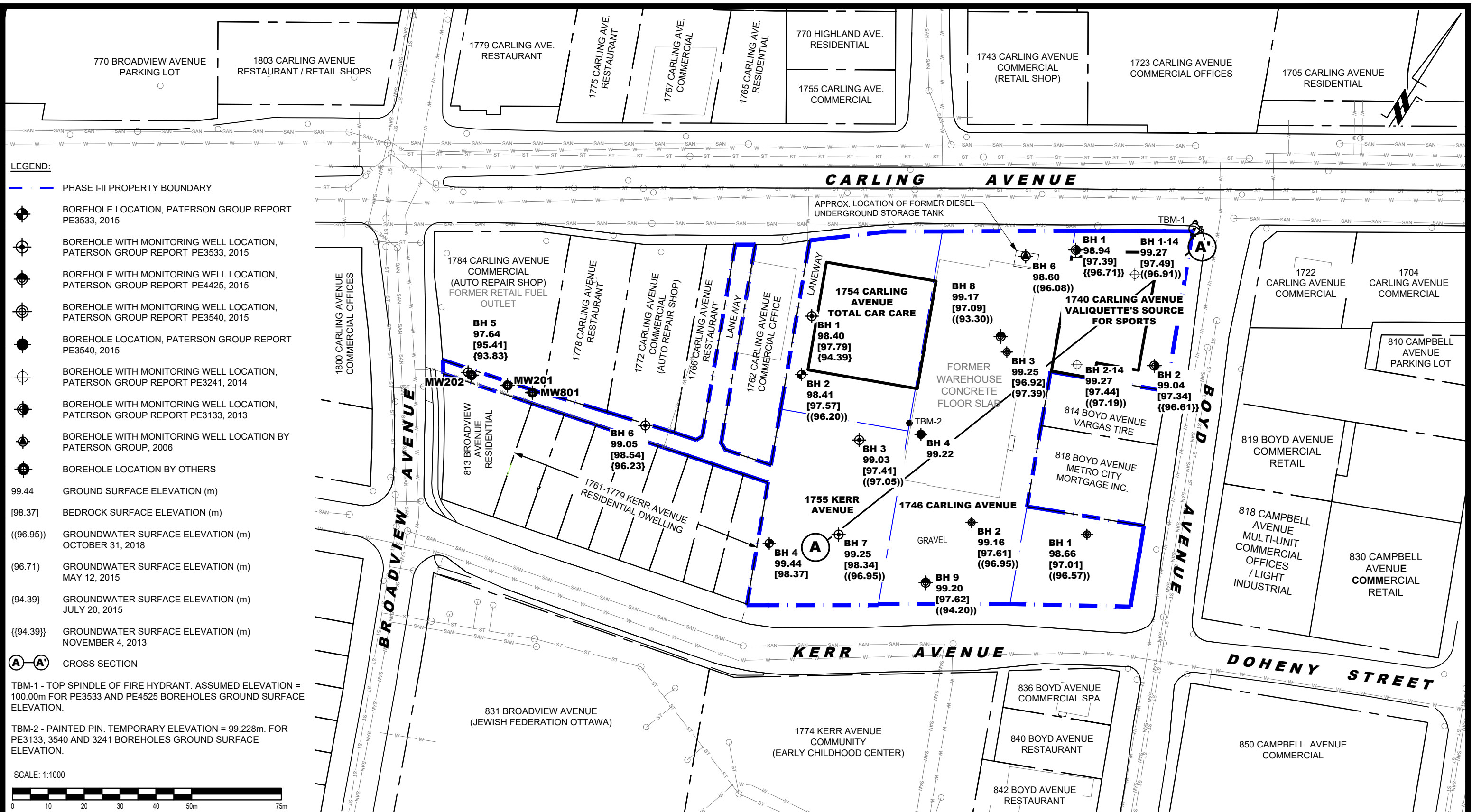
# **FIGURES**

**DRAWING PE4425-3 – TEST HOLE LOCATION PLAN**

**DRAWING PE4425-4 – ANALYTICAL TESTING PLAN – SOIL  
DRAWING PE4425-4A – CROSS SECTION A-A' – SOIL**

**DRAWING PE4425-5 – ANALYTICAL TESTING PLAN –  
GROUNDWATER**

**DRAWING PE4425-5A – CROSS-SECTION A – A' – GROUNDWATER**



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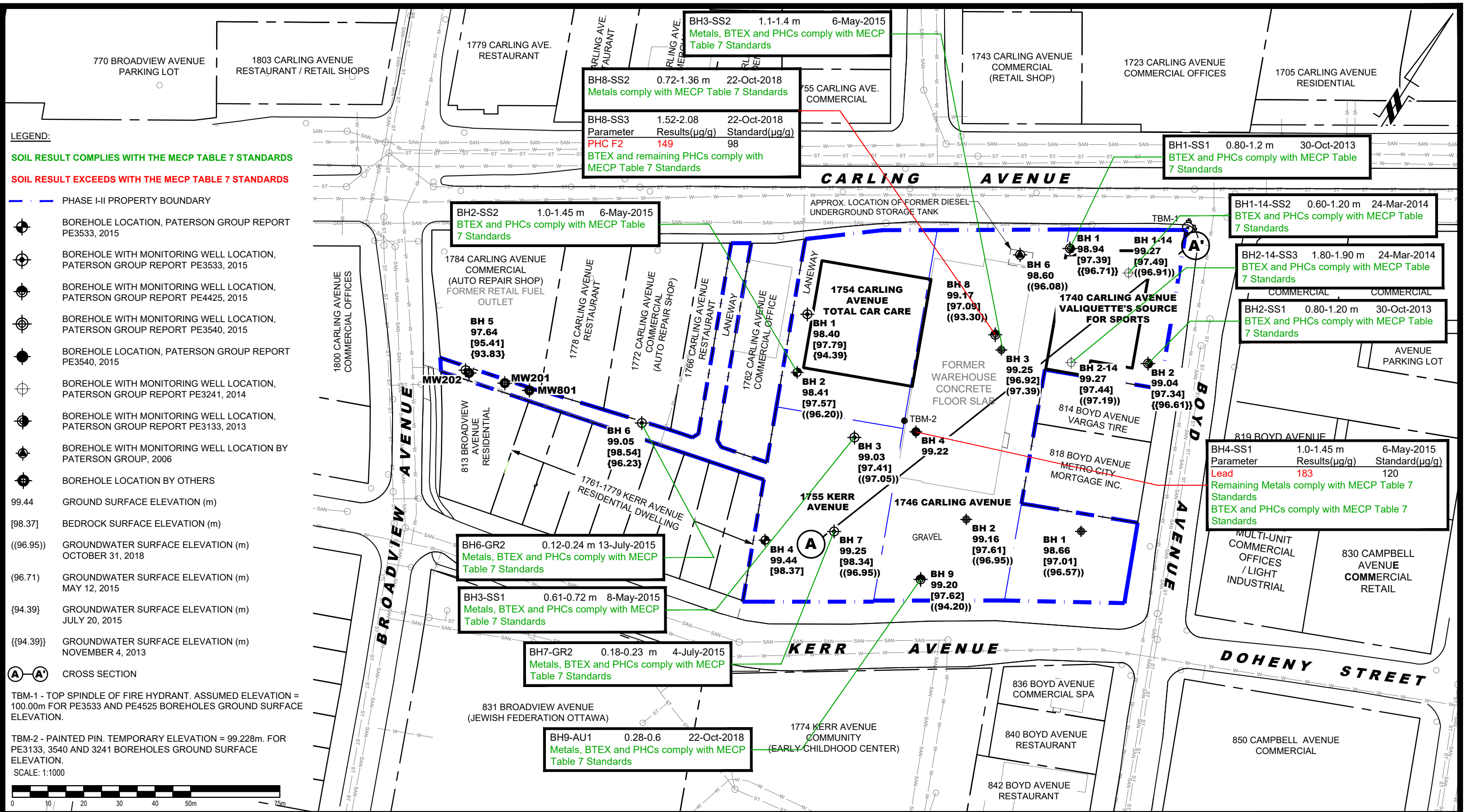
**PHASE II - ENVIRONMENTAL SITE ASSESSMENT**

**1740, 1746 & 1754 CARLING AVENUE & 828 BOYD AVENUE & 1755 KERR AVENUE**

**OTTAWA, ONTARIO**

Title: **TEST HOLE LOCATION PLAN**

Scale:	1:1000	Date:	07/2025
Drawn by:	GK	Report No.:	PE4425-2
Checked by:	MR	Dwg. No.:	<b>PE4425-3</b>
Approved by:	MSD	Revision No.:	



**LEGEND:**  
**SOIL RESULT COMPLIES WITH THE MECP TABLE 7 STANDARDS**  
**SOIL RESULT EXCEEDS WITH THE MECP TABLE 7 STANDARDS**

- PHASE I-II PROPERTY BOUNDARY
- ⊕ BOREHOLE LOCATION, PATERSON GROUP REPORT PE3533, 2015
- ⊕ BOREHOLE WITH MONITORING WELL LOCATION, PATERSON GROUP REPORT PE3533, 2015
- ⊕ BOREHOLE WITH MONITORING WELL LOCATION, PATERSON GROUP REPORT PE4425, 2015
- ⊕ BOREHOLE WITH MONITORING WELL LOCATION, PATERSON GROUP REPORT PE3540, 2015
- ⊕ BOREHOLE WITH MONITORING WELL LOCATION, PATERSON GROUP REPORT PE3540, 2015
- ⊕ BOREHOLE WITH MONITORING WELL LOCATION, PATERSON GROUP REPORT PE3241, 2014
- ⊕ BOREHOLE WITH MONITORING WELL LOCATION, PATERSON GROUP REPORT PE3133, 2013
- ⊕ BOREHOLE WITH MONITORING WELL LOCATION BY PATERSON GROUP, 2006
- ⊕ BOREHOLE LOCATION BY OTHERS
- 99.44 GROUND SURFACE ELEVATION (m)
- [98.37] BEDROCK SURFACE ELEVATION (m)
- ((96.95)) GROUNDWATER SURFACE ELEVATION (m) OCTOBER 31, 2018
- (96.71) GROUNDWATER SURFACE ELEVATION (m) MAY 12, 2015
- {94.39} GROUNDWATER SURFACE ELEVATION (m) JULY 20, 2015
- {{94.39}} GROUNDWATER SURFACE ELEVATION (m) NOVEMBER 4, 2013
- ⓐ-ⓐ' CROSS SECTION

TBM-1 - TOP SPINDLE OF FIRE HYDRANT. ASSUMED ELEVATION = 100.00m FOR PE3533 AND PE4525 BOREHOLES GROUND SURFACE ELEVATION.  
 TBM-2 - PAINTED PIN. TEMPORARY ELEVATION = 99.228m. FOR PE3133, 3540 AND 3241 BOREHOLES GROUND SURFACE ELEVATION.  
 SCALE: 1:1000

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**KERR BROADVIEW PROPERTIES LTD**  
**PHASE II - ENVIRONMENTAL SITE ASSESSMENT**  
**1740, 1746 & 1754 CARLING AVENUE & 828 BOYD AVENUE & 1755 KERR AVENUE**  
 OTTAWA, ONTARIO  
 Title: **ANALYTICAL TESTING PLAN - SOIL**

Scale:	1:1000	Date:	07/2025
Drawn by:	GK	Report No.:	PE4425-2
Checked by:	MR	Dwg. No.:	<b>PE4425-4</b>
Approved by:	MSD	Revision No.:	

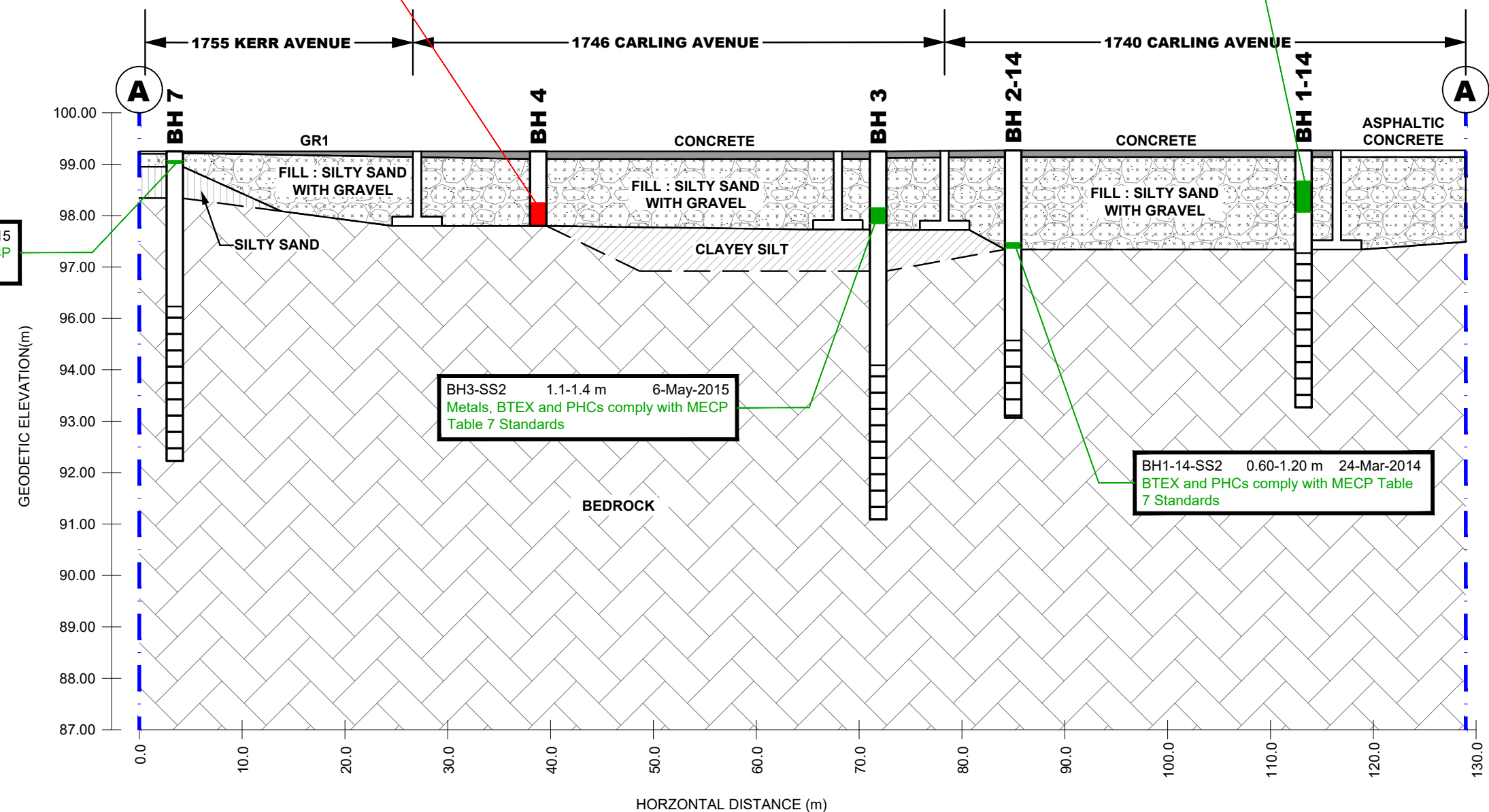
BH4-SS1	1.0-1.45 m	6-May-2015
Parameter	Results(µg/g)	Standard(µg/g)
Lead	183	120
Remaining Metals comply with MECP Table 7 Standards		
BTEX and PHCs comply with MECP Table 7 Standards		

BH2-14-SS3	1.80-1.90 m	24-Mar-2014
BTEX and PHCs comply with MECP Table 7 Standards		

BH7-GR2	0.18-0.23 m	4-July-2015
Metals, BTEX and PHCs comply with MECP Table 7 Standards		

BH3-SS2	1.1-1.4 m	6-May-2015
Metals, BTEX and PHCs comply with MECP Table 7 Standards		

BH1-14-SS2	0.60-1.20 m	24-Mar-2014
BTEX and PHCs comply with MECP Table 7 Standards		



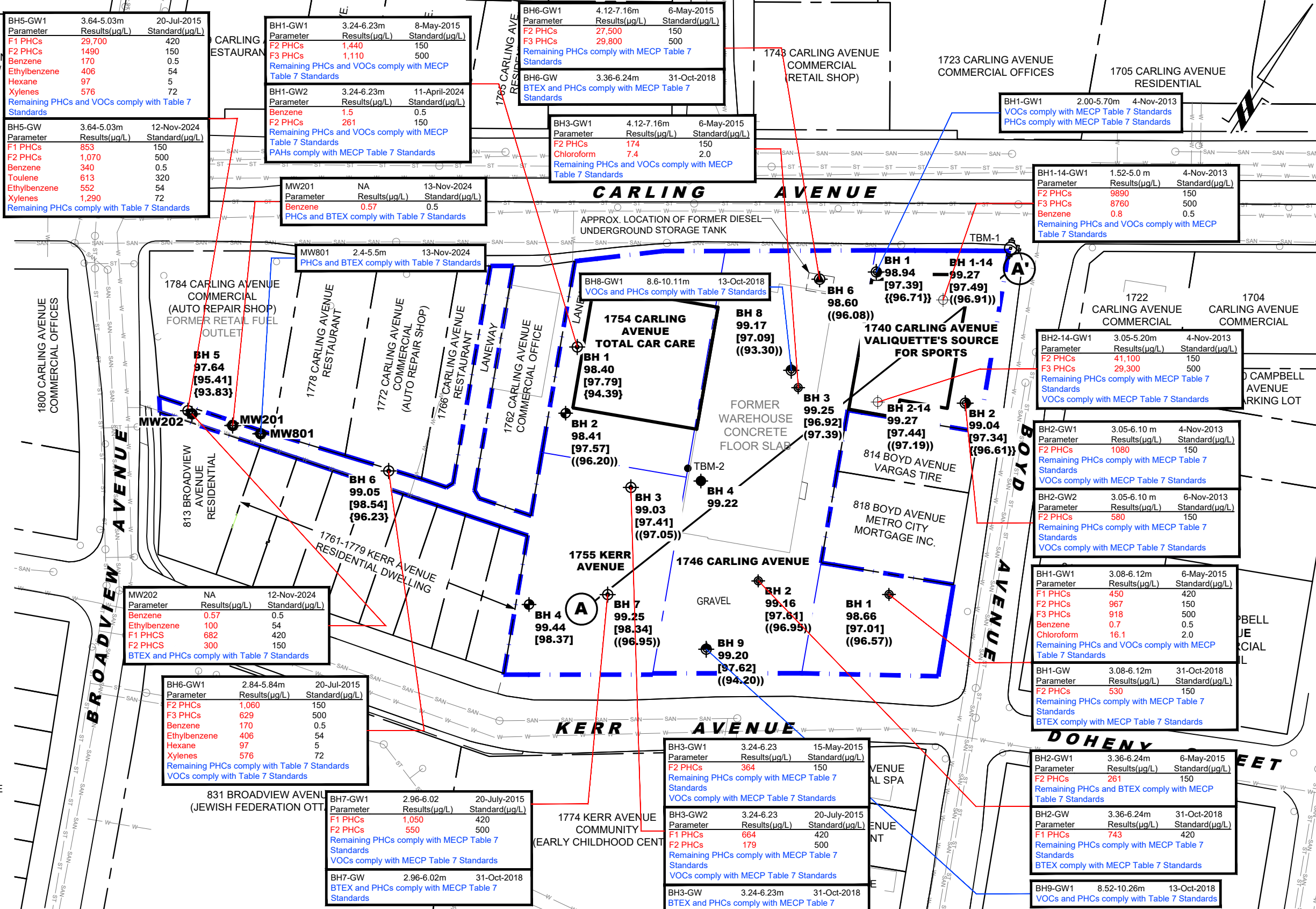
**LEGEND:**  
 SOIL RESULT COMPLIES WITH THE MECP TABLE 7 STANDARDS  
 SOIL RESULT EXCEEDS WITH THE MECP TABLE 7 STANDARDS  
 PHASE I-II PROPERTY BOUNDARY

**PATERSON GROUP**  
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**PHASE II - ENVIRONMENTAL SITE ASSESSMENT**  
 1740, 1746 & 1754 CARLING AVENUE & 828 BOYD AVENUE & 1755 KERR AVENUE  
 OTTAWA, ONTARIO  
 Title: **CROSS-SECTION A-A' - SOIL**

Scale:	AS SHOWN	Date:	07/2025
Drawn by:	GK	Report No.:	PE4425-2
Checked by:	MR	Dwg. No.:	<b>PE4425-4A</b>
Approved by:	MSD	Revision No.:	



**LEGEND:**

**GROUNDWATER RESULT COMPLIES WITH THE MECP TABLE 7 STANDARDS**

**GROUNDWATER RESULT EXCEEDS WITH THE MECP TABLE 7 STANDARDS**

— PHASE II PROPERTY BOUNDARY

● BOREHOLE LOCATION, PATERSON GROUP REPORT PE3533, 2015

● BOREHOLE WITH MONITORING WELL LOCATION, PATERSON GROUP REPORT PE3533, 2015

● BOREHOLE WITH MONITORING WELL LOCATION, PATERSON GROUP REPORT PE4425, 2015

● BOREHOLE WITH MONITORING WELL LOCATION, PATERSON GROUP REPORT PE3540, 2015

● BOREHOLE LOCATION, PATERSON GROUP REPORT PE3540, 2015

● BOREHOLE WITH MONITORING WELL LOCATION, PATERSON GROUP REPORT PE3241, 2014

● BOREHOLE WITH MONITORING WELL LOCATION, PATERSON GROUP REPORT PE3133, 2013

● BOREHOLE WITH MONITORING WELL LOCATION BY PATERSON GROUP, 2006

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99.44 GROUND SURFACE ELEVATION (m)

[98.37] BEDROCK SURFACE ELEVATION (m)

((96.95)) GROUNDWATER SURFACE ELEVATION (m) OCTOBER 31, 2018

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{{94.39}} GROUNDWATER SURFACE ELEVATION (m) NOVEMBER 4, 2013

Ⓐ-Ⓐ CROSS SECTION

TBM-1 - TOP SPINDLE OF FIRE HYDRANT. ASSUMED ELEVATION = 100.00m FOR PE3533 AND PE4525 BOREHOLES GROUND SURFACE ELEVATION.

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SCALE: 1:1000

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**PHASE II - ENVIRONMENTAL SITE ASSESSMENT**

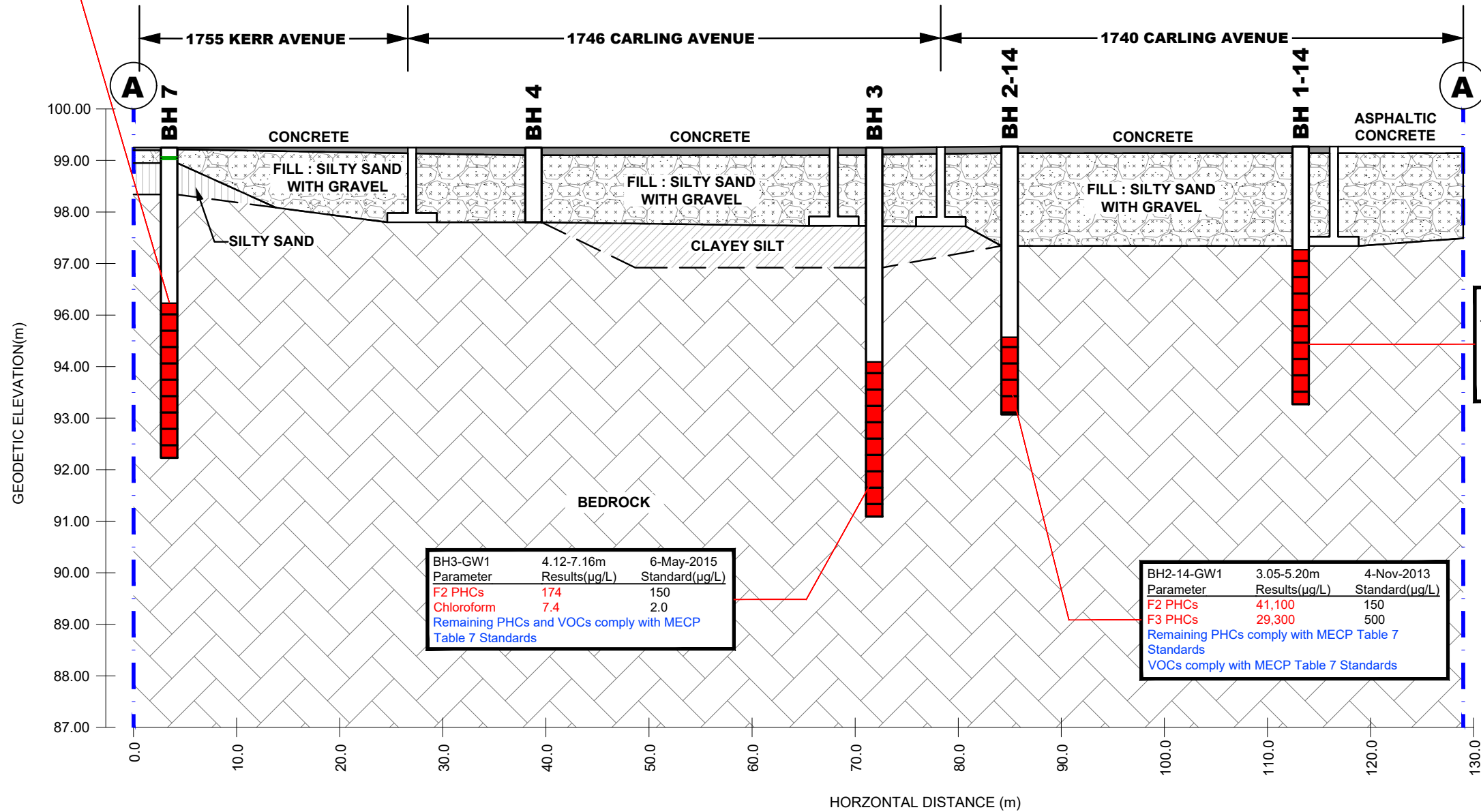
**1740, 1746 & 1754 CARLING AVENUE & 828 BOYD AVENUE & 1755 KERR AVENUE**

**OTTAWA, ONTARIO**

Title: **ANALYTICAL TESTING PLAN - GROUNDWATER**

Scale:	1:1000	Date:	07/2025
Drawn by:	GK	Report No.:	PE4425-2
Checked by:	MR	Dwg. No.:	<b>PE4425-5</b>
Approved by:	MSD	Revision No.:	

Parameter	Results(µg/L)	Standard(µg/L)
BH7-GW1	2.96-6.02	20-July-2015
F1 PHCs	1,050	420
F2 PHCs	550	500
Remaining PHCs comply with MECP Table 7 Standards		
VOCs comply with MECP Table 7 Standards		
BH7-GW	2.96-6.02m	31-Oct-2018
BTEX and PHCs comply with MECP Table 7 Standards		



Parameter	Results(µg/L)	Standard(µg/L)
BH1-14-GW1	1.52-5.0 m	4-Nov-2013
F2 PHCs	9890	150
F3 PHCs	8760	500
Benzene	0.8	0.5
Remaining PHCs and VOCs comply with MECP Table 7 Standards		

Parameter	Results(µg/L)	Standard(µg/L)
BH3-GW1	4.12-7.16m	6-May-2015
F2 PHCs	174	150
Chloroform	7.4	2.0
Remaining PHCs and VOCs comply with MECP Table 7 Standards		

Parameter	Results(µg/L)	Standard(µg/L)
BH2-14-GW1	3.05-5.20m	4-Nov-2013
F2 PHCs	41,100	150
F3 PHCs	29,300	500
Remaining PHCs comply with MECP Table 7 Standards		
VOCs comply with MECP Table 7 Standards		

LEGEND:

GROUNDWATER RESULT COMPLIES WITH THE MECP TABLE 7 STANDARDS

GROUNDWATER RESULT EXCEEDS WITH THE MECP TABLE 7 STANDARDS

PHASE I-II PROPERTY BOUNDARY

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NO.	REVISIONS	DATE	INITIAL

KERR BROADVIEW PROPERTIES LTD  
**PHASE II - ENVIRONMENTAL SITE ASSESSMENT**  
 1740, 1746 & 1754 CARLING AVENUE & 828 BOYD AVENUE & 1755 KERR AVENUE  
 OTTAWA, ONTARIO  
 Title: **CROSS-SECTION A-A' - GROUNDWATER**

Scale:	AS SHOWN	Date:	07/2025
Drawn by:	GK	Report No.:	PE4425-2
Checked by:	MR	Dwg. No.:	<b>PE4425-5A</b>
Approved by:	MSD	Revision No.:	

# **TABLES**

**TABLE A1: SOIL ANALYTICAL RESULTS COMPARED TO MECP  
TABLE 7 STANDARDS**

**TABLE A2: SOIL ANALYTICAL RESULTS COMPARED TO MECP  
TABLE 7 STANDARDS**

Parameter	Units	Regulation	BH1-SS1 1344303-01	BH2-SS1 1344303-02	BH1-14-SS2 1413124-01	BH2-14-SS3 1413124-02	BH3-SS2 1519321-01	BH4-SS1 1519321-02	BH8-SS2 1843421-01	BH8-SS3 1843421-02	BH9-AU1 1843421-03	BH2-SS2 1519389-01	BH3-SS1 1519389-02	BH6-GR2 1529206-01	BH7-GR2 1529206-02
Sample Depth (m)		Reg 153/04 - Table 7 Residential, coarse	0.80-1.2	0.80-1.2	0.60-1.20	1.80-1.90	1.1-1.4	1.0-1.45	0.72-1.36	1.52-2.08	0.28-0.6	0.61-0.72	0.61-0.72	0.12-0.24	0.18-0.23
Sample Date			30-Oct-2013	30-Oct-2013	24-Mar-14	24-Mar-14	6-May-2015	6-May-2015	22-Oct-2018	22-Oct-2018	22-Oct-2018	8-May-2015	8-May-2015	13-Jul-2015	14-Jul-2015
<b>Physical Characteristics</b>															
% Solids	% by Wt.		79.7	79.5	76.9	85.7	85.9	86.7	91.4	93.5	94.6	96.5	76.1	82.7	90.2
<b>Metals</b>															
Antimony	ug/g dry	7.5	N/A	N/A	N/A	N/A	nd	nd	nd	N/A	nd	N/A	N/A	nd	nd
Arsenic	ug/g dry	18	N/A	N/A	N/A	N/A	10	5.8	1.8	N/A	8.8	N/A	N/A	4.4	10.5
Barium	ug/g dry	390	N/A	N/A	N/A	N/A	120	127	78	N/A	122	N/A	N/A	92.4	62.8
Beryllium	ug/g dry	4.0	N/A	N/A	N/A	N/A	nd	nd	nd	N/A	nd	N/A	N/A	nd	nd
Boron	ug/g dry	120	N/A	N/A	N/A	N/A	4.8	4	nd	N/A	6.5	N/A	N/A	13.4	3.4
Cadmium	ug/g dry	1.2	N/A	N/A	N/A	N/A	nd	nd	nd	N/A	0.6	N/A	N/A	nd	nd
Chromium (VI)	ug/g dry	8.0	N/A	N/A	N/A	N/A	N/A	nd	nd	N/A	nd	N/A	N/A	N/A	N/A
Chromium	ug/g dry	160	N/A	N/A	N/A	N/A	22.9	20.7	14.4	N/A	22.4	N/A	N/A	16.9	18.7
Cobalt	ug/g dry	22	N/A	N/A	N/A	N/A	6.8	6.5	4	N/A	5.8	N/A	N/A	5.8	4.6
Copper	ug/g dry	140	N/A	N/A	N/A	N/A	14.9	17.1	7	N/A	17.4	N/A	N/A	11.3	10.2
Lead	ug/g dry	120	N/A	N/A	N/A	N/A	71.8	183	6.6	N/A	47.4	N/A	N/A	30.1	57.3
Mercury	ug/g dry	0.27	N/A	N/A	N/A	N/A	N/A	N/A	nd	N/A	nd	N/A	N/A	N/A	N/A
Molybdenum	ug/g dry	6.9	N/A	N/A	N/A	N/A	nd	nd	nd	N/A	1.3	N/A	N/A	nd	nd
Nickel	ug/g dry	100	N/A	N/A	N/A	N/A	13.3	12.7	9.4	N/A	13.5	N/A	N/A	10.8	9.2
Selenium	ug/g dry	2.4	N/A	N/A	N/A	N/A	1.2	nd	nd	N/A	nd	N/A	N/A	nd	nd
Silver	ug/g dry	20	N/A	N/A	N/A	N/A	nd	nd	nd	N/A	nd	N/A	N/A	nd	nd
Thallium	ug/g dry	1.0	N/A	N/A	N/A	N/A	nd	nd	nd	N/A	nd	N/A	N/A	nd	nd
Uranium	ug/g dry	23	N/A	N/A	N/A	N/A	nd	nd	nd	N/A	nd	N/A	N/A	nd	nd
Vanadium	ug/g dry	86	N/A	N/A	N/A	N/A	30.3	27.1	23.3	N/A	28.8	N/A	N/A	22.0	31.1
Zinc	ug/g dry	340	N/A	N/A	N/A	N/A	77.2	152	20.4	N/A	73.7	N/A	N/A	64.7	42.7
<b>BTEX</b>															
Benzene	ug/g dry	0.21	nd	nd	nd	nd	nd	nd	N/A	nd	nd	nd	nd	nd	nd
Ethylbenzene	ug/g dry	2.0	nd	nd	nd	nd	nd	nd	N/A	nd	nd	nd	nd	nd	nd
Toluene	ug/g dry	2.3	nd	nd	nd	nd	nd	nd	N/A	nd	nd	nd	nd	nd	nd
m/p-Xylene	ug/g dry	3.1	nd	nd	nd	nd	nd	nd	N/A	nd	nd	nd	nd	nd	nd
o-Xylene	ug/g dry	3.1	nd	nd	nd	nd	nd	nd	N/A	nd	nd	nd	nd	nd	nd
Xylenes, total	ug/g dry	3.1	nd	nd	nd	nd	nd	nd	N/A	nd	nd	nd	nd	nd	nd
<b>Hydrocarbons</b>															
F1 PHCs (C6-C10)	ug/g dry	55	nd	nd	nd	nd	nd	nd	N/A	nd	nd	nd	nd	nd	nd
F2 PHCs (C10-C16)	ug/g dry	98	nd	nd	nd	65	nd	nd	N/A	149	nd	nd	nd	nd	nd
F3 PHCs (C16-C34)	ug/g dry	300	nd	nd	nd	78	nd	61	N/A	180	58	113	9	nd	66
F4 PHCs (C34-C50)	ug/g dry	2800	nd	nd	nd	nd	nd	nd	N/A	nd	65	458	29	nd	142

2.00 Result exceeds Reg 153/04 - Table 7 Residential, coarse Standards

ND (0.2) MDL exceeds Reg 153/04 - Table 7 Residential, coarse Standards

ND (0.2) No concentrations identified above the MDL

N/A Parameter not analysed

NV No value given for indicated parameter

Soil results from boreholes located at 1740 Carling Avenue

Soil results from boreholes located at 828 Boyd Avenue

Soil results from boreholes located at 1746 Carling Avenue

Soil results from boreholes located at 1756 Carling Avenue

Soil results from boreholes located at 1755 Kerr Avenue

Parameter	Units	Regulation	BH1-GW1	BH2-GW1	BH2-GW2	BH1-14-GW1	BH2-14-GW1	BH1-GW1	BH2-GW1	BH3-GW1	BH4-GW1	BH5-GW1	BH6-GW1	BH7-GW1	BH1-GW1	BH2-GW1	BH3-GW1	BH4-GW1	BH5-GW1	BH6-GW1	BH7-GW1	BH8-GW1	BH9-GW1	BH1-GW1	BH2-GW1	BH3-GW1	BH4-GW1	BH5-GW1	BH6-GW1	BH7-GW1	BH8-GW1	BH9-GW1	BH1-GW1	BH2-GW1	MW202	MW201	MW201		
			1345024-01	1345024-02	1345249-1	1414062-01	1414062-02	1520161-01	1520161-02	1520161-03	1520161-04	1520161-01	1520161-02	1520161-03	1520161-04	1520161-01	1520161-02	1520161-03	1520161-04	1520161-01	1520161-02	1520161-03	1520161-04	1520161-01	1520161-02	1520161-03	1520161-04	1520161-01	1520161-02	1520161-03	1520161-04	1520161-01	1520161-02	1520161-03	1520161-04	1520161-01	1520161-02	1520161-03	1520161-04
Sample Depth (m)		Reg 153/04 - Table 7 Non-Potable Groundwater, coarse	2.00-5.70	3.05-5.20	3.05-5.20	3.24-5.0	3.05-5.20	3.05-5.20	3.36-6.24	4.12-7.16	4.12-7.16	3.24-6.23	3.24-6.23	3.64-5.03	2.84-5.84	2.96-6.02	3.08-6.12	3.36-6.24	3.24-6.23	2.96-6.02	2.96-6.02	2.96-6.02	8.6-10.11	8.52-10.26	3.24-6.23	3.64-5.03	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A				
Sample Date		4-Nov-2013	4-Nov-2013	6-Nov-2013	31-Mar-2014	31-Mar-2014	12-May-2015	12-May-2015	12-May-2015	12-May-2015	15-May-2015	15-May-2015	20-Jul-2015	20-Jul-2015	20-Jul-2015	20-Jul-2015	31-Oct-2018	31-Oct-2018	31-Oct-2018	31-Oct-2018	31-Oct-2018	31-Oct-2018	31-Oct-2018	31-Oct-2018	31-Oct-2018	11-Apr-2024	12-Nov-2024	12-Nov-2024	13-Nov-2024	13-Nov-2024	13-Nov-2024	13-Nov-2024	13-Nov-2024	13-Nov-2024	13-Nov-2024				
<b>Volatiles</b>																																							
Acetone	ug/L	100000	nd	nd	15.7	nd	21.2	N/A	nd	N/A	nd	nd	nd	nd	nd	N/A	N/A	N/A	N/A	N/A	N/A	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	
Benzene	ug/L	0.5	nd	nd	0.8	nd	0.7	N/A	nd	N/A	nd	nd	nd	nd	nd	170	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	
Bromodichloromethane	ug/L	67000	nd	nd	nd	nd	nd	N/A	nd	N/A	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Bromoform	ug/L	5.0	nd	nd	nd	nd	nd	N/A	nd	N/A	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Bromomethane	ug/L	0.89	nd	nd	nd	nd	nd	N/A	nd	N/A	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Carbon Tetrachloride	ug/L	0.2	nd	nd	nd	nd	nd	N/A	nd	N/A	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Chlorobenzene	ug/L	140	nd	nd	nd	nd	nd	N/A	nd	N/A	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Chloroform	ug/L	2.0	nd	nd	1.3	nd	nd	16.1	N/A	7.4	N/A	nd	1.5	nd	nd	2	nd	N/A	N/A	N/A	N/A	N/A	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	
Dibromochloromethane	ug/L	65000	nd	nd	nd	nd	nd	N/A	nd	N/A	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	
Dichlorodifluoromethane	ug/L	3500	nd	nd	nd	nd	nd	N/A	nd	N/A	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
1,2-Dichlorobenzene	ug/L	150	nd	nd	nd	nd	nd	N/A	nd	N/A	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
1,3-Dichlorobenzene	ug/L	7600	nd	nd	nd	nd	nd	N/A	nd	N/A	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
1,4-Dichlorobenzene	ug/L	1.6	nd	nd	nd	nd	nd	N/A	nd	N/A	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
1,1-Dichloroethane	ug/L	11	nd	nd	nd	nd	nd	N/A	nd	N/A	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
1,2-Dichloroethane	ug/L	0.5	nd	nd	nd	nd	nd	N/A	nd	N/A	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
1,1-Dichloroethylene	ug/L	0.5	nd	nd	nd	nd	nd	N/A	nd	N/A	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
cis-1,2-Dichloroethylene	ug/L	1.6	nd	nd	nd	nd	nd	N/A	nd	N/A	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
trans-1,2-Dichloroethylene	ug/L	1.6	nd	nd	nd	nd	nd	N/A	nd	N/A	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
1,2-Dichloropropane	ug/L	0.58	nd	nd	nd	nd	nd	N/A	nd	N/A	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
cis-1,3-Dichloropropylene	ug/L	0.5	nd	nd	nd	nd	nd	N/A	nd	N/A	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
trans-1,3-Dichloropropylene	ug/L	0.5	nd	nd	nd	nd	nd	N/A	nd	N/A	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
1,3-Dichloropropane, total	ug/L	0.5	nd	nd	nd	nd	nd	N/A	nd	N/A	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Ethylbenzene	ug/L	54	nd	nd	nd	nd	nd	4	N/A	N/A	nd	nd	nd	nd	nd	406	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Ethylene dibromide (dibromoethane)	ug/L	0.2	nd	nd	nd	nd	nd	nd	N/A	N/A	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Hexane	ug/L	5.0	nd	nd	nd	nd	nd	6.6	N/A	N/A	nd	3.9	4.8	nd	97	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	
Methyl Ethyl Ketone (2-Butanone)	ug/L	21000	nd	nd	nd	nd	nd	nd	N/A	N/A	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Methyl Isobutyl Ketone	ug/L	5300	nd	nd	nd	nd	nd	nd	N/A	N/A	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Methyl tert-butyl ether	ug/L	15	nd	nd	nd	nd	nd	nd	N/A	N/A	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Methylene Chloride	ug/L	26	nd	nd	nd	nd	nd	nd	N/A	N/A	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Styrene	ug/L	43	nd	nd	nd	nd	nd	nd	N/A	N/A	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
1,1,1,2-Tetrachloroethane	ug/L	1.1	nd	nd	nd	nd	nd	nd	N/A	N/A	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
1,1,2,2-Tetrachloroethane	ug/L	0.5	nd	nd	nd	nd	nd	nd	N/A	N/A	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Tetrachloroethylene	ug/L	0.5	nd	nd	nd	nd	nd	nd	N/A	N/A	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Toluene	ug/L	300	nd	nd	3.6	0.9	nd	0.9	N/A	N/A	nd	nd	nd	nd	nd	143	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
1,1,1-Trichloroethane	ug/L	23	nd	nd	nd	nd	nd																																

# **APPENDIX 1**

**SAMPLING AND ANALYSIS PLAN**

**SOIL PROFILE AND TEST DATA SHEETS**

**SYMBOLS AND TERMS**

**LABORATORY CERTIFICATES OF ANALYSIS**

## **Sampling & Analysis Plan**

1740, 1746 and 1754 Carling Avenue, 828 Boyd Avenue  
and 1755 Kerr Avenue  
Ottawa, Ontario

Prepared for The Properties Group

**Report: PE4425-SAP**  
**April 25, 2025**



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## 1.0 SAMPLING PROGRAM

Paterson Group Inc. (Paterson) was commissioned by Mr. Andrew Glass, to carry out a Phase II – Environmental Site Assessment (Phase II ESA) for the properties addressed 1740, 1746 and 1754 Carling Avenue, 828 Boyd Avenue and 1755 Kerr Avenue, in the City of Ottawa, Ontario. This Phase II ESA is a compilation of numerous Phase II ESAs completed for the various parcels of land over the last 10 years.

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

Borehole	Location & Rationale	Proposed Depth & Rationale
BH1	Northeastern portion of the Phase I Property to assess for potential impacts resulting from the current off-site presence of auto service garage and the former off-site use of halogenated solvents.	4-8 m; to intercept the groundwater table for the purpose of installing a monitoring well.
BH2	Northeastern portion of the Phase I Property to assess for potential impacts resulting from the current off-site presence of auto service garage and the former off-site use of halogenated solvents.	4-8 m; to intercept the groundwater table for the purpose of installing a monitoring well.
BH1-14	Northeastern portion of the Phase I Property to assess for potential impacts resulting from the current off-site presence of auto service garage and the former off-site use of halogenated solvents.	4-8 m; to intercept the groundwater table for the purpose of installing a monitoring well.
BH2-14	Northeastern portion of the Phase I Property to assess for potential impacts resulting from the current off-site presence of auto service garage and the former off-site use of halogenated solvents.	4-8 m; to intercept the groundwater table for the purpose of installing a monitoring well.
BH1	Southeastern portion of the Phase I Property to assess for potential impacts resulting from the former off-site presence of auto service garage.	4-8 m; to intercept the groundwater table for the purpose of installing a monitoring well.
BH2	Southern portion of the Phase I Property to assess for potential impacts resulting from the former off-site presence of auto service garage.	4-8 m; to intercept the groundwater table for the purpose of installing a monitoring well.
BH3	Central portion of the Phase I Property to assess for potential impacts resulting from the current off-site presence of auto service garage	4-8 m; to intercept the groundwater table for the purpose of installing a monitoring well.
BH4	Central portion of the Phase I Property to assess for potential impacts resulting from the current on-site presence of auto service garages.	For general coverage purposes
BH6	Northern portion of the Phase I Property to assess for potential impacts resulting from the former of on-site presence of the underground storage tank.	4-8 m; to intercept the groundwater table for the purpose of installing a monitoring well.
BH8	Northern portion of the Phase I Property to assess for potential impacts resulting from the former of on-site presence of the underground storage tank and the current presence of auto service garages.	4-12 m; to intercept the groundwater table for the purpose of installing a monitoring well.

BH9	Southern portion of the Phase I Property to assess for potential impacts resulting from the former off-site presence of auto service garage.	4-8 m; to intercept the groundwater table for the purpose of installing a monitoring well.
BH1	Northwestern portion of the Phase I Property to assess for potential impacts resulting from current presence of auto service garages.	4-8 m; to intercept the groundwater table for the purpose of installing a monitoring well.
BH2	Central portion of the Phase I Property to assess for potential impacts resulting from the current on-site presence of auto service garages.	For general coverage purposes
BH3	Central portion of the Phase I Property to assess for potential impacts resulting from the current on-site presence of auto service garages.	4-8 m; to intercept the groundwater table for the purpose of installing a monitoring well.
BH4	Central portion of the Phase I Property to assess for potential impacts resulting from current presence of auto service garages.	For general coverage purposes
BH5	Western portion of the Phase I Property to assess for potential impacts resulting from current off-site presence of auto service garages.	4-8 m; to intercept the groundwater table for the purpose of installing a monitoring well.
BH6	Western portion of the Phase I Property to assess for potential impacts resulting from current off-site presence of auto service garages.	4-8 m; to intercept the groundwater table for the purpose of installing a monitoring well.
BH7	Southern portion of the Phase I Property to assess for potential impacts resulting from the former off-site presence of auto service garage.	4-8 m; to intercept the groundwater table for the purpose of installing a monitoring well.

Borehole locations are shown on Drawing PE4425-3 – Test Hole Location Plan, appended to the main report.

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

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

## 2.0 ANALYTICAL TESTING PROGRAM

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

- At least one sample from each borehole should be submitted, in order to delineate the horizontal extent of contamination across the site.
- At least one sample from each stratigraphic unit should be submitted, in order to delineate the vertical extent of contamination at the site.

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

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

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

## **3.0 STANDARD OPERATING PROCEDURES**

### **3.1 Environmental Drilling Procedure**

#### **Purpose**

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

#### **Equipment**

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

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

### **Determining Borehole Locations**

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

After drilling is completed a plan with the borehole locations must be provided. Distances and orientations of boreholes with respect to site features (buildings, roadways, etc.) must be provided. Distances should be measured using a measuring tape or wheel rather than paced off. Ground surface elevations at each borehole should be surveyed relative to a geodetic benchmark, if one is available, or a temporary site benchmark which can be tied in at a later date if necessary.

### **Drilling Procedure**

The actual drilling procedure for environmental boreholes is the same as geotechnical boreholes (see SOP for drilling and sampling) with a few exceptions as follows:

- Continuous split spoon samples (every 0.6 m or 2') or semi-continuous (every 0.76 m or 2'6") are required.
- Make sure samples are well sealed in plastic bags with no holes prior to screening and are kept cool but unfrozen.
- If sampling for VOCs, BTEX, or PHCs F<sub>1</sub>, a soil core from each soil sample, which may be analyzed, must be taken and placed in the laboratory-provided methanol vial.
- Note all and any odours or discolouration of samples.
- Split spoon samplers must be washed between samples.

- If obvious contamination is encountered, continue sampling until vertical extent of contamination is delineated.
- As a general rule, environmental boreholes should be deep enough to intercept the groundwater table (unless this is impossible/impractical - call project manager to discuss).
- If at all possible, soil samples should be submitted to a preliminary screening procedure on site, either using a RKI Eagle, PID, etc. depending on type of suspected contamination.

### **Spoon Washing Procedure**

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

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

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

### **Screening Procedure**

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

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

- Samples should be brought to room temperature; this is specifically important in colder weather. Soil must not be frozen.
- Turn instrument on and allow to come to zero - calibrate if necessary

- If using RKI Eagle, ensure instrument is in methane elimination mode unless otherwise directed.
- Ensure measurement units are ppm (parts per million) initially. RKI Eagle will automatically switch to %LEL (lower explosive limit) if higher concentrations are encountered.
- Break up large lumps of soil in the sample bag, taking care not to puncture bag.
- Insert probe into soil bag, creating a seal with your hand around the opening.
- Gently manipulate soil in bag while observing instrument readings.
- Record the highest value obtained in the first 15 to 25 seconds
- Make sure to indicate scale (ppm or LEL); also note which instrument was used (RKI Eagle 1 or 2, or MiniRae).
- Jar samples and refrigerate as per Sampling and Analysis Plan.

## 3.2 Monitoring Well Installation Procedure

### Equipment

- 5' x 2" threaded sections of Schedule 40 PVC slotted well screen (5' x 1 ¼" if installing in cored hole in bedrock)
- 5' x 2" threaded sections of Schedule 40 PVC riser pipe (5' x 1 ¼" if installing in cored hole in bedrock)
- Threaded end-cap
- Slip-cap or J-plug
- Asphalt cold patch or concrete
- Silica Sand
- Bentonite chips (Holeplug)
- Steel flushmount casing

### Procedure

- Drill borehole to required depth, using drilling and sampling procedures described above.
- If borehole is deeper than required monitoring well, backfill with bentonite chips to required depth. This should only be done on wells where contamination is not suspected, in order to prevent downward migration of contamination.
- Only one monitoring well should be installed per borehole.
- Monitoring wells should not be screened across more than one stratigraphic unit to prevent potential migration of contaminants between units.
- Where LNAPLs are the suspected contaminants of concern, monitoring wells should be screened straddling the water table in order to capture any free product floating on top of the water table.

- Thread the end cap onto a section of screen. Thread second section of screen if required. Thread risers onto screen. Lower into borehole to required depth. Ensure slip-cap or J-plug is inserted to prevent backfill materials entering well.
- As drillers remove augers, backfill borehole annulus with silica sand until the level of sand is approximately 0.3 m above the top of the screen.
- Backfill with holeplug until at least 0.3 m of holeplug is present above the top of the silica sand.
- Backfill remainder of borehole with holeplug or with auger cuttings (if contamination is not suspected).
- Install flushmount casing. Seal space between flushmount and borehole annulus with concrete, cold patch, or holeplug to match surrounding ground surface.

### **3.3 Monitoring Well Sampling Procedure**

#### **Equipment**

- Water level metre or interface probe on hydrocarbon/LNAPL sites
- Spray bottles containing water and methanol to clean water level tape or interface probe
- Peristaltic pump
- Polyethylene tubing for peristaltic pump
- Flexible tubing for peristaltic pump
- Latex or nitrile gloves (depending on suspected contaminant)
- Allen keys and/or 9/16" socket wrench to remove well caps
- Graduated bucket with volume measurements
- pH/Temperature/Conductivity combo pen
- Laboratory-supplied sample bottles

#### **Sampling Procedure**

- Locate well and use socket wrench or Allan key to open metal flush mount protector cap. Remove plastic well cap.
- Measure water level, with respect to existing ground surface, using water level meter or interface probe. If using interface probe on suspected NAPL site, measure the thickness of free product.
- Measure total depth of well.
- Clean water level tape or interface probe using methanol and water. Change gloves between wells.
- Calculate volume of standing water within well and record.

- Insert polyethylene tubing into well and attach to peristaltic pump. Turn on peristaltic pump and purge into graduated bucket. Purge at least three well volumes of water from the well. Measure and record field chemistry. Continue to purge, measuring field chemistry after every well volume purged, until appearance or field chemistry stabilizes.
- Note appearance of purge water, including colour, opacity (clear, cloudy, silty), sheen, presence of LNAPL, and odour. Note any other unusual features (particulate matter, effervescence (bubbling) of dissolved gas, etc.).
- Fill required sample bottles. If sampling for metals, attach 75-micron filter to discharge tube and filter metals sample. If sampling for VOCs, use low flow rate to ensure continuous stream of non-turbulent flow into sample bottles. Ensure no headspace is present in VOC vials.
- Replace well cap and flushmount casing cap.

## 4.0 QUALITY ASSURANCE/QUALITY CONTROL (QA/QC)

The QA/QC program for this Phase II ESA is as follows:

- All non-dedicated sampling equipment (split spoons) will be decontaminated according to the SOPs listed above.
- All groundwater sampling equipment is dedicated (polyethylene and flexible peristaltic tubing is replaced for each well).
- Where groundwater samples are to be analyzed for VOCs, one laboratory-provided trip blank will be submitted for analysis with every laboratory submission.
- Approximately one (1) field duplicate will be submitted for every ten (10) samples submitted for laboratory analysis. A minimum of one (1) field duplicate per project will be submitted. Field duplicates will be submitted for soil and groundwater samples
- Where combo pens are used to measure field chemistry, they will be calibrated on an approximately monthly basis, according to frequency of use.

## 5.0 DATA QUALITY OBJECTIVES

The purpose of setting data quality objectives (DQOs) is to ensure that the level of uncertainty in data collected during the Phase II ESA is low enough that decision-making is not affected, and that the overall objectives of the investigation are met.

The quality of data is assessed by comparing field duplicates with original samples. If the relative percent difference (RPD) between the duplicate and the sample is within 20%, the data are considered to be of sufficient quality so as not to affect decision-making. The RPD is calculated as follows:

$$RPD = \left| \frac{x_1 - x_2}{(x_1 + x_2)/2} \right| \times 100\%$$

Where  $x_1$  is the concentration of a given parameter in an original sample and  $x_2$  is the concentration of that same parameter in the field duplicate sample.

For the purpose of calculating the RPD, it is desirable to select field duplicates from samples for which parameters are present in concentrations above laboratory detection limits, i.e. samples which are expected to be contaminated. If parameters are below laboratory detection limits for selected samples or duplicates, the RPD may be calculated using a concentration equal to one half the laboratory detection limit.

It is also important to consider data quality in the overall context of the project. For example, if the DQOs are not met for a given sample, yet the concentrations of contaminants in both the sample and the duplicate exceed the MOE site remediation standards by a large margin, the decision-making usefulness of the sample may not be considered to be impaired. The proximity of other samples which meet the DQOs must also be considered in developing the Phase II Conceptual Site Model; often there are enough data available to produce a reliable Phase II Conceptual Site Model even if DQOs are not met for certain individual samples.

These considerations are discussed in the body of the report.

## 6.0 PHYSICAL IMPEDIMENTS

Physical impediments to the Sampling and Analysis plan may include:

- The location of underground utilities
- Poor recovery of split-spoon soil samples
- Insufficient groundwater volume for groundwater samples
- Breakage of sampling containers following sampling or while in transit to the laboratory
- Elevated detection limits due to matrix interference (generally related to soil colour or presence of organic material)

- 
- Elevated detection limits due to high concentrations of certain parameters, necessitating dilution of samples in laboratory
  - Drill rig breakdowns
  - Winter conditions
  - Other site-specific impediments

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

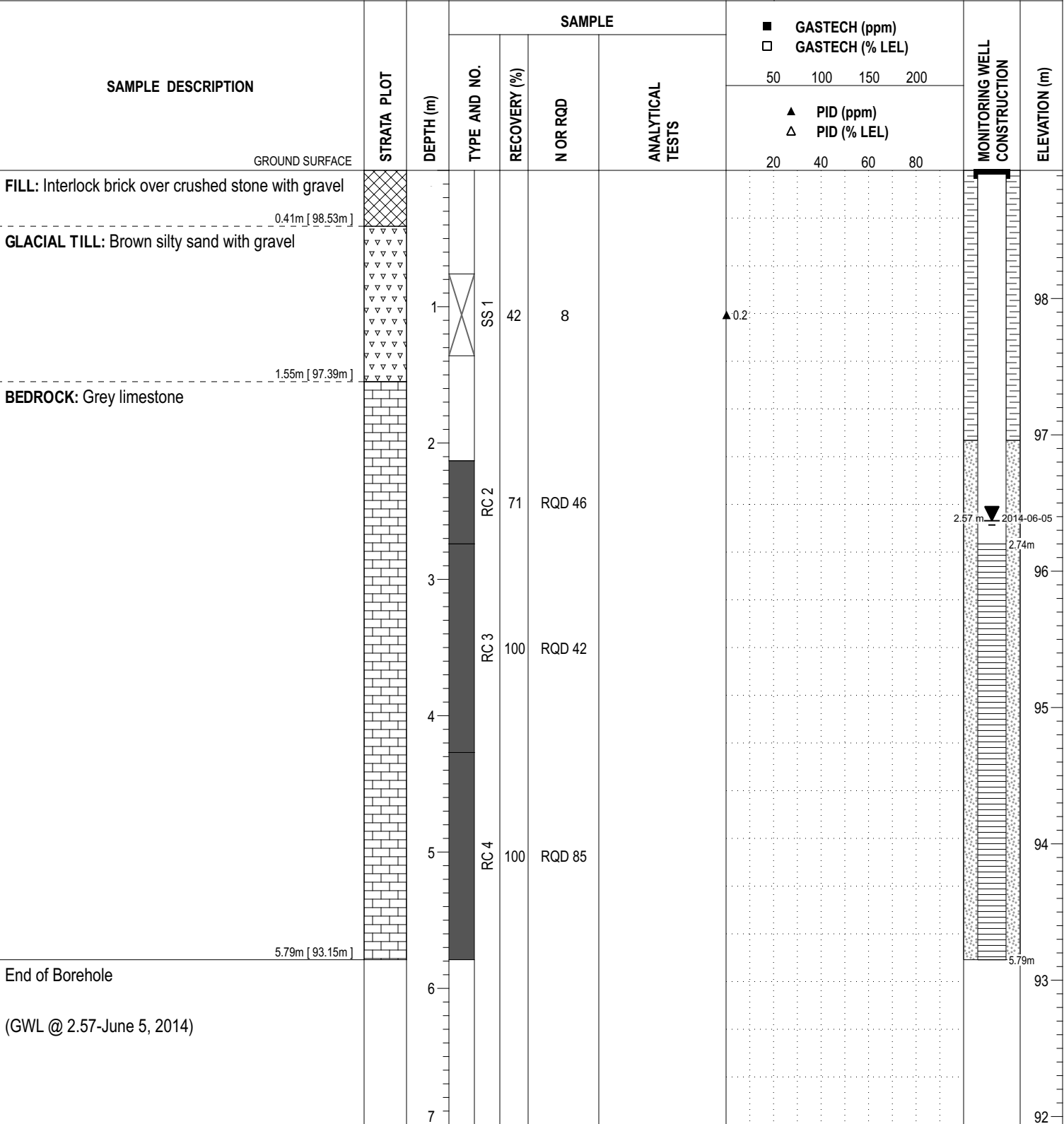
TBM - Top of spindle of fire hydrant located at the northeast corner of subject site. Assumed elevation = 100.00m.

**COORD. SYS.:** MTM ZONE 9      **EASTING:** 363353.11      **NORTHING:** 5026714.03      **ELEVATION:** 98.94

**PROJECT:** Previous Investigation PE3133      **FILE NO. :** PE4425

**ADVANCED BY:** CME 55 Power Auger      **DATE:** October 30, 2013      **HOLE NO. :** BH 1

**REMARKS:**



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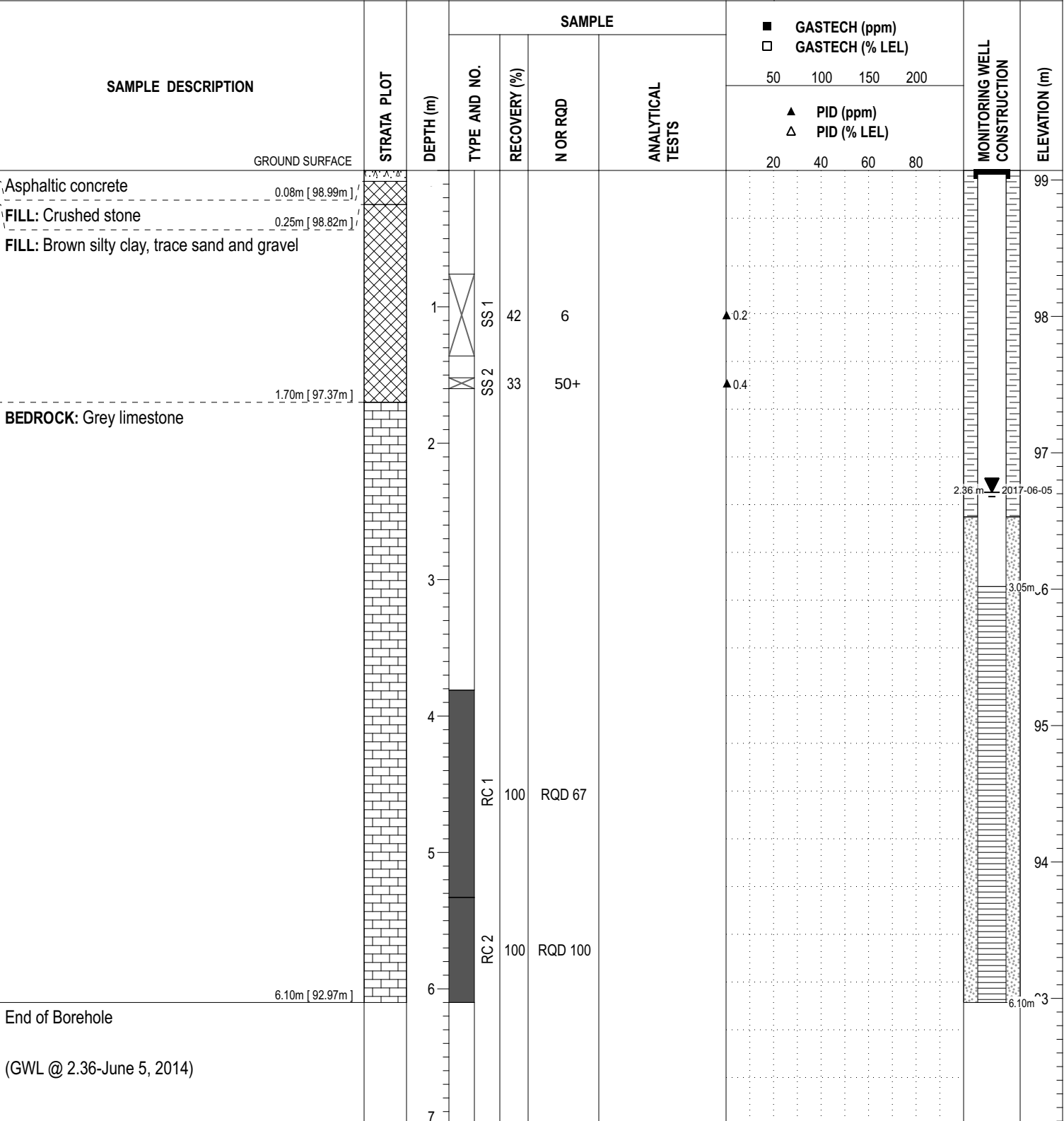
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**COORD. SYS.:** MTM ZONE 9      **EASTING:** 363388.90      **NORTHING:** 5026698.49      **ELEVATION:** 99.07

**PROJECT:** Previous Investigation PE3133      **FILE NO. :** PE4425

**ADVANCED BY:** CME 55 Power Auger      **DATE:** October 30, 2013      **HOLE NO. :** BH 2

**REMARKS:**



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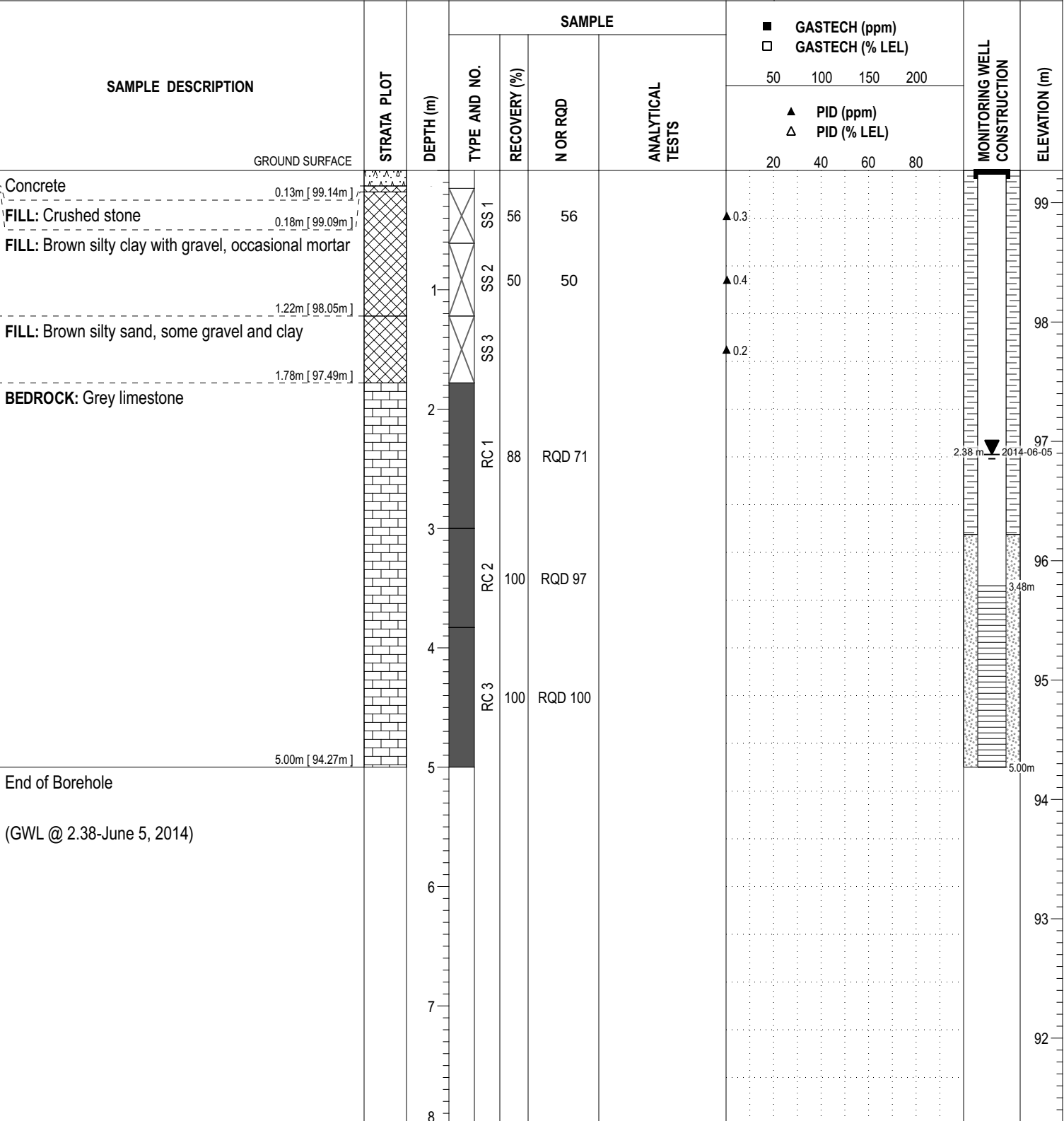
TBM - Top of spindle of fire hydrant located at the northeast corner of subject site. Assumed elevation = 100.00m.  
P:/AutoCAD Drawings/Test Hole Data Files/PE3133/PE3133 (gINT export)/data.scf/14:13 Paterson\_Template

**COORD. SYS.:** MTM ZONE 9      **EASTING:** 363370.69      **NORTHING:** 5026717.03      **ELEVATION:** 99.27

**PROJECT:** Previous Investigation PE3241      **FILE NO.:** PE4425

**ADVANCED BY:** CME 55 Power Auger      **HOLE NO.:** BH 1-14

**REMARKS:**      **DATE:** March 24, 2014



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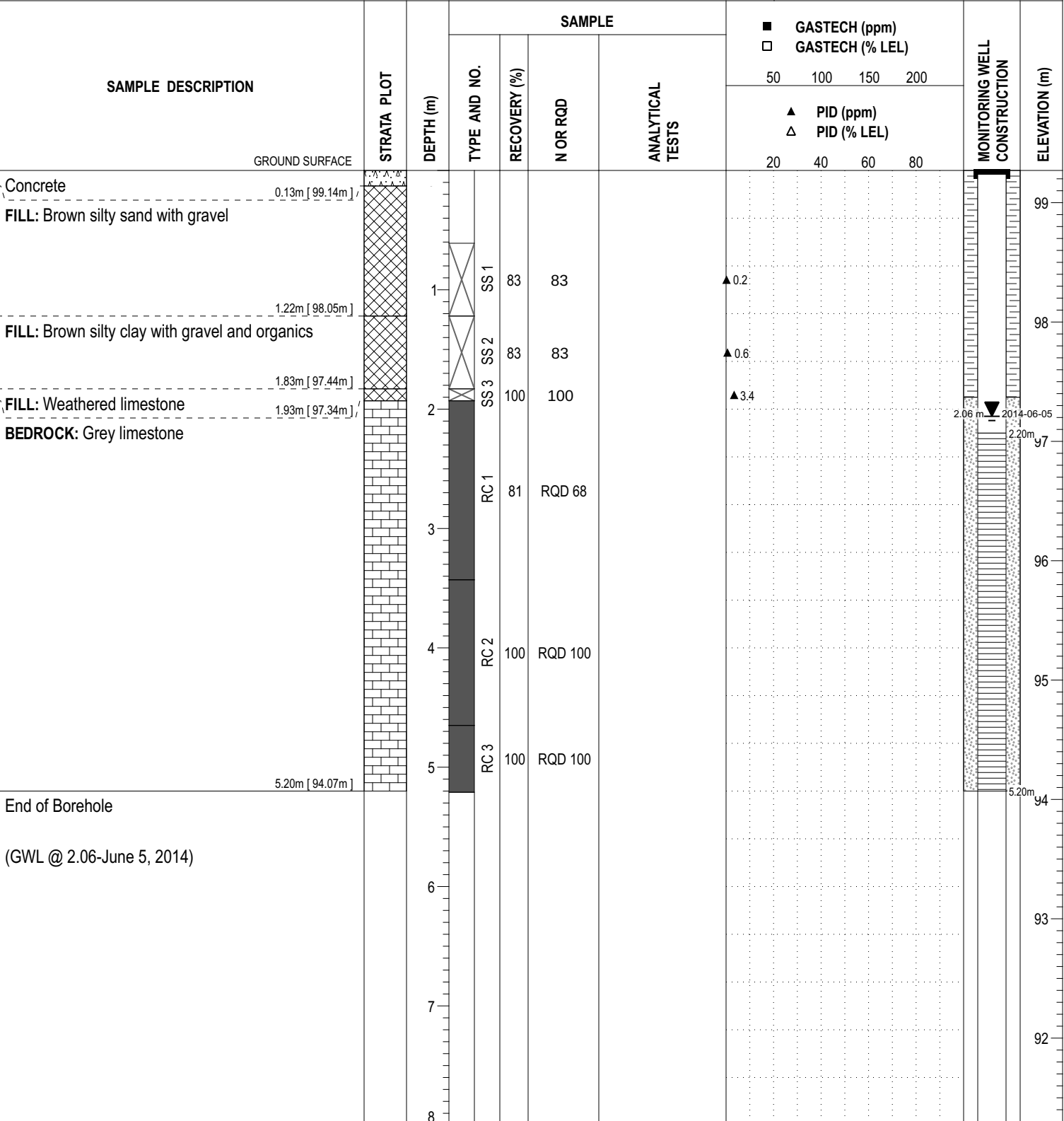
TBM - Top spindle of fire hydrant located at the southwest corner of Boyd Avenue and Carling Avenue. Assumed elevation = 100.00m.  
 P:/AutoCAD Drawings/Test Hole Data Files/PE3241 (gINT export)/data.scf/16 2025-07-02, 14:10 Pateron\_Template

**COORD. SYS.:** MTM ZONE 9      **EASTING:** 363370.57      **NORTHING:** 5026687.20      **ELEVATION:** 99.27

**PROJECT:** Previous Investigation PE3241      **FILE NO.:** PE4425

**ADVANCED BY:** CME 55 Power Auger      **HOLE NO.:** BH 2-14

**REMARKS:**      **DATE:** March 24, 2014



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P:\AutoCAD Drawings\Test Hole Data Files\PE3241 (gINT export)\data.sc11e 2025-07-02, 14:10 Paterson\_Template  
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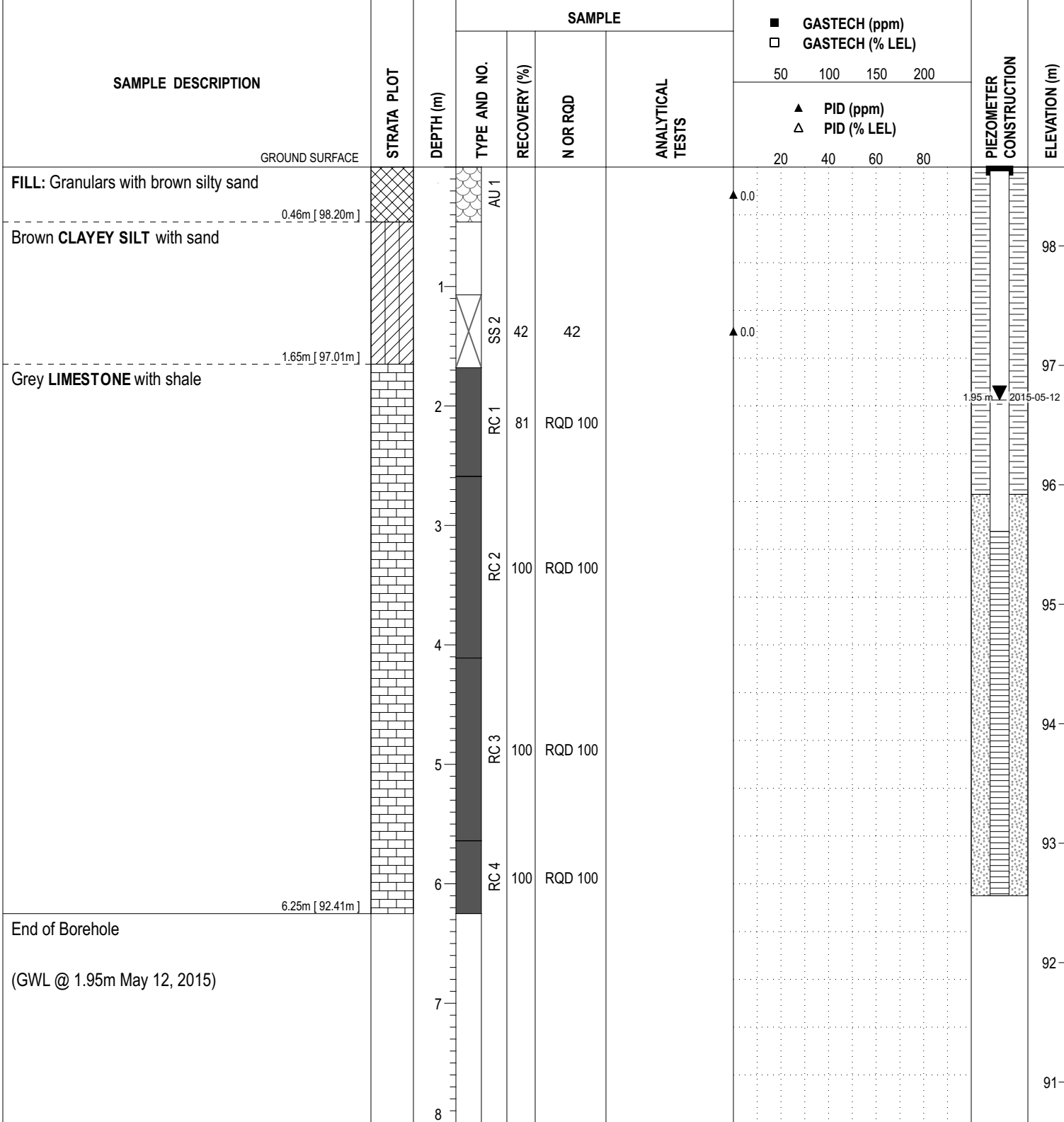
TBM - Top of spindle of fire hydrant located at the south-west corner of Boyd Avenue and Carling Avenue. Assumed elevation = 100.00m.

**COORD. SYS.:** MTM ZONE 9      **EASTING:** 363398.25      **NORTHING:** 5026648.68      **ELEVATION:** 98.66

**PROJECT:** Previous Investigation PE3540      **FILE NO.:** PE4425

**ADVANCED BY:** CME 55 Power Auger      **DATE:** May 6, 2015      **HOLE NO.:** BH 1

**REMARKS:**



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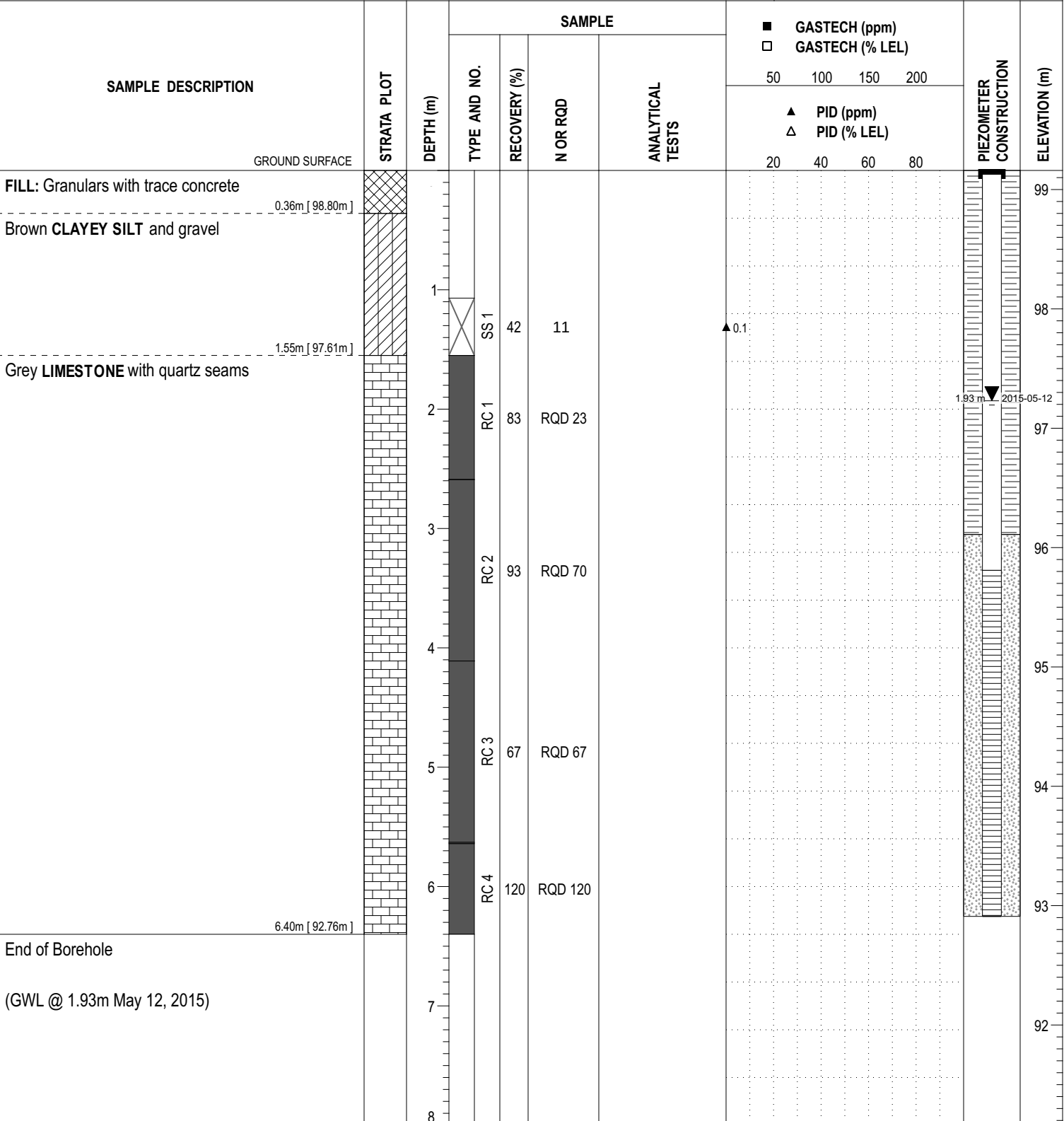
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**COORD. SYS.:** MTM ZONE 9      **EASTING:** 363369.28      **NORTHING:** 5026634.27      **ELEVATION:** 99.16

**PROJECT:** Previous Investigation PE3540      **FILE NO. :** PE4425

**ADVANCED BY:** CME 55 Power Auger      **HOLE NO. :** BH 2

**REMARKS:**      **DATE:** May 6, 2015



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TBM - Top of spindle of fire hydrant located at the south-west corner of Boyd Avenue and Carling Avenue. Assumed elevation = 100.00m.  
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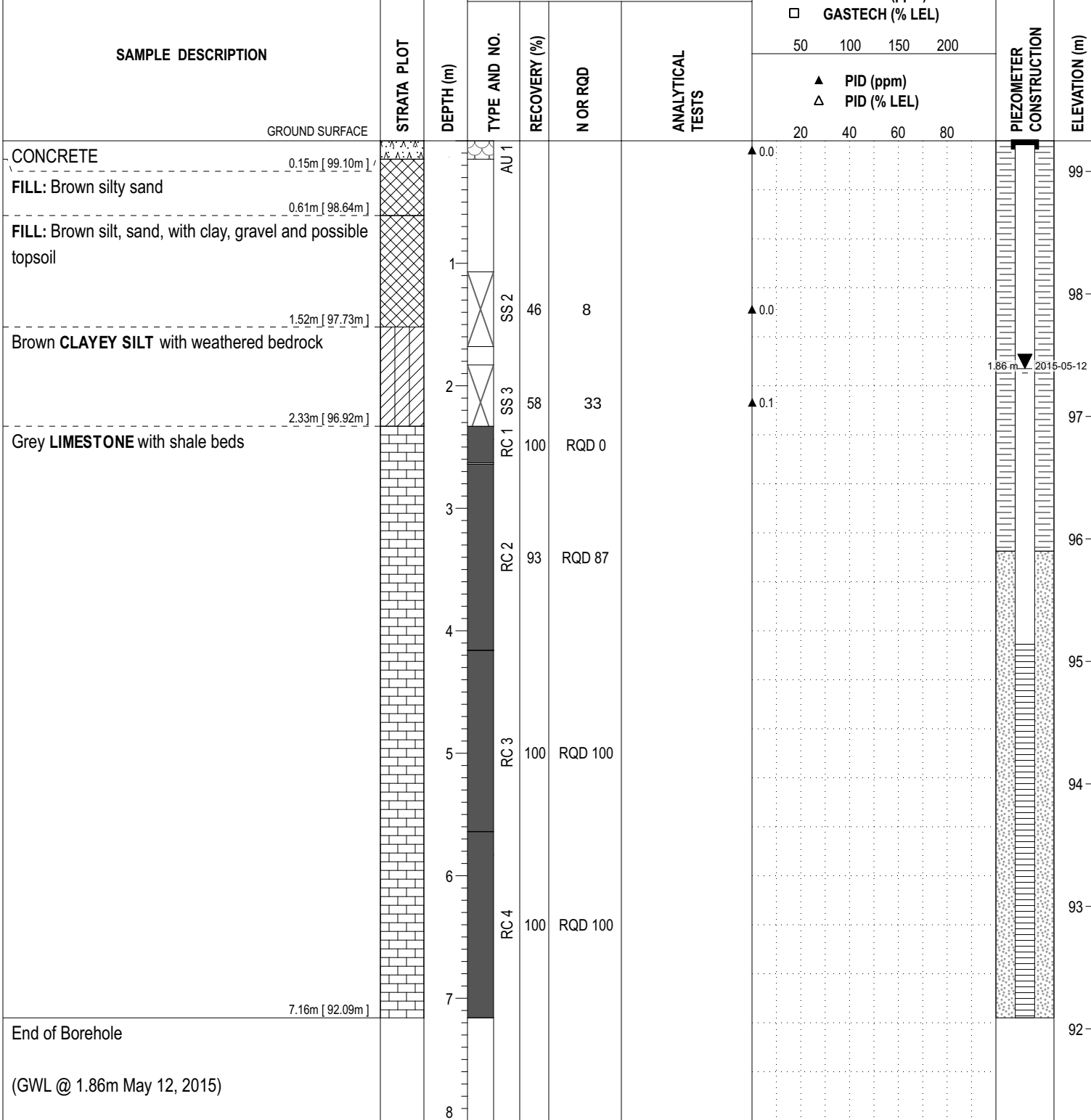
TBM - Top of spindle of fire hydrant located at the south-west corner of Boyd Avenue and Carling Avenue. Assumed elevation = 100.00m.

**COORD. SYS.:** MTM ZONE 9      **EASTING:** 363352.12      **NORTHING:** 5026679.69      **ELEVATION:** 99.25

**PROJECT:** Previous Investigation PE3540      **FILE NO.:** PE4425

**ADVANCED BY:** CME 55 Power Auger      **HOLE NO.:** BH 3

**REMARKS:**      **DATE:** May 6, 2015



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P:/AutoCAD Drawings/Test Hole Data Files/PE35xx/PE3540 (gINT export)/data.scfite 2025-07-02, 14:39 Paterson\_Template

TBM - Top of spindle of fire hydrant located at the south-west corner of Boyd Avenue and Carling Avenue. Assumed elevation = 100.00m.



# SOIL PROFILE AND TEST DATA

## Phase II - Environmental Site Assessment

1746 Carling Avenue, Ottawa, Ontario

**COORD. SYS.:** MTM ZONE 9      **EASTING:** 363344.19      **NORTHING:** 5026647.45      **ELEVATION:** 99.22

**PROJECT:** Previous Investigation PE3540      **FILE NO. :** PE4425

**ADVANCED BY:** CME 55 Power Auger      **DATE:** May 6, 2015      **HOLE NO. :** BH 4

SAMPLE DESCRIPTION	STRATA PLOT	DEPTH (m)	SAMPLE				ANALYTICAL TESTS				PIEZOMETER CONSTRUCTION	ELEVATION (m)
			TYPE AND NO.	RECOVERY (%)	N OR RQD	ANALYTICAL TESTS	GASTECH (ppm)					
							GASTECH (% LEL)					
GROUND SURFACE												
CONCRETE	[Pattern]	0.15m [99.07m]										99
FILL: Granulars	[Pattern]	0.25m [98.97m]										98.72
FILL: Brown silt, sand, with clay and trace organic matter	[Pattern]	1.45m [97.77m]	SS 1	25	+50			▲ 0.0				98
End of Borehole		2										97
Auger refusal @ 1.45m on inferred bedrock		2										97
		3										96
		4										95
		5										94
		6										93
		7										92
		8										91

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P:/AutoCAD Drawings/Test Hole Data Files/PE35xx/PE3540 (gINT export)/data.scfite 2025-07-02, 14:39 Paterson\_Template

TBM - Painted pin located near the northeast corner of 1755 Kerr Avenue. Temporary elevation = 99.228m.

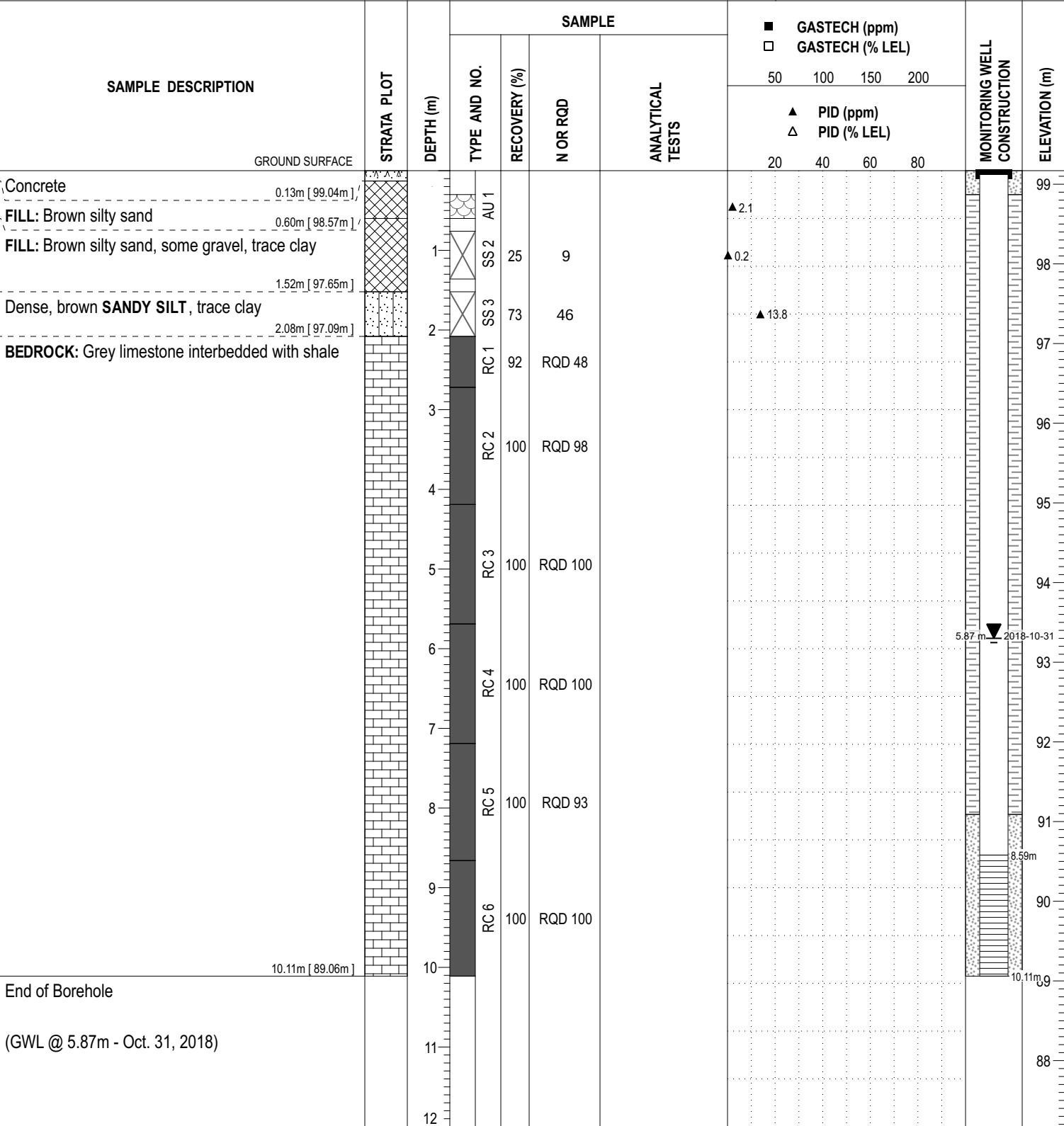
P:\AutoCAD Drawings\Test Hole Data Files\PE4425 (gINT export)\data.scfite 2025-07-02, 14:02 Paterson\_Template

**COORD. SYS.:** MTM ZONE 9      **EASTING:** 363348.40      **NORTHING:** 5026682.38      **ELEVATION:** 99.17

**PROJECT:** Previous Investigation PE4425, 2018      **FILE NO.:** PE4425

**ADVANCED BY:** CME 55 Power Auger      **DATE:** October 22, 2018      **HOLE NO.:** BH 8

**REMARKS:**



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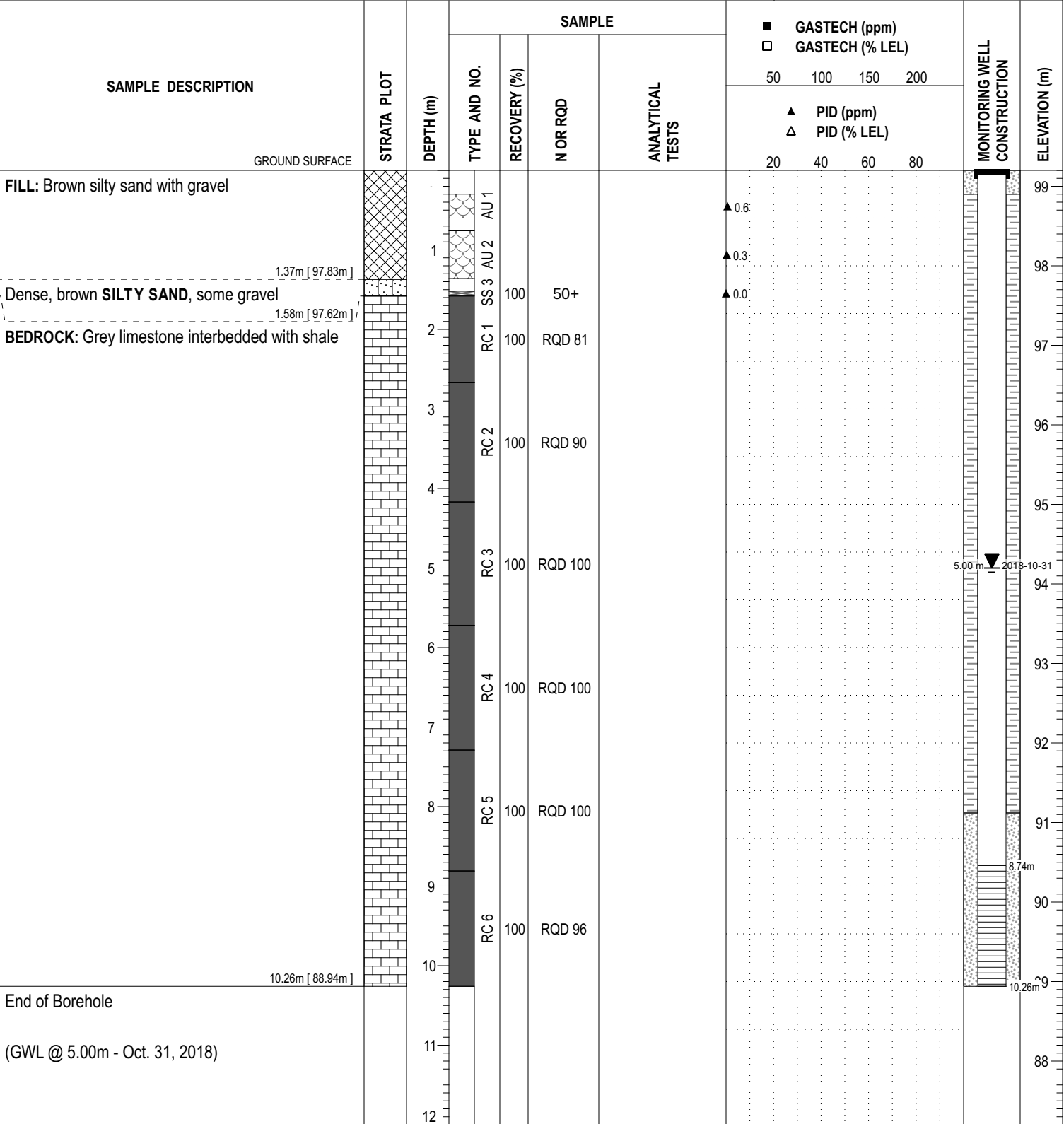
TBM - Painted pin located near the northeast corner of 1755 Kerr Avenue. Temporary elevation = 99.228m.

**COORD. SYS.:** MTM ZONE 9      **EASTING:** 363367.49      **NORTHING:** 5026613.21      **ELEVATION:** 99.20

**PROJECT:** Previous Investigation PE4425, 2018      **FILE NO.:** PE4425

**ADVANCED BY:** CME 55 Power Auger      **HOLE NO.:** BH 9

**REMARKS:**      **DATE:** October 22, 2018



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P:/AutoCAD Drawings/Test Hole Data Files/PE44xx/PE4425 (gINT export)/data.scfite 2025-07-02, 14:02 Paterson\_Template

TBM - Painted pin located near the northeast corner of 1755 Kerr Avenue. Temporary elevation = 99.228m.

P:\AutoCAD Drawings\Test Hole Data Files\PE3533 (gINT export)\data.sc\title 2025-07-02, 14:09 Paterson\_Template

**COORD. SYS.:** MTM ZONE 9      **EASTING:** 363300.83      **NORTHING:** 5026659.00      **ELEVATION:** 98.40

**PROJECT:** Previous Investigation PE3533      **FILE NO. :** PE4425

**ADVANCED BY:** CME 55 Power Auger      **HOLE NO. :** BH 1

**REMARKS:**      **DATE:** May 8, 2015

SAMPLE DESCRIPTION	STRATA PLOT	DEPTH (m)	SAMPLE			ANALYTICAL TESTS				MONITORING WELL CONSTRUCTION	ELEVATION (m)
			TYPE AND NO.	RECOVERY (%)	N OR RQD	GASTECH (ppm)		GASTECH (% LEL)			
						50	100	150	200		
GROUND SURFACE											
Asphaltic concrete		0.08m [98.32m]	AU 1			▲ 2.7					
FILL: Crushed stone		0.23m [98.17m]									
Brown SANDY SILT		0.61m [97.79m]	SS 2	0	+50	▲ 0.0					
Fractured BEDROCK		1.22m [97.18m]	SS 3	0	+50	▲ 0.3					
BEDROCK: Interbedded limestone and dolostone			RC 1SS 3	78	RQD 87						
			RC 2	95	RQD 84						
			RC 3	100	RQD 100						
			RC 4	100	RQD 97						
End of Borehole		6.23m [92.17m]									
(GWL @ 4.01m-May 15, 2015)											

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TBM - Painted pin located near the northeast corner of 1755 Kerr Avenue. Temporary elevation = 99.228m.

**COORD. SYS.:** MTM ZONE 9      **EASTING:** 363307.15      **NORTHING:** 5026643.73      **ELEVATION:** 98.41

**PROJECT:** Previous Investigation PE3533      **FILE NO.:** PE4425

**ADVANCED BY:** CME 55 Power Auger      **REMARKS:**

**DATE:** May 8, 2015

**HOLE NO.:** BH 2

SAMPLE DESCRIPTION	STRATA PLOT	DEPTH (m)	SAMPLE				ANALYTICAL TESTS				PIEZOMETER CONSTRUCTION	ELEVATION (m)
			TYPE AND NO.	RECOVERY (%)	N OR RQD	ANALYTICAL TESTS	GASTECH (ppm)		GASTECH (% LEL)			
							50	100	150	200		
GROUND SURFACE												
Asphaltic concrete		0.05m [98.36m]										
FILL: Crushed stone		0.15m [98.26m]	AU 1									
Brown SANDY SILT		0.84m [97.57m]										
Fractured BEDROCK		1.04m [97.37m]	SS 2	0	+50							
End of Borehole												
Practical refusal to augering at 1.04m depth												
		2										
		3										
		4										
		5										
		6										
		7										

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P:/AutoCAD Drawings/Test Hole Data Files/PE3533 (gINT export)/data.scfite 2025-07-02, 14:09 Paterson\_Template

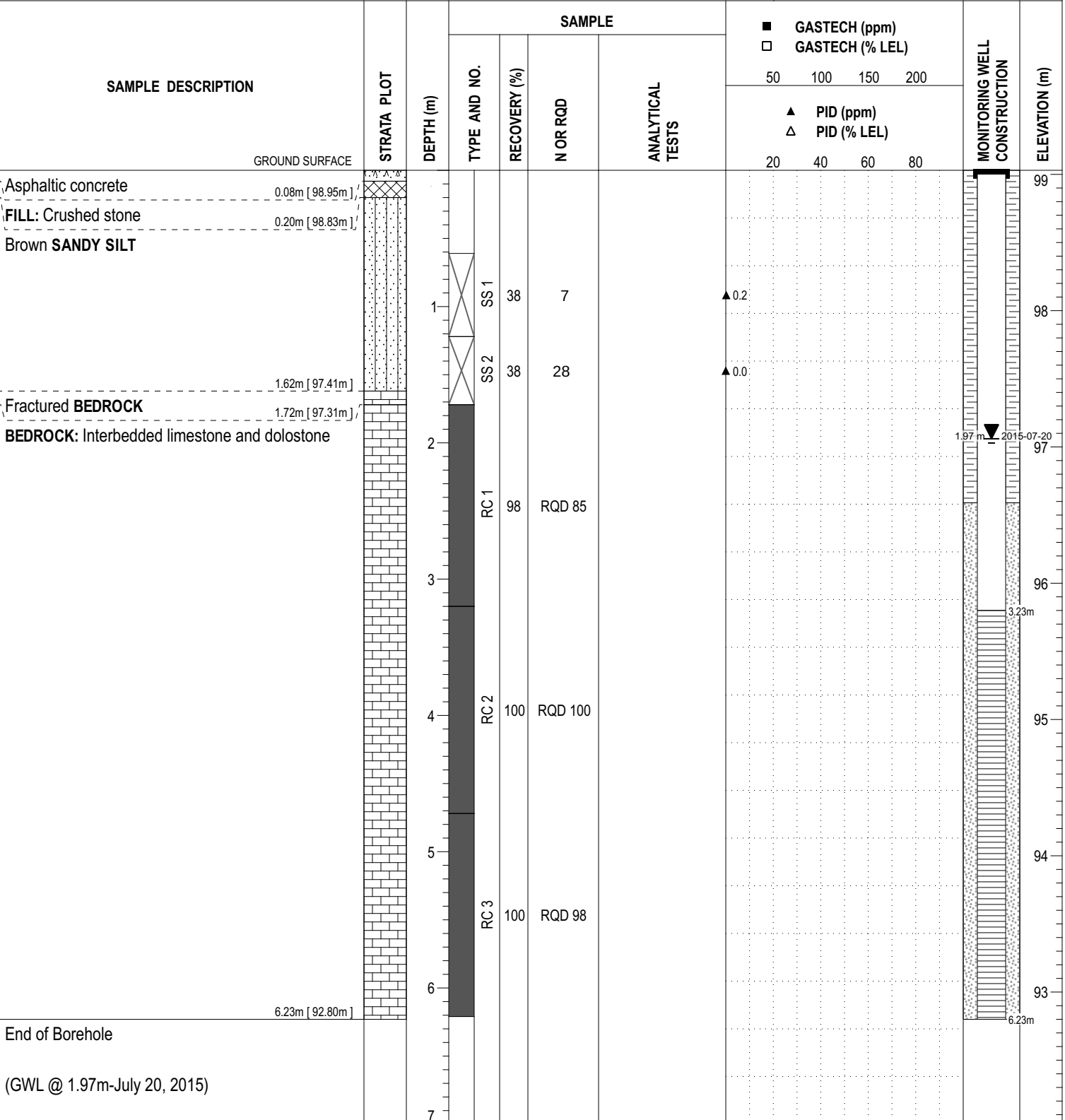
TBM - Painted pin located near the northeast corner of 1755 Kerr Avenue. Temporary elevation = 99.228m.

**COORD. SYS.:** MTM ZONE 9      **EASTING:** 363330.49      **NORTHING:** 5026636.91      **ELEVATION:** 99.03

**PROJECT:** Previous Investigation PE3533      **FILE NO. :** PE4425

**ADVANCED BY:** CME 55 Power Auger      **DATE:** May 8, 2015      **HOLE NO. :** BH 3

**REMARKS:**



(GWL @ 1.97m-July 20, 2015)

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P:/AutoCAD Drawings/Test Hole Data Files/PE3533 (gINT export)/data.scfite 2025-07-02, 14:09 Paterson\_Template

TBM - Painted pin located near the northeast corner of 1755 Kerr Avenue. Temporary elevation = 99.228m.

**COORD. SYS.:** MTM ZONE 9      **EASTING:** 363324.74      **NORTHING:** 5026599.14      **ELEVATION:** 99.44

**PROJECT:** Previous Investigation PE3533      **FILE NO.:** PE4425

**ADVANCED BY:** CME 55 Power Auger      **HOLE NO.:** BH 4

**REMARKS:**      **DATE:** May 8, 2015

SAMPLE DESCRIPTION	STRATA PLOT	DEPTH (m)	SAMPLE				ANALYTICAL TESTS				PIEZOMETER CONSTRUCTION	ELEVATION (m)
			TYPE AND NO.	RECOVERY (%)	N OR RQD	ANALYTICAL TESTS	GASTECH (ppm)		GASTECH (% LEL)			
							50	100	150	200		
GROUND SURFACE												
Asphaltic concrete		0.08m [99.36m]	AU 1									99.38
FILL: Crushed stone		0.23m [99.21m]										99.18
Brown SANDY SILT		1.07m [98.37m]										98.30
Fractured BEDROCK		1.22m [98.22m]	SS 2	29	10							98.22
End of Borehole												
Practical refusal to augering at 1.22m depth												

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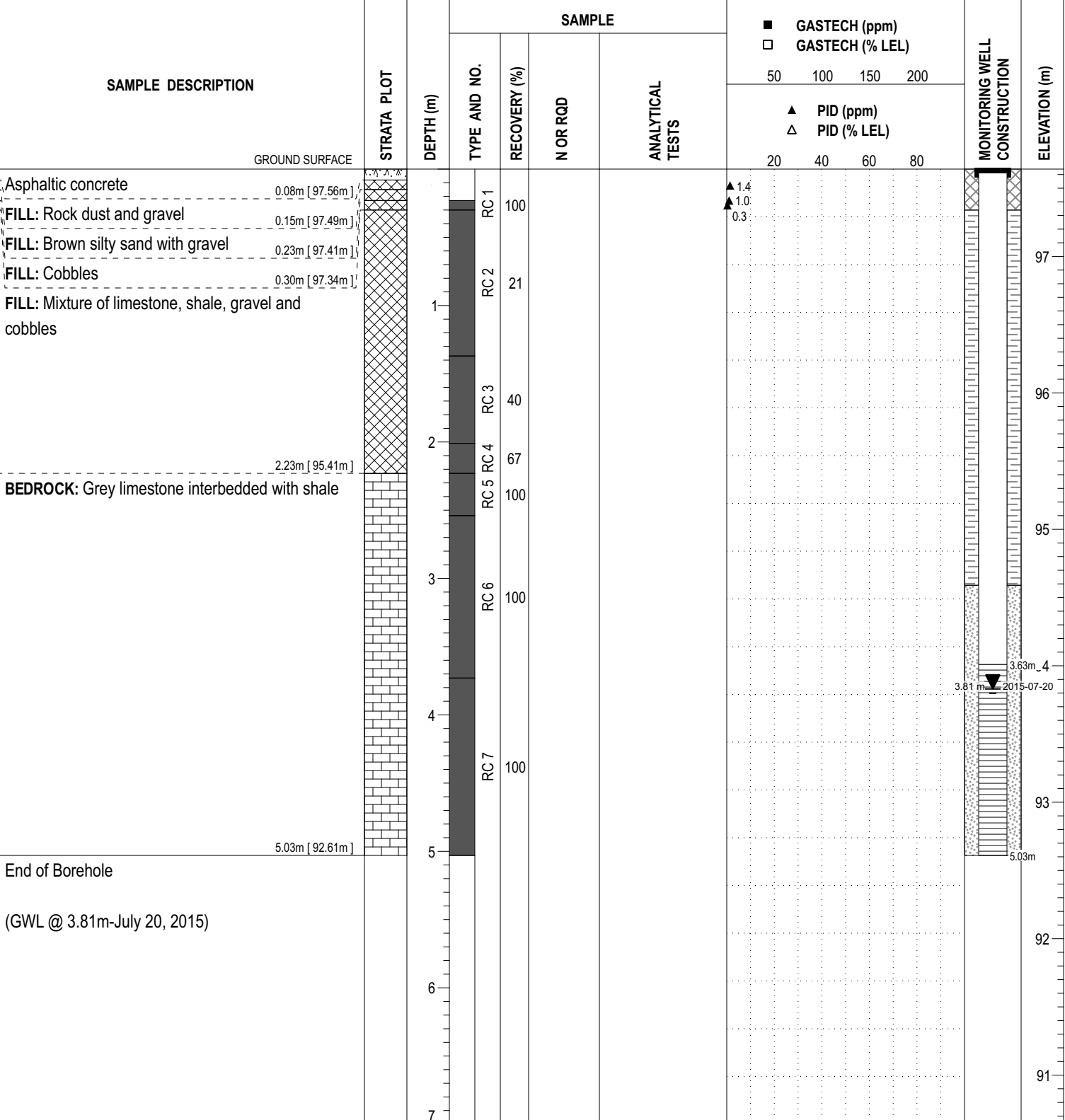
TBM - Painted pin located near the northeast corner of 1755 Kerr Avenue. Temporary elevation = 99.228m.

**COORD. SYS.:** MTM ZONE 9      **EASTING:** 363228.30      **NORTHING:** 5026594.45      **ELEVATION:** 97.64

**PROJECT:** Previous Investigation PE3533      **FILE NO.:** PE4425

**ADVANCED BY:** Portable Drill      **HOLE NO.:** BH 5

**REMARKS:**      **DATE:** July 13, 2015



P:/AutoCAD Drawings/Test Hole Data Files/PE3533 (gINT export)/data.scf/14:09 Paterson\_Template

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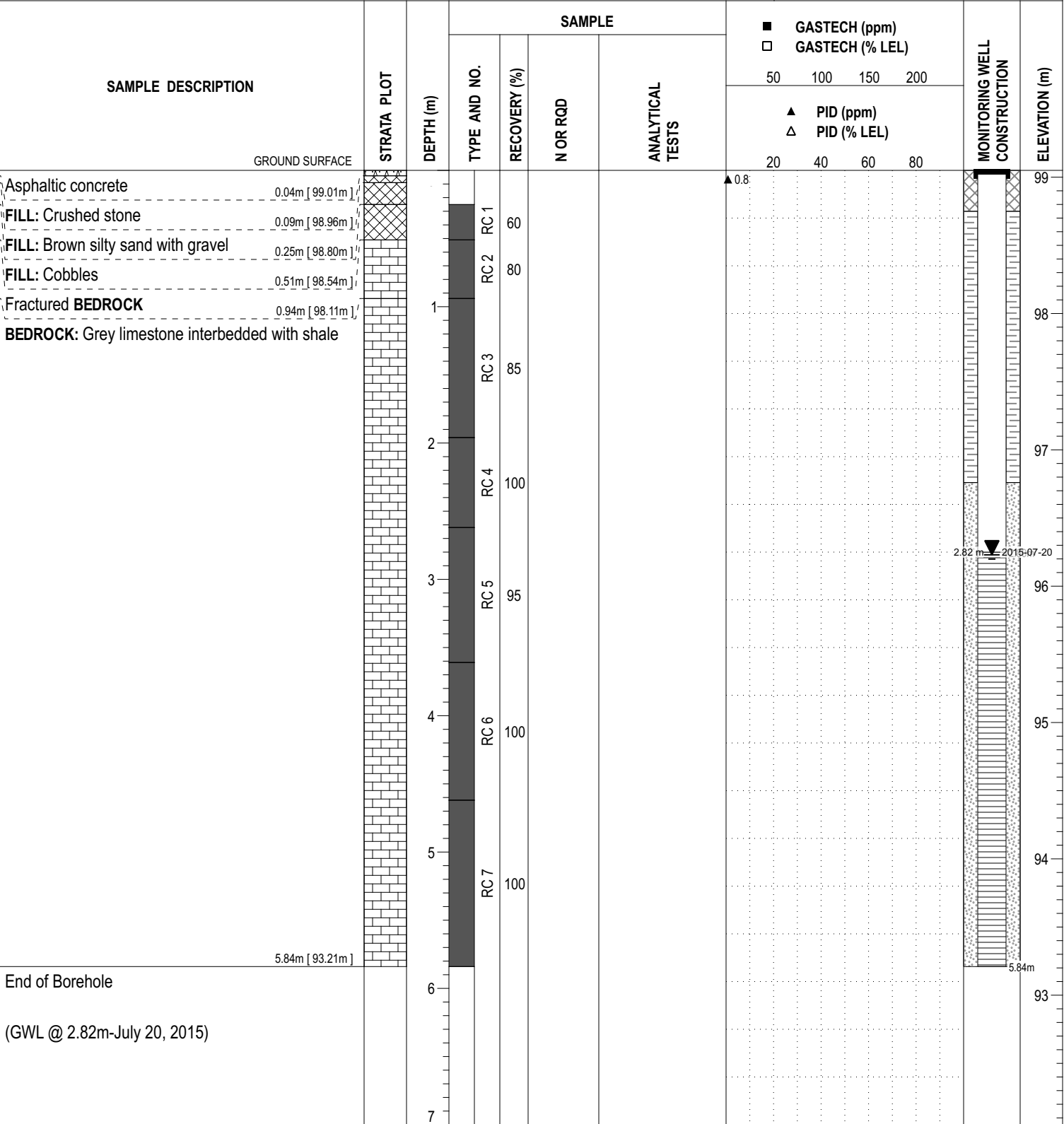
P:\AutoCAD Drawings\Test Hole Data Files\PE3533 (gINT export)\data.scfite 2025-07-02, 14:09 Paterson\_Template

**COORD. SYS.:** MTM ZONE 9      **EASTING:** 363277.96      **NORTHING:** 5026608.39      **ELEVATION:** 99.05

**PROJECT:** Previous Investigation PE3533      **FILE NO.:** PE4425

**ADVANCED BY:** Portable Drill      **HOLE NO.:** BH 6

**REMARKS:**      **DATE:** July 14, 2015



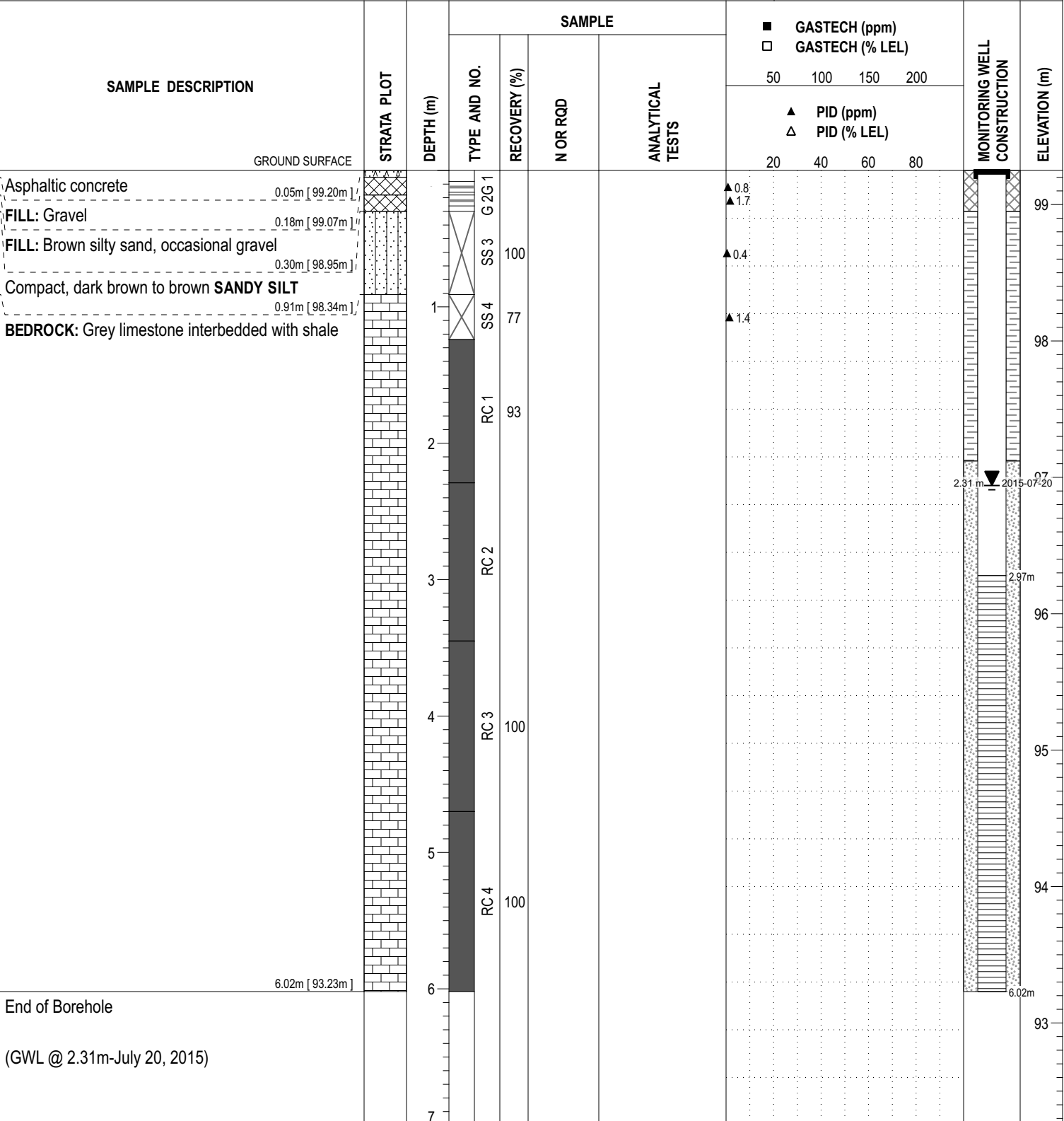
DISCLAIMER: THE DATA PRESENTED IN THIS SHEET IS THE PROPERTY OF PATERSON GROUP AND THE CLIENT FOR WHOM IT WAS PRODUCED. THIS SHEET SHOULD BE READ IN CONJUNCTION WITH ITS CORRESPONDING REPORT. PATERSON GROUP IS NOT RESPONSIBLE FOR THE UNAUTHORIZED USE OF THIS DATA.

**COORD. SYS.:** MTM ZONE 9      **EASTING:** 363339.79      **NORTHING:** 5026611.57      **ELEVATION:** 99.25

**PROJECT:** Previous Investigation PE3533      **FILE NO. :** PE4425

**ADVANCED BY:** Portable Drill

**REMARKS:**      **DATE:** July 14, 2015      **HOLE NO. :** BH 7



TBM - Painted pin located near the northeast corner of 1755 Kerr Avenue. Temporary elevation = 99.228m.

P:/AutoCAD Drawings/Test Hole Data Files/PE3533x/PE3533 (gINT export)/data.scf/14:09 Paterson\_Template

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# SYMBOLS AND TERMS

## SOIL DESCRIPTION

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

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

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

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

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

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

## SYMBOLS AND TERMS (continued)

### SOIL DESCRIPTION (continued)

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

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

### ROCK DESCRIPTION

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

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

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

### SAMPLE TYPES

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

## SYMBOLS AND TERMS (continued)

### PLASTICITY LIMITS AND GRAIN SIZE DISTRIBUTION

WC%	-	Natural water content or water content of sample, %
LL	-	Liquid Limit, % (water content above which soil behaves as a liquid)
PL	-	Plastic Limit, % (water content above which soil behaves plastically)
PI	-	Plasticity Index, % (difference between LL and PL)
D <sub>xx</sub>	-	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
D <sub>10</sub>	-	Grain size at which 10% of the soil is finer (effective grain size)
D <sub>60</sub>	-	Grain size at which 60% of the soil is finer
C <sub>c</sub>	-	Concavity coefficient = $(D_{30})^2 / (D_{10} \times D_{60})$
C <sub>u</sub>	-	Uniformity coefficient = $D_{60} / D_{10}$

C<sub>c</sub> and C<sub>u</sub> are used to assess the grading of sands and gravels:

Well-graded gravels have:  $1 < C_c < 3$  and  $C_u > 4$

Well-graded sands have:  $1 < C_c < 3$  and  $C_u > 6$

Sands and gravels not meeting the above requirements are poorly-graded or uniformly-graded.

C<sub>c</sub> and C<sub>u</sub> 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

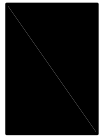
p' <sub>o</sub>	-	Present effective overburden pressure at sample depth
p' <sub>c</sub>	-	Preconsolidation pressure of (maximum past pressure on) sample
C <sub>cr</sub>	-	Recompression index (in effect at pressures below p' <sub>c</sub> )
C <sub>c</sub>	-	Compression index (in effect at pressures above p' <sub>c</sub> )
OC Ratio		Overconsolidation ratio = $p'_c / p'_o$
Void Ratio		Initial sample void ratio = volume of voids / volume of solids
W <sub>o</sub>	-	Initial water content (at start of consolidation test)

### PERMEABILITY TEST

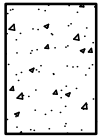
k	-	Coefficient of permeability or hydraulic conductivity is a measure of the ability of water to flow through the sample. The value of k is measured at a specified unit weight for (remoulded) cohesionless soil samples, because its value will vary with the unit weight or density of the sample during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

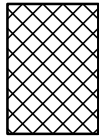
### STRATA PLOT



Topsoil



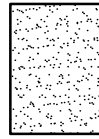
Asphalt



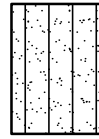
Fill



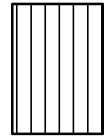
Peat



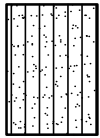
Sand



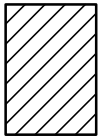
Silty Sand



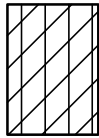
Silt



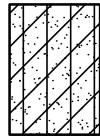
Sandy Silt



Clay



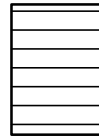
Silty Clay



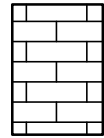
Clayey Silty Sand



Glacial Till



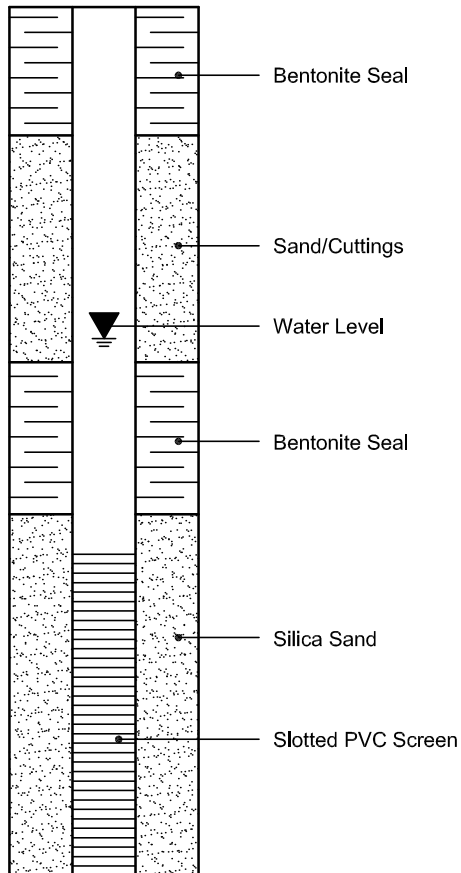
Shale



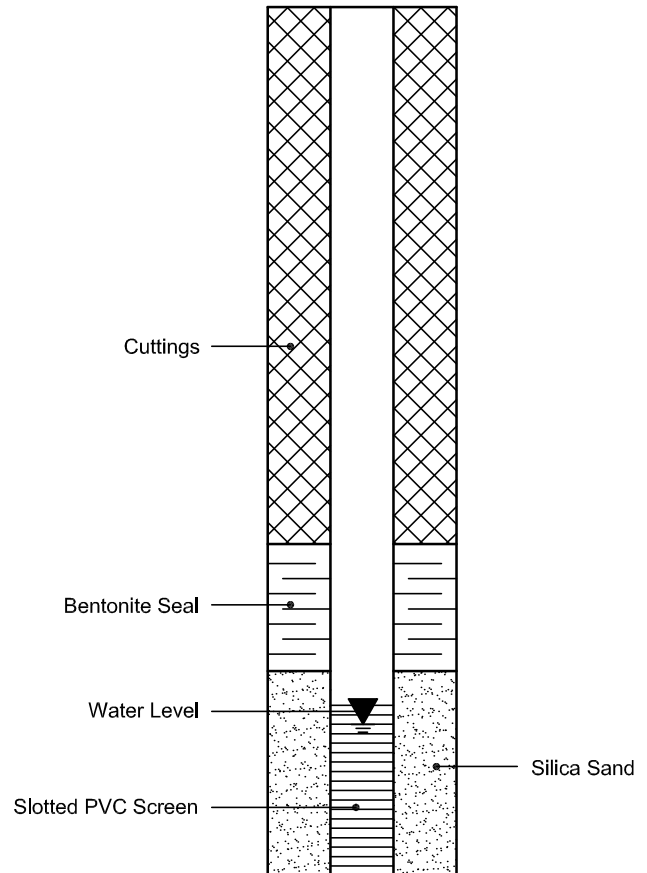
Bedrock

### MONITORING WELL AND PIEZOMETER CONSTRUCTION

#### MONITORING WELL CONSTRUCTION



#### PIEZOMETER CONSTRUCTION



## *Certificate of Analysis*

### **Paterson Group Consulting Engineers**

154 Colonnade Road South  
Nepean, ON K2E 7J5

Attn: Mark D'Arcy

Client PO: 14857

Project: PE3133

Custody: 98275

Phone: (613) 226-7381

Fax: (613) 226-6344

Report Date: 7-Nov-2013

Order Date: 7-Nov-2013

**Order #: 1345249**

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

**Paracel ID**  
1345249-01

**Client ID**  
BH2-GW2

Approved By:



Mark Foto, M.Sc. For Dale Robertson, BSc  
Laboratory Director

**Certificate of Analysis**

Report Date: 07-Nov-2013

Client: **Paterson Group Consulting Engineers**

Order Date: 7-Nov-2013

Client PO: 14857

Project Description: PE3133

**Analysis Summary Table**

Analysis	Method Reference/Description	Extraction Date	Analysis Date
PHC F1	CWS Tier 1 - P&T GC-FID	7-Nov-13	7-Nov-13
PHC F2 - F4	CWS Tier 1 - GC-FID, extraction	7-Nov-13	7-Nov-13
VOCs by P&T GC-MS	EPA 624 - P&T GC-MS	7-Nov-13	7-Nov-13

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**NIAGARA FALLS**  
5415 Morning Glory Cr.  
Niagara Falls, ON L2J 0A3

**SARNIA**  
123 Christina St. N.  
Sarnia, ON N7T 5T7

**Certificate of Analysis**

Report Date: 07-Nov-2013

Client: **Paterson Group Consulting Engineers**

Order Date: 7-Nov-2013

Client PO: 14857

Project Description: PE3133

<b>Client ID:</b>	BH2-GW2	-	-	-
<b>Sample Date:</b>	06-Nov-13	-	-	-
<b>Sample ID:</b>	1345249-01	-	-	-
<b>MDL/Units</b>	Water	-	-	-

**Volatiles**

Acetone	5.0 ug/L	15.7	-	-	-
Benzene	0.5 ug/L	<0.5	-	-	-
Bromodichloromethane	0.5 ug/L	<0.5	-	-	-
Bromoform	0.5 ug/L	<0.5	-	-	-
Bromomethane	0.5 ug/L	<0.5	-	-	-
Carbon Tetrachloride	0.2 ug/L	<0.2	-	-	-
Chlorobenzene	0.5 ug/L	<0.5	-	-	-
Chloroethane	1.0 ug/L	<1.0	-	-	-
Chloroform	0.5 ug/L	1.3	-	-	-
Chloromethane	3.0 ug/L	<3.0	-	-	-
Dibromochloromethane	0.5 ug/L	<0.5	-	-	-
Dichlorodifluoromethane	1.0 ug/L	<1.0	-	-	-
1,2-Dibromoethane	0.2 ug/L	<0.2	-	-	-
1,2-Dichlorobenzene	0.5 ug/L	<0.5	-	-	-
1,3-Dichlorobenzene	0.5 ug/L	<0.5	-	-	-
1,4-Dichlorobenzene	0.5 ug/L	<0.5	-	-	-
1,1-Dichloroethane	0.5 ug/L	<0.5	-	-	-
1,2-Dichloroethane	0.5 ug/L	<0.5	-	-	-
1,1-Dichloroethylene	0.5 ug/L	<0.5	-	-	-
cis-1,2-Dichloroethylene	0.5 ug/L	<0.5	-	-	-
trans-1,2-Dichloroethylene	0.5 ug/L	<0.5	-	-	-
1,2-Dichloroethylene, total	0.5 ug/L	<0.5	-	-	-
1,2-Dichloropropane	0.5 ug/L	<0.5	-	-	-
cis-1,3-Dichloropropylene	0.5 ug/L	<0.5	-	-	-
trans-1,3-Dichloropropylene	0.5 ug/L	<0.5	-	-	-
1,3-Dichloropropene, total	0.5 ug/L	<0.5	-	-	-
Ethylbenzene	0.5 ug/L	<0.5	-	-	-
Hexane	1.0 ug/L	<1.0	-	-	-
Methyl Ethyl Ketone (2-Butanone)	5.0 ug/L	<5.0	-	-	-
Methyl Butyl Ketone (2-Hexanone)	10.0 ug/L	<10.0	-	-	-
Methyl Isobutyl Ketone	5.0 ug/L	<5.0	-	-	-
Methyl tert-butyl ether	2.0 ug/L	<2.0	-	-	-
Methylene Chloride	5.0 ug/L	<5.0	-	-	-

**Certificate of Analysis**

Report Date: 07-Nov-2013

Order Date: 7-Nov-2013

 Client: **Paterson Group Consulting Engineers**

Client PO: 14857

Project Description: PE3133

	Client ID: Sample Date: Sample ID:	BH2-GW2 06-Nov-13 1345249-01	-	-	-
	MDL/Units	Water	-	-	-
Styrene	0.5 ug/L	<0.5	-	-	-
1,1,1,2-Tetrachloroethane	0.5 ug/L	<0.5	-	-	-
1,1,2,2-Tetrachloroethane	0.5 ug/L	<0.5	-	-	-
Tetrachloroethylene	0.5 ug/L	<0.5	-	-	-
Toluene	0.5 ug/L	0.9	-	-	-
1,2,4-Trichlorobenzene	0.5 ug/L	<0.5	-	-	-
1,1,1-Trichloroethane	0.5 ug/L	<0.5	-	-	-
1,1,2-Trichloroethane	0.5 ug/L	<0.5	-	-	-
Trichloroethylene	0.5 ug/L	<0.5	-	-	-
Trichlorofluoromethane	1.0 ug/L	<1.0	-	-	-
1,3,5-Trimethylbenzene	0.5 ug/L	13.7	-	-	-
Vinyl chloride	0.5 ug/L	<0.5	-	-	-
m,p-Xylenes	0.5 ug/L	0.5	-	-	-
o-Xylene	0.5 ug/L	<0.5	-	-	-
Xylenes, total	0.5 ug/L	0.8	-	-	-
4-Bromofluorobenzene	Surrogate	104%	-	-	-
Dibromofluoromethane	Surrogate	91.0%	-	-	-
Toluene-d8	Surrogate	90.7%	-	-	-

**Hydrocarbons**

F1 PHCs (C6-C10)	25 ug/L	147	-	-	-
F2 PHCs (C10-C16)	100 ug/L	580	-	-	-
F3 PHCs (C16-C34)	100 ug/L	360	-	-	-
F4 PHCs (C34-C50)	100 ug/L	<100	-	-	-
F1 + F2 PHCs	125 ug/L	727	-	-	-
F3 + F4 PHCs	200 ug/L	360	-	-	-

**Certificate of Analysis**

Report Date: 07-Nov-2013

Client: **Paterson Group Consulting Engineers**

Order Date: 7-Nov-2013

Client PO: 14857

Project Description: PE3133

**Method Quality Control: Blank**

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
<b>Hydrocarbons</b>									
F1 PHCs (C6-C10)	ND	25	ug/L						
F2 PHCs (C10-C16)	ND	100	ug/L						
F3 PHCs (C16-C34)	ND	100	ug/L						
F4 PHCs (C34-C50)	ND	100	ug/L						
<b>Volatiles</b>									
Acetone	ND	5.0	ug/L						
Benzene	ND	0.5	ug/L						
Bromodichloromethane	ND	0.5	ug/L						
Bromoform	ND	0.5	ug/L						
Bromomethane	ND	0.5	ug/L						
Carbon Tetrachloride	ND	0.2	ug/L						
Chlorobenzene	ND	0.5	ug/L						
Chloroethane	ND	1.0	ug/L						
Chloroform	ND	0.5	ug/L						
Chloromethane	ND	3.0	ug/L						
Dibromochloromethane	ND	0.5	ug/L						
Dichlorodifluoromethane	ND	1.0	ug/L						
1,2-Dibromoethane	ND	0.2	ug/L						
1,2-Dichlorobenzene	ND	0.5	ug/L						
1,3-Dichlorobenzene	ND	0.5	ug/L						
1,4-Dichlorobenzene	ND	0.5	ug/L						
1,1-Dichloroethane	ND	0.5	ug/L						
1,2-Dichloroethane	ND	0.5	ug/L						
1,1-Dichloroethylene	ND	0.5	ug/L						
cis-1,2-Dichloroethylene	ND	0.5	ug/L						
trans-1,2-Dichloroethylene	ND	0.5	ug/L						
1,2-Dichloroethylene, total	ND	0.5	ug/L						
1,2-Dichloropropane	ND	0.5	ug/L						
cis-1,3-Dichloropropylene	ND	0.5	ug/L						
trans-1,3-Dichloropropylene	ND	0.5	ug/L						
1,3-Dichloropropene, total	ND	0.5	ug/L						
Ethylbenzene	ND	0.5	ug/L						
Hexane	ND	1.0	ug/L						
Methyl Ethyl Ketone (2-Butanone)	ND	5.0	ug/L						
Methyl Butyl Ketone (2-Hexanone)	ND	10.0	ug/L						
Methyl Isobutyl Ketone	ND	5.0	ug/L						
Methyl tert-butyl ether	ND	2.0	ug/L						
Methylene Chloride	ND	5.0	ug/L						
Styrene	ND	0.5	ug/L						
1,1,1,2-Tetrachloroethane	ND	0.5	ug/L						
1,1,2,2-Tetrachloroethane	ND	0.5	ug/L						
Tetrachloroethylene	ND	0.5	ug/L						
Toluene	ND	0.5	ug/L						
1,2,4-Trichlorobenzene	ND	0.5	ug/L						
1,1,1-Trichloroethane	ND	0.5	ug/L						
1,1,2-Trichloroethane	ND	0.5	ug/L						
Trichloroethylene	ND	0.5	ug/L						
Trichlorofluoromethane	ND	1.0	ug/L						
1,3,5-Trimethylbenzene	ND	0.5	ug/L						
Vinyl chloride	ND	0.5	ug/L						
m,p-Xylenes	ND	0.5	ug/L						
o-Xylene	ND	0.5	ug/L						
Xylenes, total	ND	0.5	ug/L						
Surrogate: 4-Bromofluorobenzene	90.2		ug/L		113	50-140			
Surrogate: Dibromofluoromethane	69.5		ug/L		86.9	50-140			
Surrogate: Toluene-d8	71.3		ug/L		89.1	50-140			

**Certificate of Analysis**

Report Date: 07-Nov-2013

Client: **Paterson Group Consulting Engineers**

Order Date: 7-Nov-2013

Client PO: 14857

Project Description: PE3133

**Method Quality Control: Duplicate**

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
<b>Hydrocarbons</b>									
F1 PHCs (C6-C10)	ND	25	ug/L	ND				30	
<b>Volatiles</b>									
Acetone	ND	5.0	ug/L	ND				30	
Benzene	ND	0.5	ug/L	ND				30	
Bromodichloromethane	ND	0.5	ug/L	ND				30	
Bromoform	ND	0.5	ug/L	ND				30	
Bromomethane	ND	0.5	ug/L	ND				30	
Carbon Tetrachloride	ND	0.2	ug/L	ND				30	
Chlorobenzene	ND	0.5	ug/L	ND				30	
Chloroethane	ND	1.0	ug/L	ND				30	
Chloroform	ND	0.5	ug/L	ND				30	
Chloromethane	ND	3.0	ug/L	ND				30	
Dibromochloromethane	ND	0.5	ug/L	ND				30	
Dichlorodifluoromethane	ND	1.0	ug/L	ND				30	
1,2-Dibromoethane	ND	0.2	ug/L	ND				30	
1,2-Dichlorobenzene	ND	0.5	ug/L	ND				30	
1,3-Dichlorobenzene	ND	0.5	ug/L	ND				30	
1,4-Dichlorobenzene	ND	0.5	ug/L	ND				30	
1,1-Dichloroethane	ND	0.5	ug/L	ND				30	
1,2-Dichloroethane	ND	0.5	ug/L	ND				30	
1,1-Dichloroethylene	ND	0.5	ug/L	ND				30	
cis-1,2-Dichloroethylene	ND	0.5	ug/L	ND				30	
trans-1,2-Dichloroethylene	ND	0.5	ug/L	ND				30	
1,2-Dichloropropane	ND	0.5	ug/L	ND				30	
cis-1,3-Dichloropropylene	ND	0.5	ug/L	ND				30	
trans-1,3-Dichloropropylene	ND	0.5	ug/L	ND				30	
Ethylbenzene	ND	0.5	ug/L	ND				30	
Hexane	ND	1.0	ug/L	ND				30	
Methyl Ethyl Ketone (2-Butanone)	ND	5.0	ug/L	ND				30	
Methyl Butyl Ketone (2-Hexanone)	ND	10.0	ug/L	ND				30	
Methyl Isobutyl Ketone	ND	5.0	ug/L	ND				30	
Methyl tert-butyl ether	ND	2.0	ug/L	ND				30	
Methylene Chloride	ND	5.0	ug/L	ND				30	
Styrene	ND	0.5	ug/L	ND				30	
1,1,1,2-Tetrachloroethane	ND	0.5	ug/L	ND				30	
1,1,2,2-Tetrachloroethane	ND	0.5	ug/L	ND				30	
Tetrachloroethylene	ND	0.5	ug/L	ND				30	
Toluene	ND	0.5	ug/L	ND				30	
1,2,4-Trichlorobenzene	ND	0.5	ug/L	ND				30	
1,1,1-Trichloroethane	ND	0.5	ug/L	ND				30	
1,1,2-Trichloroethane	ND	0.5	ug/L	ND				30	
Trichloroethylene	ND	0.5	ug/L	ND				30	
Trichlorofluoromethane	ND	1.0	ug/L	ND				30	
1,3,5-Trimethylbenzene	ND	0.5	ug/L	ND				30	
Vinyl chloride	ND	0.5	ug/L	ND				30	
m,p-Xylenes	ND	0.5	ug/L	ND				30	
o-Xylene	ND	0.5	ug/L	ND				30	
Surrogate: 4-Bromofluorobenzene	87.2		ug/L	ND	109	50-140			
Surrogate: Dibromofluoromethane	73.1		ug/L	ND	91.4	50-140			
Surrogate: Toluene-d8	73.4		ug/L	ND	91.7	50-140			

**Certificate of Analysis**

Report Date: 07-Nov-2013

Client: **Paterson Group Consulting Engineers**

Order Date: 7-Nov-2013

Client PO: 14857

Project Description: PE3133

**Method Quality Control: Spike**

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
<b>Hydrocarbons</b>									
F1 PHCs (C6-C10)	1910	25	ug/L	ND	95.6	68-117			
F2 PHCs (C10-C16)	1880	100	ug/L	ND	104	60-140			
F3 PHCs (C16-C34)	3760	100	ug/L	ND	101	60-140			
F4 PHCs (C34-C50)	2100	100	ug/L	ND	84.7	60-140			
<b>Volatiles</b>									
Acetone	122	5.0	ug/L	ND	122	50-140			
Benzene	32.4	0.5	ug/L	ND	81.1	60-130			
Bromodichloromethane	28.4	0.5	ug/L	ND	71.0	60-130			
Bromoform	48.4	0.5	ug/L	ND	121	60-130			
Bromomethane	49.0	0.5	ug/L	ND	122	50-140			
Carbon Tetrachloride	28.0	0.2	ug/L	ND	70.0	60-130			
Chlorobenzene	45.7	0.5	ug/L	ND	114	60-130			
Chloroethane	42.5	1.0	ug/L	ND	106	50-140			
Chloroform	29.7	0.5	ug/L	ND	74.2	60-130			
Chloromethane	41.6	3.0	ug/L	ND	104	50-140			
Dibromochloromethane	45.4	0.5	ug/L	ND	114	60-130			
Dichlorodifluoromethane	35.6	1.0	ug/L	ND	89.1	50-140			
1,2-Dibromoethane	46.3	0.2	ug/L	ND	116	60-130			
1,2-Dichlorobenzene	46.7	0.5	ug/L	ND	117	60-130			
1,3-Dichlorobenzene	46.5	0.5	ug/L	ND	116	60-130			
1,4-Dichlorobenzene	36.9	0.5	ug/L	ND	92.4	60-130			
1,1-Dichloroethane	43.0	0.5	ug/L	ND	108	60-130			
1,2-Dichloroethane	35.3	0.5	ug/L	ND	88.3	60-130			
1,1-Dichloroethylene	30.0	0.5	ug/L	ND	75.1	60-130			
cis-1,2-Dichloroethylene	36.7	0.5	ug/L	ND	91.7	60-130			
trans-1,2-Dichloroethylene	36.6	0.5	ug/L	ND	91.4	60-130			
1,2-Dichloropropane	31.5	0.5	ug/L	ND	78.7	60-130			
cis-1,3-Dichloropropylene	30.0	0.5	ug/L	ND	75.1	60-130			
trans-1,3-Dichloropropylene	31.1	0.5	ug/L	ND	77.8	60-130			
Ethylbenzene	36.6	0.5	ug/L	ND	91.6	60-130			
Hexane	33.2	1.0	ug/L	ND	82.9	60-130			
Methyl Ethyl Ketone (2-Butanone)	95.0	5.0	ug/L	ND	95.0	50-140			
Methyl Butyl Ketone (2-Hexanone)	79.4	10.0	ug/L	ND	79.4	50-140			
Methyl Isobutyl Ketone	62.6	5.0	ug/L	ND	62.6	50-140			
Methyl tert-butyl ether	60.4	2.0	ug/L	ND	60.4	50-140			
Methylene Chloride	44.0	5.0	ug/L	ND	110	60-130			
Styrene	45.7	0.5	ug/L	ND	114	60-130			
1,1,1,2-Tetrachloroethane	43.1	0.5	ug/L	ND	108	60-130			
1,1,2,2-Tetrachloroethane	45.9	0.5	ug/L	ND	115	60-130			
Tetrachloroethylene	51.6	0.5	ug/L	ND	129	60-130			
Toluene	36.4	0.5	ug/L	ND	91.1	60-130			
1,2,4-Trichlorobenzene	40.4	0.5	ug/L	ND	101	60-130			
1,1,1-Trichloroethane	28.8	0.5	ug/L	ND	72.0	60-130			
1,1,2-Trichloroethane	37.2	0.5	ug/L	ND	93.0	60-130			
Trichloroethylene	28.8	0.5	ug/L	ND	72.1	60-130			
Trichlorofluoromethane	27.8	1.0	ug/L	ND	69.4	60-130			
1,3,5-Trimethylbenzene	31.5	0.5	ug/L	ND	78.8	60-130			
Vinyl chloride	36.4	0.5	ug/L	ND	91.0	50-140			
m,p-Xylenes	87.2	0.5	ug/L	ND	109	60-130			

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5415 Morning Glory Cr.  
Niagara Falls, ON L2J 0A3

**SARNIA**  
123 Christina St. N.  
Sarnia, ON N7T 5T7

**Certificate of Analysis**

Report Date: 07-Nov-2013

Client: **Paterson Group Consulting Engineers**

Order Date: 7-Nov-2013

Client PO: 14857

Project Description: PE3133

**Method Quality Control: Spike**

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
o-Xylene	38.2	0.5	ug/L	ND	95.4	60-130			
Surrogate: 4-Bromofluorobenzene	89.5		ug/L		112	50-140			

**Certificate of Analysis**

Report Date: 07-Nov-2013

Client: **Paterson Group Consulting Engineers**

Order Date: 7-Nov-2013

Client PO: 14857

Project Description: PE3133

**Qualifier Notes:**

None

**Sample Data Revisions**

None

**Work Order Revisions / Comments:**

None

**Other Report Notes:**

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

*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.

Client Name: <i>Paterson Group</i>	Project Reference: <i>PE3133</i>	TAT: <input type="checkbox"/> Regular <input type="checkbox"/> 3 Day <input type="checkbox"/> 2 Day <input type="checkbox"/> 1 Day
Contact Name: <i>Mark D'Arcy</i>	Quote #	
Address: <i>154 Colonnade</i>	PO# <i>14857</i>	
Telephone: <i>613-226-7381</i>	Email Address: <i>mdarcy@patersongroup.ca</i>	Date Required: <i>TODAY</i> <i>Nov 7/2013</i>

Criteria:  O. Reg. 153/04 (As Amended) Table 7  RSC Filing  O. Reg. 558/00  PWQO  CCME  SUB (Storm)  SUB (Sanitary) Municipality: \_\_\_\_\_  Other: \_\_\_\_\_

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

Required Analyses

Paracel Order Number:		Matrix	Air Volume	# of Containers	Sample Taken		PHCs F1-F4+BTEX	VOCs	PAHs	Metals by ICP			B (HWS)
Sample ID/Location Name					Date	Time				Hg	Cr-VI		
1	<i>BH2-GW2</i>	<i>GW</i>		<i>3</i>	<i>Nov 6/13</i>	<i>4pm</i>	<i>XX</i>						
2													
3													
4													
5													
6													
7													
8													
9													
10													

Comments: \_\_\_\_\_ Method of Delivery: *Walk-in*

Relinquished By (Sign): _____	Received by Driver/Depot: _____	Received at Lab: <i>SCOL</i>	Verified By: <i>SCOL</i>
Relinquished By (Print): _____	Date/Time: _____	Date/Time: <i>Nov 7/13</i>	Date/Time: <i>Nov 7/13</i>
Date/Time: _____	Temperature: _____ °C	Temperature: <i>13.9 8:50a</i>	pH Verified <input type="checkbox"/> By: <i>N/A</i>

*8:58a*

## *Certificate of Analysis*

### **Paterson Group Consulting Engineers**

154 Colonnade Road South  
Nepean, ON K2E 7J5  
Attn: Eric Leveque

Phone: (613) 226-7381  
Fax: (613) 226-6344

Client PO: 14770  
Project: PE3133  
Custody: 13342

Report Date: 4-Nov-2013  
Order Date: 30-Oct-2013

**Order #: 1344303**

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

<b>Paracel ID</b>	<b>Client ID</b>
1344303-01	BH1-SS1
1344303-02	BH2-SS1

Approved By:



Mark Foto, M.Sc. For Dale Robertson, BSc  
Laboratory Director

**Certificate of Analysis**

Report Date: 04-Nov-2013

Client: **Paterson Group Consulting Engineers**

Order Date: 30-Oct-2013

Client PO: 14770

Project Description: PE3133

**Analysis Summary Table**

Analysis	Method Reference/Description	Extraction Date	Analysis Date
BTEX by P&T GC-MS	EPA 8260 - P&T GC-MS	4-Nov-13	4-Nov-13
PHC F1	CWS Tier 1 - P&T GC-FID	4-Nov-13	4-Nov-13
PHC F2 - F4	CWS Tier 1 - GC-FID, extraction	31-Oct-13	2-Nov-13
Solids, %	Gravimetric, calculation	1-Nov-13	1-Nov-13

P: 1-800-749-1947  
E: PARACEL@PARACELLABS.COM

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**OTTAWA**  
300-2319 St. Laurent Blvd.  
Ottawa, ON K1G 4J8

**MISSISSAUGA**  
6845 Kitimat Rd. Unit #27  
Mississauga, ON L5N 6J3

**NIAGARA FALLS**  
5415 Morning Glory Cr.  
Niagara Falls, ON L2J 0A3

**SARNIA**  
123 Christina St. N.  
Sarnia, ON N7T 5T7

**Certificate of Analysis**

Report Date: 04-Nov-2013

Order Date: 30-Oct-2013

Client: Paterson Group Consulting Engineers

Project Description: PE3133

Client PO: 14770

<b>Client ID:</b>	BH1-SS1	BH2-SS1	-	-
<b>Sample Date:</b>	30-Oct-13	30-Oct-13	-	-
<b>Sample ID:</b>	1344303-01	1344303-02	-	-
<b>MDL/Units</b>	Soil	Soil	-	-

**Physical Characteristics**

% Solids	0.1 % by Wt.	79.7	79.5	-	-
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**Volatiles**

Benzene	0.02 ug/g dry	<0.02	<0.02	-	-
Ethylbenzene	0.05 ug/g dry	<0.05	<0.05	-	-
Toluene	0.05 ug/g dry	<0.05	<0.05	-	-
m,p-Xylenes	0.05 ug/g dry	<0.05	<0.05	-	-
o-Xylene	0.05 ug/g dry	<0.05	<0.05	-	-
Xylenes, total	0.05 ug/g dry	<0.05	<0.05	-	-
Toluene-d8	Surrogate	108%	109%	-	-

**Hydrocarbons**

F1 PHCs (C6-C10)	7 ug/g dry	<7	<7	-	-
F2 PHCs (C10-C16)	4 ug/g dry	<4	<4	-	-
F3 PHCs (C16-C34)	8 ug/g dry	<8	<8	-	-
F4 PHCs (C34-C50)	6 ug/g dry	<6	<6	-	-

**Certificate of Analysis**

Report Date: 04-Nov-2013

Client: **Paterson Group Consulting Engineers**

Order Date: 30-Oct-2013

Client PO: 14770

Project Description: PE3133

**Method Quality Control: Blank**

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
<b>Hydrocarbons</b>									
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						
<b>Volatiles</b>									
Benzene	ND	0.02	ug/g						
Ethylbenzene	ND	0.05	ug/g						
Toluene	ND	0.05	ug/g						
m,p-Xylenes	ND	0.05	ug/g						
o-Xylene	ND	0.05	ug/g						
Xylenes, total	ND	0.05	ug/g						
Surrogate: Toluene-d8	3.33		ug/g		104	50-140			

**Certificate of Analysis**

Report Date: 04-Nov-2013

Client: **Paterson Group Consulting Engineers**

Order Date: 30-Oct-2013

Client PO: 14770

Project Description: PE3133

**Method Quality Control: Duplicate**

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
<b>Hydrocarbons</b>									
F1 PHCs (C6-C10)	ND	7	ug/g dry	ND				40	
F2 PHCs (C10-C16)	ND	4	ug/g dry	ND				30	
F3 PHCs (C16-C34)	ND	8	ug/g dry	ND				30	
F4 PHCs (C34-C50)	ND	6	ug/g dry	ND				30	
<b>Physical Characteristics</b>									
% Solids	84.5	0.1	% by Wt.	84.1			0.4	25	
<b>Volatiles</b>									
Benzene	ND	0.02	ug/g dry	ND				50	
Ethylbenzene	ND	0.05	ug/g dry	ND				50	
Toluene	ND	0.05	ug/g dry	ND				50	
m,p-Xylenes	ND	0.05	ug/g dry	ND				50	
o-Xylene	ND	0.05	ug/g dry	ND				50	
Surrogate: Toluene-d8	2.29		ug/g dry	ND	61.6	50-140			

**Certificate of Analysis**

Report Date: 04-Nov-2013

Client: **Paterson Group Consulting Engineers**

Order Date: 30-Oct-2013

Client PO: 14770

Project Description: PE3133

**Method Quality Control: Spike**

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
<b>Hydrocarbons</b>									
F1 PHCs (C6-C10)	190	7	ug/g	ND	95.0	80-120			
F2 PHCs (C10-C16)	71	4	ug/g	ND	72.5	60-140			
F3 PHCs (C16-C34)	178	8	ug/g	ND	87.8	60-140			
F4 PHCs (C34-C50)	107	6	ug/g	ND	79.1	60-140			
<b>Volatiles</b>									
Benzene	4.11	0.02	ug/g	ND	103	60-130			
Ethylbenzene	3.92	0.05	ug/g	ND	97.9	60-130			
Toluene	4.47	0.05	ug/g	ND	112	60-130			
m,p-Xylenes	9.35	0.05	ug/g	ND	117	60-130			
o-Xylene	4.67	0.05	ug/g	ND	117	60-130			
Surrogate: Toluene-d8	2.86		ug/g		89.4	50-140			

**Certificate of Analysis**

Client: **Paterson Group Consulting Engineers**  
Client PO: 14770

Project Description: PE3133

Report Date: 04-Nov-2013  
Order Date: 30-Oct-2013

**Qualifier Notes:**

None

**Sample Data Revisions**

None

**Work Order Revisions / Comments:**

None

**Other Report Notes:**

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

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

*CCME PHC additional information:*

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

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Page \_\_\_ of \_\_\_

Client Name: <i>Paterson Group</i>	Project Reference: <i>PE 3133</i>	TAT: <input checked="" type="checkbox"/> Regular <input type="checkbox"/> 3 Day <input checked="" type="checkbox"/> 1 Day
Contact Name: <i>ERIC LEVEQUE</i>	Quote #	<input type="checkbox"/> 2 Day <input type="checkbox"/> 1 Day
Address: <i>154 Colonnade Rd. S.</i>	PO# <i>14770</i>	Date Required: _____
Telephone: <i>613-226-7381</i>	Email Address: <i>e.levaque@patersongroup.ca</i>	

Criteria:  O. Reg. 153/04 (As Amended) Table 7  RSC Filing  O. Reg. 558/00  PWQO  CCME  SUB (Storm)  SUB (Sanitary) Municipality: \_\_\_\_\_  Other: \_\_\_\_\_

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

Required Analyses

Paracel Order Number: <i>1344303</i>		Matrix	Air Volume	# of Containers	Sample Taken		<i>ACLS-PA</i>	<i>BTEX</i>											
Sample ID/Location Name					Date	Time													
1	<i>BH1-SS1</i>	<i>S</i>		<i>2</i>	<i>Oct 30/13</i>	<i>NOON</i>	<i>X</i>	<i>X</i>											
2	<i>BH2-SS1</i>	<i>S</i>		<i>2</i>	<i>↓</i>	<i>↓</i>	<i>X</i>	<i>X</i>											<i>-120ml + 1 vial</i>
3																			
4																			
5																			
6																			
7																			
8																			
9																			
10																			

Comments: *\* PLEASE COPY MARK D'ARCY FROM OUR OFFICE RESULTS. \* Changed TAT to 3-day per Eric.* Method of Delivery: *Paracel Carrier*

Relinquished By (Sign): <i>Mike B.</i>	Received by Driver/Depot: <i>M. BROUSE</i>	Received at Lab: <i>SUNBEPORN</i>	Verified By: <i>[Signature]</i>
Relinquished By (Print):	Date/Time: <i>30/10/13 3:51 PM</i>	Date/Time: <i>OCT 31 2013 10:35</i>	Date/Time: <i>OCT 31/13</i>
Date/Time:	Temperature: _____ °C	Temperature: <i>8.1</i> °C	pH Verified   By: <i>ALA</i>

*10:40a*

## *Certificate of Analysis*

### **Paterson Group Consulting Engineers**

154 Colonnade Road South  
Nepean, ON K2E 7J5  
Attn: Mike Beaudoin

Phone: (613) 226-7381  
Fax: (613) 226-6344

Client PO: 14777  
Project: PE3133  
Custody: 98273

Report Date: 5-Nov-2013  
Order Date: 4-Nov-2013

**Order #: 1345024**

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

<b>Paracel ID</b>	<b>Client ID</b>
1345024-01	BH1-GW1
1345024-02	BH2-GW1

Approved By:



Mark Foto, M.Sc. For Dale Robertson, BSc  
Laboratory Director

**Certificate of Analysis**

Report Date: 05-Nov-2013

Client: **Paterson Group Consulting Engineers**

Order Date: 4-Nov-2013

Client PO: 14777

Project Description: PE3133

**Analysis Summary Table**

Analysis	Method Reference/Description	Extraction Date	Analysis Date
PHC F1	CWS Tier 1 - P&T GC-FID	4-Nov-13	4-Nov-13
PHC F2 - F4	CWS Tier 1 - GC-FID, extraction	4-Nov-13	4-Nov-13
VOCs by P&T GC-MS	EPA 624 - P&T GC-MS	4-Nov-13	4-Nov-13

**Certificate of Analysis**

Report Date: 05-Nov-2013

 Client: **Paterson Group Consulting Engineers**

Order Date: 4-Nov-2013

Client PO: 14777

Project Description: PE3133

<b>Client ID:</b>	BH1-GW1	BH2-GW1	-	-
<b>Sample Date:</b>	04-Nov-13	04-Nov-13	-	-
<b>Sample ID:</b>	1345024-01	1345024-02	-	-
<b>MDL/Units</b>	Water	Water	-	-

**Volatiles**

Acetone	5.0 ug/L	<5.0	<5.0	-	-
Benzene	0.5 ug/L	<0.5	<0.5	-	-
Bromodichloromethane	0.5 ug/L	<0.5	<0.5	-	-
Bromoform	0.5 ug/L	<0.5	<0.5	-	-
Bromomethane	0.5 ug/L	<0.5	<0.5	-	-
Carbon Tetrachloride	0.2 ug/L	<0.2	<0.2	-	-
Chlorobenzene	0.5 ug/L	<0.5	<0.5	-	-
Chloroethane	1.0 ug/L	<1.0	<1.0	-	-
Chloroform	0.5 ug/L	<0.5	<0.5	-	-
Chloromethane	3.0 ug/L	<3.0	<3.0	-	-
Dibromochloromethane	0.5 ug/L	<0.5	<0.5	-	-
Dichlorodifluoromethane	1.0 ug/L	<1.0	<1.0	-	-
1,2-Dibromoethane	0.2 ug/L	<0.2	<0.2	-	-
1,2-Dichlorobenzene	0.5 ug/L	<0.5	<0.5	-	-
1,3-Dichlorobenzene	0.5 ug/L	<0.5	<0.5	-	-
1,4-Dichlorobenzene	0.5 ug/L	<0.5	<0.5	-	-
1,1-Dichloroethane	0.5 ug/L	<0.5	<0.5	-	-
1,2-Dichloroethane	0.5 ug/L	<0.5	<0.5	-	-
1,1-Dichloroethylene	0.5 ug/L	<0.5	<0.5	-	-
cis-1,2-Dichloroethylene	0.5 ug/L	<0.5	<0.5	-	-
trans-1,2-Dichloroethylene	0.5 ug/L	<0.5	<0.5	-	-
1,2-Dichloroethylene, total	0.5 ug/L	<0.5	<0.5	-	-
1,2-Dichloropropane	0.5 ug/L	<0.5	<0.5	-	-
cis-1,3-Dichloropropylene	0.5 ug/L	<0.5	<0.5	-	-
trans-1,3-Dichloropropylene	0.5 ug/L	<0.5	<0.5	-	-
1,3-Dichloropropene, total	0.5 ug/L	<0.5	<0.5	-	-
Ethylbenzene	0.5 ug/L	<0.5	<0.5	-	-
Hexane	1.0 ug/L	<1.0	<1.0	-	-
Methyl Ethyl Ketone (2-Butanone)	5.0 ug/L	<5.0	<5.0	-	-
Methyl Butyl Ketone (2-Hexanone)	10.0 ug/L	<10.0	<10.0	-	-
Methyl Isobutyl Ketone	5.0 ug/L	<5.0	<5.0	-	-
Methyl tert-butyl ether	2.0 ug/L	<2.0	<2.0	-	-
Methylene Chloride	5.0 ug/L	<5.0	<5.0	-	-

 P: 1-800-749-1947  
 E: PARACEL@PARACELLABS.COM

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**SARNIA**  
 123 Christina St. N.  
 Sarnia, ON N7T 5T7

**Certificate of Analysis**

Report Date: 05-Nov-2013

 Client: **Paterson Group Consulting Engineers**

Order Date: 4-Nov-2013

Client PO: 14777

Project Description: PE3133

	Client ID:	BH1-GW1	BH2-GW1	-	-
	Sample Date:	04-Nov-13	04-Nov-13	-	-
	Sample ID:	1345024-01	1345024-02	-	-
	MDL/Units	Water	Water	-	-
Styrene	0.5 ug/L	<0.5	<0.5	-	-
1,1,1,2-Tetrachloroethane	0.5 ug/L	<0.5	<0.5	-	-
1,1,2,2-Tetrachloroethane	0.5 ug/L	<0.5	<0.5	-	-
Tetrachloroethylene	0.5 ug/L	<0.5	<0.5	-	-
Toluene	0.5 ug/L	<0.5	1.6	-	-
1,2,4-Trichlorobenzene	0.5 ug/L	<0.5	<0.5	-	-
1,1,1-Trichloroethane	0.5 ug/L	<0.5	<0.5	-	-
1,1,2-Trichloroethane	0.5 ug/L	<0.5	<0.5	-	-
Trichloroethylene	0.5 ug/L	<0.5	<0.5	-	-
Trichlorofluoromethane	1.0 ug/L	<1.0	<1.0	-	-
1,3,5-Trimethylbenzene	0.5 ug/L	<0.5	35.0	-	-
Vinyl chloride	0.5 ug/L	<0.5	<0.5	-	-
m,p-Xylenes	0.5 ug/L	<0.5	<0.5	-	-
o-Xylene	0.5 ug/L	<0.5	<0.5	-	-
Xylenes, total	0.5 ug/L	<0.5	<0.5	-	-
4-Bromofluorobenzene	Surrogate	105%	111%	-	-
Dibromofluoromethane	Surrogate	87.7%	76.3%	-	-
Toluene-d8	Surrogate	138%	136%	-	-

**Hydrocarbons**

F1 PHCs (C6-C10)	25 ug/L	<25	<25	-	-
F2 PHCs (C10-C16)	100 ug/L	<100	1080	-	-
F3 PHCs (C16-C34)	100 ug/L	<100	373	-	-
F4 PHCs (C34-C50)	100 ug/L	<100	<100	-	-
F1 + F2 PHCs	125 ug/L	<125	1080	-	-
F3 + F4 PHCs	200 ug/L	<200	373	-	-

**Certificate of Analysis**

Report Date: 05-Nov-2013

Client: **Paterson Group Consulting Engineers**

Order Date: 4-Nov-2013

Client PO: 14777

Project Description: PE3133

**Method Quality Control: Blank**

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
<b>Hydrocarbons</b>									
F1 PHCs (C6-C10)	ND	25	ug/L						
F2 PHCs (C10-C16)	ND	100	ug/L						
F3 PHCs (C16-C34)	ND	100	ug/L						
F4 PHCs (C34-C50)	ND	100	ug/L						
<b>Volatiles</b>									
Acetone	ND	5.0	ug/L						
Benzene	ND	0.5	ug/L						
Bromodichloromethane	ND	0.5	ug/L						
Bromoform	ND	0.5	ug/L						
Bromomethane	ND	0.5	ug/L						
Carbon Tetrachloride	ND	0.2	ug/L						
Chlorobenzene	ND	0.5	ug/L						
Chloroethane	ND	1.0	ug/L						
Chloroform	ND	0.5	ug/L						
Chloromethane	ND	3.0	ug/L						
Dibromochloromethane	ND	0.5	ug/L						
Dichlorodifluoromethane	ND	1.0	ug/L						
1,2-Dibromoethane	ND	0.2	ug/L						
1,2-Dichlorobenzene	ND	0.5	ug/L						
1,3-Dichlorobenzene	ND	0.5	ug/L						
1,4-Dichlorobenzene	ND	0.5	ug/L						
1,1-Dichloroethane	ND	0.5	ug/L						
1,2-Dichloroethane	ND	0.5	ug/L						
1,1-Dichloroethylene	ND	0.5	ug/L						
cis-1,2-Dichloroethylene	ND	0.5	ug/L						
trans-1,2-Dichloroethylene	ND	0.5	ug/L						
1,2-Dichloroethylene, total	ND	0.5	ug/L						
1,2-Dichloropropane	ND	0.5	ug/L						
cis-1,3-Dichloropropylene	ND	0.5	ug/L						
trans-1,3-Dichloropropylene	ND	0.5	ug/L						
1,3-Dichloropropene, total	ND	0.5	ug/L						
Ethylbenzene	ND	0.5	ug/L						
Hexane	ND	1.0	ug/L						
Methyl Ethyl Ketone (2-Butanone)	ND	5.0	ug/L						
Methyl Butyl Ketone (2-Hexanone)	ND	10.0	ug/L						
Methyl Isobutyl Ketone	ND	5.0	ug/L						
Methyl tert-butyl ether	ND	2.0	ug/L						
Methylene Chloride	ND	5.0	ug/L						
Styrene	ND	0.5	ug/L						
1,1,1,2-Tetrachloroethane	ND	0.5	ug/L						
1,1,1,2,2-Tetrachloroethane	ND	0.5	ug/L						
Tetrachloroethylene	ND	0.5	ug/L						
Toluene	ND	0.5	ug/L						
1,2,4-Trichlorobenzene	ND	0.5	ug/L						
1,1,1-Trichloroethane	ND	0.5	ug/L						
1,1,2-Trichloroethane	ND	0.5	ug/L						
Trichloroethylene	ND	0.5	ug/L						
Trichlorofluoromethane	ND	1.0	ug/L						
1,3,5-Trimethylbenzene	ND	0.5	ug/L						
Vinyl chloride	ND	0.5	ug/L						
m,p-Xylenes	ND	0.5	ug/L						
o-Xylene	ND	0.5	ug/L						
Xylenes, total	ND	0.5	ug/L						
Surrogate: 4-Bromofluorobenzene	35.6		ug/L		111	50-140			
Surrogate: Dibromofluoromethane	24.1		ug/L		75.3	50-140			
Surrogate: Toluene-d8	38.0		ug/L		119	50-140			

**Certificate of Analysis**

Report Date: 05-Nov-2013

Client: **Paterson Group Consulting Engineers**

Order Date: 4-Nov-2013

Client PO: 14777

Project Description: PE3133

**Method Quality Control: Duplicate**

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
<b>Hydrocarbons</b>									
F1 PHCs (C6-C10)	ND	25	ug/L	ND				30	
F2 PHCs (C10-C16)	ND	100	ug/L	ND				30	
F3 PHCs (C16-C34)	ND	100	ug/L	ND				30	
F4 PHCs (C34-C50)	ND	100	ug/L	ND				30	
<b>Volatiles</b>									
Acetone	ND	5.0	ug/L	ND				30	
Benzene	ND	0.5	ug/L	ND				30	
Bromodichloromethane	ND	0.5	ug/L	ND				30	
Bromoform	ND	0.5	ug/L	ND				30	
Bromomethane	ND	0.5	ug/L	ND				30	
Carbon Tetrachloride	ND	0.2	ug/L	ND				30	
Chlorobenzene	ND	0.5	ug/L	ND				30	
Chloroethane	ND	1.0	ug/L	ND				30	
Chloroform	ND	0.5	ug/L	ND				30	
Chloromethane	ND	3.0	ug/L	ND				30	
Dibromochloromethane	ND	0.5	ug/L	ND				30	
Dichlorodifluoromethane	ND	1.0	ug/L	ND				30	
1,2-Dibromoethane	ND	0.2	ug/L	ND				30	
1,2-Dichlorobenzene	ND	0.5	ug/L	ND				30	
1,3-Dichlorobenzene	ND	0.5	ug/L	ND				30	
1,4-Dichlorobenzene	ND	0.5	ug/L	ND				30	
1,1-Dichloroethane	ND	0.5	ug/L	ND				30	
1,2-Dichloroethane	ND	0.5	ug/L	ND				30	
1,1-Dichloroethylene	ND	0.5	ug/L	ND				30	
cis-1,2-Dichloroethylene	ND	0.5	ug/L	ND				30	
trans-1,2-Dichloroethylene	ND	0.5	ug/L	ND				30	
1,2-Dichloropropane	ND	0.5	ug/L	ND				30	
cis-1,3-Dichloropropylene	ND	0.5	ug/L	ND				30	
trans-1,3-Dichloropropylene	ND	0.5	ug/L	ND				30	
Ethylbenzene	ND	0.5	ug/L	ND				30	
Hexane	ND	1.0	ug/L	ND				30	
Methyl Ethyl Ketone (2-Butanone)	ND	5.0	ug/L	ND				30	
Methyl Butyl Ketone (2-Hexanone)	ND	10.0	ug/L	ND				30	
Methyl Isobutyl Ketone	ND	5.0	ug/L	ND				30	
Methyl tert-butyl ether	ND	2.0	ug/L	ND				30	
Methylene Chloride	ND	5.0	ug/L	ND				30	
Styrene	ND	0.5	ug/L	ND				30	
1,1,1,2-Tetrachloroethane	ND	0.5	ug/L	ND				30	
1,1,2,2-Tetrachloroethane	ND	0.5	ug/L	ND				30	
Tetrachloroethylene	ND	0.5	ug/L	ND				30	
Toluene	ND	0.5	ug/L	ND				30	
1,2,4-Trichlorobenzene	ND	0.5	ug/L	ND				30	
1,1,1-Trichloroethane	ND	0.5	ug/L	ND				30	
1,1,2-Trichloroethane	ND	0.5	ug/L	ND				30	
Trichloroethylene	ND	0.5	ug/L	ND				30	
Trichlorofluoromethane	ND	1.0	ug/L	ND				30	
1,3,5-Trimethylbenzene	ND	0.5	ug/L	ND				30	
Vinyl chloride	ND	0.5	ug/L	ND				30	
m,p-Xylenes	ND	0.5	ug/L	ND				30	
o-Xylene	ND	0.5	ug/L	ND				30	
Surrogate: 4-Bromofluorobenzene	37.3		ug/L	ND	117	50-140			
Surrogate: Dibromofluoromethane	23.5		ug/L	ND	73.5	50-140			
Surrogate: Toluene-d8	44.6		ug/L	ND	139	50-140			

**Certificate of Analysis**

Report Date: 05-Nov-2013

Client: **Paterson Group Consulting Engineers**

Order Date: 4-Nov-2013

Client PO: 14777

Project Description: PE3133

**Method Quality Control: Spike**

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
<b>Hydrocarbons</b>									
F1 PHCs (C6-C10)	1950	25	ug/L	ND	97.4	68-117			
F2 PHCs (C10-C16)	1540	100	ug/L	ND	85.3	60-140			
F3 PHCs (C16-C34)	3120	100	ug/L	ND	83.9	60-140			
F4 PHCs (C34-C50)	1700	100	ug/L	ND	68.7	60-140			
<b>Volatiles</b>									
Acetone	97.4	5.0	ug/L	ND	97.4	50-140			
Benzene	28.3	0.5	ug/L	ND	70.8	50-140			
Bromodichloromethane	31.6	0.5	ug/L	ND	78.9	50-140			
Bromoform	51.2	0.5	ug/L	ND	128	50-140			
Bromomethane	23.5	0.5	ug/L	ND	58.6	50-140			
Carbon Tetrachloride	25.4	0.2	ug/L	ND	63.5	50-140			
Chlorobenzene	35.2	0.5	ug/L	ND	88.0	50-140			
Chloroethane	27.0	1.0	ug/L	ND	67.6	50-140			
Chloroform	20.4	0.5	ug/L	ND	50.9	50-140			
Chloromethane	21.3	3.0	ug/L	ND	53.2	50-140			
Dibromochloromethane	51.0	0.5	ug/L	ND	128	50-140			
Dichlorodifluoromethane	27.2	1.0	ug/L	ND	67.9	50-140			
1,2-Dibromoethane	36.0	0.2	ug/L	ND	89.9	50-140			
1,2-Dichlorobenzene	36.1	0.5	ug/L	ND	90.2	50-140			
1,3-Dichlorobenzene	36.7	0.5	ug/L	ND	91.7	50-140			
1,4-Dichlorobenzene	34.6	0.5	ug/L	ND	86.4	50-140			
1,1-Dichloroethane	30.6	0.5	ug/L	ND	76.4	50-140			
1,2-Dichloroethane	27.4	0.5	ug/L	ND	68.4	50-140			
1,1-Dichloroethylene	22.1	0.5	ug/L	ND	55.2	50-140			
cis-1,2-Dichloroethylene	29.3	0.5	ug/L	8.59	51.7	50-140			
trans-1,2-Dichloroethylene	40.2	0.5	ug/L	ND	100	50-140			
1,2-Dichloropropane	24.4	0.5	ug/L	ND	60.9	50-140			
cis-1,3-Dichloropropylene	39.0	0.5	ug/L	ND	97.4	50-140			
trans-1,3-Dichloropropylene	22.0	0.5	ug/L	ND	55.1	50-140			
Ethylbenzene	36.3	0.5	ug/L	ND	90.8	50-140			
Hexane	24.6	1.0	ug/L	ND	61.5	50-140			
Methyl Ethyl Ketone (2-Butanone)	73.8	5.0	ug/L	ND	73.8	50-140			
Methyl Butyl Ketone (2-Hexanone)	73.5	10.0	ug/L	ND	73.5	50-140			
Methyl Isobutyl Ketone	101	5.0	ug/L	ND	101	50-140			
Methyl tert-butyl ether	79.7	2.0	ug/L	ND	79.7	50-140			
Methylene Chloride	26.9	5.0	ug/L	ND	67.2	50-140			
Styrene	36.4	0.5	ug/L	ND	91.0	50-140			
1,1,1,2-Tetrachloroethane	47.2	0.5	ug/L	ND	118	50-140			
1,1,2,2-Tetrachloroethane	36.5	0.5	ug/L	ND	91.3	50-140			
Tetrachloroethylene	38.4	0.5	ug/L	ND	95.9	50-140			
Toluene	36.2	0.5	ug/L	ND	90.6	50-140			
1,2,4-Trichlorobenzene	31.6	0.5	ug/L	ND	78.9	50-140			
1,1,1-Trichloroethane	24.6	0.5	ug/L	ND	61.6	50-140			
1,1,2-Trichloroethane	44.7	0.5	ug/L	ND	112	50-140			
Trichloroethylene	25.2	0.5	ug/L	ND	63.1	50-140			
Trichlorofluoromethane	28.2	1.0	ug/L	ND	70.4	50-140			
1,3,5-Trimethylbenzene	33.4	0.5	ug/L	ND	83.4	50-140			
Vinyl chloride	35.0	0.5	ug/L	ND	87.5	50-140			
m,p-Xylenes	68.2	0.5	ug/L	ND	85.3	50-140			

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123 Christina St. N.  
Sarnia, ON N7T 5T7

**Certificate of Analysis**

Report Date: 05-Nov-2013

Client: **Paterson Group Consulting Engineers**

Order Date: 4-Nov-2013

Client PO: 14777

Project Description: PE3133

**Method Quality Control: Spike**

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
o-Xylene	39.5	0.5	ug/L	ND	98.8	50-140			
Surrogate: 4-Bromofluorobenzene	29.8		ug/L		93.2	50-140			

**Certificate of Analysis**

Report Date: 05-Nov-2013

Client: Paterson Group Consulting Engineers

Order Date: 4-Nov-2013

Client PO: 14777

Project Description: PE3133

**Qualifier Notes:**

None

**Sample Data Revisions**

None

**Work Order Revisions / Comments:**

None

**Other Report Notes:**

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

*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.



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Chain of Custody  
(Lab Use Only)  
No 98273

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Client Name: <u>Paterson Group</u>	Project Reference: <u>PE3133</u>	Page <u>  </u> of <u>  </u>
Contact Name: <u>Mike Beaudoin</u>	Quote #	
Address: <u>154 Colonnade Rd S</u>	PO # <u>14777</u>	
Telephone: <u>613-226-7381</u>	Email Address: <u>mbeaudoin@patersongroup.ca</u>	

TAT:  Regular  3 Day  
 2 Day  1 Day  
Date Required: \_\_\_\_\_

Criteria:  O. Reg. 153/04 (As Amended) Table 7  RSC Filing  O. Reg. 558/00  PWQO  CCME  SUB (Storm)  SUB (Sanitary) Municipality: \_\_\_\_\_  Other: \_\_\_\_\_

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

Required Analyses

Parcel Order Number: <u>1345024</u>		Matrix	Air Volume	# of Containers	Sample Taken		PHCs F1-F4+BTEX	VOCs	PAHs	Metals by ICP	Hg	Cr/Vl	B (HWS)							
Sample ID/Location Name					Date	Time														
1	<u>BH1-GW1</u>	<u>GW</u>		<u>3</u>	<u>Nov 4/13</u>	<u>8 Am</u>	<u>XX</u>													
2	<u>BH2-GW1</u>	<u>GW</u>		<u>3</u>	<u>Nov 4/13</u>	<u>8:30 Am</u>	<u>XX</u>													
3																				
4																				
5																				
6																				
7																				
8																				
9																				
10																				

Comments: Also send results to Mark D. mduffy@patersongroup.ca Method of Delivery: Paracel Carrier

Relinquished By (Sign): <u>Mike B.</u>	Received by Driver/Depot: <u>J. ROUSE</u>	Received at Lab: <u>SUNPEPORN</u>	Verified By: <u>M. C. [Signature]</u>
Relinquished By (Print):	Date/Time: <u>04/11/13 10:39am</u>	Date/Time: <u>NOV 04 2013 11:20</u>	Date/Time: <u>Nov 4/13 1:08</u>
Date/Time:	Temperature: <u>  </u> °C	Temperature: <u>10.6</u> °C	pH Verified <input type="checkbox"/> By: <u>N/A</u>

## *Certificate of Analysis*

### **Paterson Group Consulting Engineers**

154 Colonnade Road South  
Nepean, ON K2E 7J5  
Attn: Eric Leveque

Phone: (613) 226-7381  
Fax: (613) 226-6344

Client PO: 15537  
Project: PE3241  
Custody: 14396

Report Date: 3-Apr-2014  
Order Date: 31-Mar-2014

**Order #: 1414062**

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

<b>Paracel ID</b>	<b>Client ID</b>
1414062-01	BH1-14 GW1
1414062-02	BH2-14 GW1

Approved By:



Mark Foto, M.Sc. For Dale Robertson, BSc  
Laboratory Director

**Certificate of Analysis**

Client: **Paterson Group Consulting Engineers**  
Client PO: 15537

Project Description: PE3241

Report Date: 03-Apr-2014  
Order Date: 31-Mar-2014

**Analysis Summary Table**

Analysis	Method Reference/Description	Extraction Date	Analysis Date
PHC F1	CWS Tier 1 - P&T GC-FID	1-Apr-14	1-Apr-14
PHC F2 - F4	CWS Tier 1 - GC-FID, extraction	1-Apr-14	1-Apr-14
VOCs by P&T GC-MS	EPA 624 - P&T GC-MS	1-Apr-14	1-Apr-14

**Certificate of Analysis**

Report Date: 03-Apr-2014

Order Date: 31-Mar-2014

 Client: **Paterson Group Consulting Engineers**

Client PO: 15537

Project Description: PE3241

	Client ID:	BH1-14 GW1	BH2-14 GW1	-	-
	Sample Date:	31-Mar-14	31-Mar-14	-	-
	Sample ID:	1414062-01	1414062-02	-	-
	MDL/Units	Water	Water	-	-

**Volatiles**

	MDL/Units	BH1-14 GW1	BH2-14 GW1	-	-
Acetone	5.0 ug/L	<5.0	<5.0	-	-
Benzene	0.5 ug/L	0.8	<0.5	-	-
Bromodichloromethane	0.5 ug/L	<0.5	<0.5	-	-
Bromoform	0.5 ug/L	<0.5	<0.5	-	-
Bromomethane	0.5 ug/L	<0.5	<0.5	-	-
Carbon Tetrachloride	0.2 ug/L	<0.2	<0.2	-	-
Chlorobenzene	0.5 ug/L	<0.5	<0.5	-	-
Chloroethane	1.0 ug/L	<1.0	<1.0	-	-
Chloroform	0.5 ug/L	<0.5	<0.5	-	-
Chloromethane	3.0 ug/L	<3.0	<3.0	-	-
Dibromochloromethane	0.5 ug/L	<0.5	<0.5	-	-
Dichlorodifluoromethane	1.0 ug/L	<1.0	<1.0	-	-
1,2-Dibromoethane	0.2 ug/L	<0.2	<0.2	-	-
1,2-Dichlorobenzene	0.5 ug/L	<0.5	<0.5	-	-
1,3-Dichlorobenzene	0.5 ug/L	<0.5	<0.5	-	-
1,4-Dichlorobenzene	0.5 ug/L	<0.5	<0.5	-	-
1,1-Dichloroethane	0.5 ug/L	<0.5	<0.5	-	-
1,2-Dichloroethane	0.5 ug/L	<0.5	<0.5	-	-
1,1-Dichloroethylene	0.5 ug/L	<0.5	<0.5	-	-
cis-1,2-Dichloroethylene	0.5 ug/L	<0.5	<0.5	-	-
trans-1,2-Dichloroethylene	0.5 ug/L	<0.5	<0.5	-	-
1,2-Dichloroethylene, total	0.5 ug/L	<0.5	<0.5	-	-
1,2-Dichloropropane	0.5 ug/L	<0.5	<0.5	-	-
cis-1,3-Dichloropropylene	0.5 ug/L	<0.5	<0.5	-	-
trans-1,3-Dichloropropylene	0.5 ug/L	<0.5	<0.5	-	-
1,3-Dichloropropene, total	0.5 ug/L	<0.5	<0.5	-	-
Ethylbenzene	0.5 ug/L	<0.5	<0.5	-	-
Hexane	1.0 ug/L	<1.0	<1.0	-	-
Methyl Ethyl Ketone (2-Butanone)	5.0 ug/L	<5.0	<5.0	-	-
Methyl Butyl Ketone (2-Hexanone)	10.0 ug/L	<10.0	<10.0	-	-
Methyl Isobutyl Ketone	5.0 ug/L	<5.0	<5.0	-	-
Methyl tert-butyl ether	2.0 ug/L	<2.0	<2.0	-	-
Methylene Chloride	5.0 ug/L	<5.0	<5.0	-	-

**Certificate of Analysis**

Report Date: 03-Apr-2014

Order Date: 31-Mar-2014

 Client: **Paterson Group Consulting Engineers**

Project Description: PE3241

Client PO: 15537

	Client ID:	BH1-14 GW1	BH2-14 GW1		
	Sample Date:	31-Mar-14	31-Mar-14		
	Sample ID:	1414062-01	1414062-02		
	MDL/Units	Water	Water		
Styrene	0.5 ug/L	<0.5	<0.5	-	-
1,1,1,2-Tetrachloroethane	0.5 ug/L	<0.5	<0.5	-	-
1,1,2,2-Tetrachloroethane	0.5 ug/L	<0.5	<0.5	-	-
Tetrachloroethylene	0.5 ug/L	<0.5	<0.5	-	-
Toluene	0.5 ug/L	<0.5	<0.5	-	-
1,1,1-Trichloroethane	0.5 ug/L	<0.5	<0.5	-	-
1,1,2-Trichloroethane	0.5 ug/L	<0.5	<0.5	-	-
Trichloroethylene	0.5 ug/L	<0.5	<0.5	-	-
Trichlorofluoromethane	1.0 ug/L	<1.0	<1.0	-	-
1,3,5-Trimethylbenzene	0.5 ug/L	<0.5	<0.5	-	-
Vinyl chloride	0.5 ug/L	<0.5	<0.5	-	-
m,p-Xylenes	0.5 ug/L	<0.5	<0.5	-	-
o-Xylene	0.5 ug/L	<0.5	<0.5	-	-
Xylenes, total	0.5 ug/L	<0.5	<0.5	-	-
4-Bromofluorobenzene	Surrogate	84.8%	83.9%	-	-
Dibromofluoromethane	Surrogate	110%	95.1%	-	-
Toluene-d8	Surrogate	108%	120%	-	-

**Hydrocarbons**

F1 PHCs (C6-C10)	25 ug/L	123	255	-	-
F2 PHCs (C10-C16)	100 ug/L	9890	41100	-	-
F3 PHCs (C16-C34)	100 ug/L	8760	29300	-	-
F4 PHCs (C34-C50)	100 ug/L	<100	<100	-	-
F1 + F2 PHCs	125 ug/L	10000	41400	-	-
F3 + F4 PHCs	200 ug/L	8760	29300	-	-

**Certificate of Analysis**

Report Date: 03-Apr-2014

Client: **Paterson Group Consulting Engineers**

Order Date: 31-Mar-2014

Client PO: 15537

Project Description: PE3241

**Method Quality Control: Blank**

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
<b>Hydrocarbons</b>									
F1 PHCs (C6-C10)	ND	25	ug/L						
F2 PHCs (C10-C16)	ND	100	ug/L						
F3 PHCs (C16-C34)	ND	100	ug/L						
F4 PHCs (C34-C50)	ND	100	ug/L						
<b>Volatiles</b>									
Acetone	ND	5.0	ug/L						
Benzene	ND	0.5	ug/L						
Bromodichloromethane	ND	0.5	ug/L						
Bromoform	ND	0.5	ug/L						
Bromomethane	ND	0.5	ug/L						
Carbon Tetrachloride	ND	0.2	ug/L						
Chlorobenzene	ND	0.5	ug/L						
Chloroethane	ND	1.0	ug/L						
Chloroform	ND	0.5	ug/L						
Chloromethane	ND	3.0	ug/L						
Dibromochloromethane	ND	0.5	ug/L						
Dichlorodifluoromethane	ND	1.0	ug/L						
1,2-Dibromoethane	ND	0.2	ug/L						
1,2-Dichlorobenzene	ND	0.5	ug/L						
1,3-Dichlorobenzene	ND	0.5	ug/L						
1,4-Dichlorobenzene	ND	0.5	ug/L						
1,1-Dichloroethane	ND	0.5	ug/L						
1,2-Dichloroethane	ND	0.5	ug/L						
1,1-Dichloroethylene	ND	0.5	ug/L						
cis-1,2-Dichloroethylene	ND	0.5	ug/L						
trans-1,2-Dichloroethylene	ND	0.5	ug/L						
1,2-Dichloroethylene, total	ND	0.5	ug/L						
1,2-Dichloropropane	ND	0.5	ug/L						
cis-1,3-Dichloropropylene	ND	0.5	ug/L						
trans-1,3-Dichloropropylene	ND	0.5	ug/L						
1,3-Dichloropropene, total	ND	0.5	ug/L						
Ethylbenzene	ND	0.5	ug/L						
Hexane	ND	1.0	ug/L						
Methyl Ethyl Ketone (2-Butanone)	ND	5.0	ug/L						
Methyl Butyl Ketone (2-Hexanone)	ND	10.0	ug/L						
Methyl Isobutyl Ketone	ND	5.0	ug/L						
Methyl tert-butyl ether	ND	2.0	ug/L						
Methylene Chloride	ND	5.0	ug/L						
Styrene	ND	0.5	ug/L						
1,1,1,2-Tetrachloroethane	ND	0.5	ug/L						
1,1,2,2-Tetrachloroethane	ND	0.5	ug/L						
Tetrachloroethylene	ND	0.5	ug/L						
Toluene	ND	0.5	ug/L						
1,1,1-Trichloroethane	ND	0.5	ug/L						
1,1,2-Trichloroethane	ND	0.5	ug/L						
Trichloroethylene	ND	0.5	ug/L						
Trichlorofluoromethane	ND	1.0	ug/L						
1,3,5-Trimethylbenzene	ND	0.5	ug/L						
Vinyl chloride	ND	0.5	ug/L						
m,p-Xylenes	ND	0.5	ug/L						
o-Xylene	ND	0.5	ug/L						
Xylenes, total	ND	0.5	ug/L						
Surrogate: 4-Bromofluorobenzene	32.1		ug/L		100	50-140			
Surrogate: Dibromofluoromethane	34.8		ug/L		109	50-140			
Surrogate: Toluene-d8	36.1		ug/L		113	50-140			

**Certificate of Analysis**

Report Date: 03-Apr-2014

Client: **Paterson Group Consulting Engineers**

Order Date: 31-Mar-2014

Client PO: 15537

Project Description: PE3241

**Method Quality Control: Duplicate**

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
<b>Hydrocarbons</b>									
F1 PHCs (C6-C10)	ND	25	ug/L	ND				30	
<b>Volatiles</b>									
Acetone	ND	5.0	ug/L	ND				30	
Benzene	ND	0.5	ug/L	ND				30	
Bromodichloromethane	ND	0.5	ug/L	ND				30	
Bromoform	ND	0.5	ug/L	ND				30	
Bromomethane	ND	0.5	ug/L	ND				30	
Carbon Tetrachloride	ND	0.2	ug/L	ND				30	
Chlorobenzene	ND	0.5	ug/L	ND				30	
Chloroethane	ND	1.0	ug/L	ND				30	
Chloroform	ND	0.5	ug/L	ND				30	
Chloromethane	ND	3.0	ug/L	ND				30	
Dibromochloromethane	ND	0.5	ug/L	ND				30	
Dichlorodifluoromethane	ND	1.0	ug/L	ND				30	
1,2-Dibromoethane	ND	0.2	ug/L	ND				30	
1,2-Dichlorobenzene	ND	0.5	ug/L	ND				30	
1,3-Dichlorobenzene	ND	0.5	ug/L	ND				30	
1,4-Dichlorobenzene	ND	0.5	ug/L	ND				30	
1,1-Dichloroethane	ND	0.5	ug/L	ND				30	
1,2-Dichloroethane	ND	0.5	ug/L	ND				30	
1,1-Dichloroethylene	ND	0.5	ug/L	ND				30	
cis-1,2-Dichloroethylene	ND	0.5	ug/L	ND				30	
trans-1,2-Dichloroethylene	ND	0.5	ug/L	ND				30	
1,2-Dichloropropane	ND	0.5	ug/L	ND				30	
cis-1,3-Dichloropropylene	ND	0.5	ug/L	ND				30	
trans-1,3-Dichloropropylene	ND	0.5	ug/L	ND				30	
Ethylbenzene	ND	0.5	ug/L	ND				30	
Hexane	ND	1.0	ug/L	ND				30	
Methyl Ethyl Ketone (2-Butanone)	ND	5.0	ug/L	ND				30	
Methyl Butyl Ketone (2-Hexanone)	ND	10.0	ug/L	ND				30	
Methyl Isobutyl Ketone	ND	5.0	ug/L	ND				30	
Methyl tert-butyl ether	ND	2.0	ug/L	ND				30	
Methylene Chloride	ND	5.0	ug/L	ND				30	
Styrene	ND	0.5	ug/L	ND				30	
1,1,1,2-Tetrachloroethane	ND	0.5	ug/L	ND				30	
1,1,2,2-Tetrachloroethane	ND	0.5	ug/L	ND				30	
Tetrachloroethylene	ND	0.5	ug/L	ND				30	
Toluene	ND	0.5	ug/L	ND				30	
1,1,1-Trichloroethane	ND	0.5	ug/L	ND				30	
1,1,2-Trichloroethane	ND	0.5	ug/L	ND				30	
Trichloroethylene	ND	0.5	ug/L	ND				30	
Trichlorofluoromethane	ND	1.0	ug/L	ND				30	
1,3,5-Trimethylbenzene	ND	0.5	ug/L	ND				30	
Vinyl chloride	ND	0.5	ug/L	ND				30	
m,p-Xylenes	ND	0.5	ug/L	ND				30	
o-Xylene	ND	0.5	ug/L	ND				30	
Surrogate: 4-Bromofluorobenzene	33.1		ug/L	ND	103	50-140			
Surrogate: Dibromofluoromethane	36.7		ug/L	ND	115	50-140			
Surrogate: Toluene-d8	35.5		ug/L	ND	111	50-140			

**Certificate of Analysis**

Report Date: 03-Apr-2014

Client: **Paterson Group Consulting Engineers**

Order Date: 31-Mar-2014

Client PO: 15537

Project Description: PE3241

**Method Quality Control: Spike**

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
<b>Hydrocarbons</b>									
F1 PHCs (C6-C10)	2020	25	ug/L	ND	101	68-117			
F2 PHCs (C10-C16)	1550	100	ug/L	ND	85.9	60-140			
F3 PHCs (C16-C34)	2950	100	ug/L	ND	79.4	60-140			
F4 PHCs (C34-C50)	1940	100	ug/L	ND	78.2	60-140			
<b>Volatiles</b>									
Acetone	89.4	5.0	ug/L	ND	89.4	50-140			
Benzene	39.1	0.5	ug/L	ND	97.7	50-140			
Bromodichloromethane	35.5	0.5	ug/L	ND	88.7	50-140			
Bromoform	42.2	0.5	ug/L	ND	105	50-140			
Bromomethane	13.4	0.5	ug/L	ND	33.5	50-140			
Carbon Tetrachloride	24.6	0.2	ug/L	ND	61.4	50-140			
Chlorobenzene	40.2	0.5	ug/L	ND	101	50-140			
Chloroethane	31.3	1.0	ug/L	ND	78.4	50-140			
Chloroform	37.0	0.5	ug/L	ND	92.4	50-140			
Chloromethane	49.2	3.0	ug/L	ND	123	50-140			
Dibromochloromethane	39.2	0.5	ug/L	ND	98.1	50-140			
Dichlorodifluoromethane	24.6	1.0	ug/L	ND	61.4	50-140			
1,2-Dibromoethane	50.3	0.2	ug/L	ND	126	50-140			
1,2-Dichlorobenzene	32.8	0.5	ug/L	ND	82.0	50-140			
1,3-Dichlorobenzene	31.3	0.5	ug/L	ND	78.2	50-140			
1,4-Dichlorobenzene	34.0	0.5	ug/L	ND	85.1	50-140			
1,1-Dichloroethane	37.4	0.5	ug/L	ND	93.6	50-140			
1,2-Dichloroethane	42.5	0.5	ug/L	ND	106	50-140			
1,1-Dichloroethylene	25.6	0.5	ug/L	ND	64.0	50-140			
cis-1,2-Dichloroethylene	39.9	0.5	ug/L	ND	99.6	50-140			
trans-1,2-Dichloroethylene	36.4	0.5	ug/L	ND	90.9	50-140			
1,2-Dichloropropane	40.1	0.5	ug/L	ND	100	50-140			
cis-1,3-Dichloropropylene	35.9	0.5	ug/L	ND	89.7	50-140			
trans-1,3-Dichloropropylene	36.8	0.5	ug/L	ND	92.0	50-140			
Ethylbenzene	40.6	0.5	ug/L	ND	102	50-140			
Hexane	34.8	1.0	ug/L	ND	86.9	50-140			
Methyl Ethyl Ketone (2-Butanone)	104	5.0	ug/L	ND	104	50-140			
Methyl Butyl Ketone (2-Hexanone)	122	10.0	ug/L	ND	122	50-140			
Methyl Isobutyl Ketone	102	5.0	ug/L	ND	102	50-140			
Methyl tert-butyl ether	79.9	2.0	ug/L	ND	79.9	50-140			
Methylene Chloride	22.1	5.0	ug/L	ND	55.3	50-140			
Styrene	45.9	0.5	ug/L	ND	115	50-140			
1,1,1,2-Tetrachloroethane	34.2	0.5	ug/L	ND	85.4	50-140			
1,1,2,2-Tetrachloroethane	38.5	0.5	ug/L	ND	96.2	60-130			
Tetrachloroethylene	34.2	0.5	ug/L	ND	85.4	50-140			
Toluene	47.5	0.5	ug/L	ND	119	50-140			
1,1,1-Trichloroethane	30.6	0.5	ug/L	ND	76.6	50-140			
1,1,2-Trichloroethane	41.2	0.5	ug/L	ND	103	50-140			
Trichloroethylene	36.6	0.5	ug/L	ND	91.6	50-140			
Trichlorofluoromethane	26.1	1.0	ug/L	ND	65.2	50-140			
1,3,5-Trimethylbenzene	30.6	0.5	ug/L	ND	76.4	50-140			
Vinyl chloride	26.4	0.5	ug/L	ND	66.1	50-140			
m,p-Xylenes	84.6	0.5	ug/L	ND	106	50-140			
o-Xylene	46.0	0.5	ug/L	ND	115	50-140			

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**MISSISSAUGA**  
6845 Kitimat Rd. Unit #27  
Mississauga, ON L5N 6J3

**NIAGARA FALLS**  
5415 Morning Glory Cr.  
Niagara Falls, ON L2J 0A3

**SARNIA**  
123 Christina St. N.  
Sarnia, ON N7T 5T7

**Certificate of Analysis**

Client: **Paterson Group Consulting Engineers**  
Client PO: 15537

Project Description: PE3241

Report Date: 03-Apr-2014  
Order Date: 31-Mar-2014

**Method Quality Control: Spike**

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Surrogate: 4-Bromofluorobenzene	21.5		ug/L		67.3	50-140			

**Certificate of Analysis**

Client: **Paterson Group Consulting Engineers**  
Client PO: 15537

Project Description: PE3241

Report Date: 03-Apr-2014  
Order Date: 31-Mar-2014

**Qualifier Notes:**

None

**Sample Data Revisions**

None

**Work Order Revisions / Comments:**

None

**Other Report Notes:**

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

*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.

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Page \_\_\_ of \_\_\_

Client Name: <i>Paterson Group</i>	Project Reference: <i>PE 3241</i>	TAT: <input checked="" type="checkbox"/> Regular <input type="checkbox"/> 3 Day
Contact Name: <i>Eric Leveque</i>	Quote #	<input type="checkbox"/> 2 Day <input type="checkbox"/> 1 Day
Address: <i>154 Colonnade Rd S</i>	PO# <i>15537</i>	Date Required: _____
Telephone: <i>613-226-7391</i>	Email Address: <i>e.veque@patersongroup.ca</i>	

Criteria:  O. Reg. 153/04 (As Amended) Table 7  RSC Filing  O. Reg. 558/00  PWQO  CCME  SUB (Storm)  SUB (Sanitary) Municipality: \_\_\_\_\_  Other: \_\_\_\_\_

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

Parcel Order Number:		Matrix	Air Volume	# of Containers	Sample Taken		VOC	PHC(FI-FED)	Required Analyses												
Sample ID/Location Name					Date	Time															
<i>1414062</i>																					
1	<i>BH1-14 GW1</i>	<i>GW</i>		<i>3</i>	<i>Mar 31/14</i>	<i>AM</i>	<i>X</i>	<i>X</i>													
2	<i>BH2-14 GW2</i>	<i>GW</i>		<i>3</i>	<i>↓</i>	<i>↓</i>	<i>X</i>	<i>X</i>	<i>Bottles read GW1? report as GW1 per Mike &amp;c.</i>												
3																					
4																					
5																					
6																					
7																					
8																					
9																					
10																					

Comments: \_\_\_\_\_ Method of Delivery: *Paracel*

Relinquished By (Sign): <i>Mike B</i>	Received by Driver/Depot: <i>M. Deuse</i>	Received at Lab: <i>MC</i>	Verified By: <i>MC</i>
Relinquished By (Print):	Date/Time: <i>31/03/14 2:37 PM</i>	Date/Time: <i>Mar 31/14 3:00</i>	Date/Time: <i>Mar 31/14 5:19</i>
Date/Time:	Temperature: _____ °C	Temperature: <i>13.2 °C</i>	pH Verified   By: <i>N/A</i>

## *Certificate of Analysis*

### **Paterson Group Consulting Engineers**

154 Colonnade Road South  
Nepean, ON K2E 7J5  
Attn: Eric Leveque

Phone: (613) 226-7381  
Fax: (613) 226-6344

Client PO: 14833  
Project: PE3241  
Custody: 98979

Report Date: 31-Mar-2014  
Order Date: 25-Mar-2014

**Order #: 1413124**

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

<b>Paracel ID</b>	<b>Client ID</b>
1413124-01	BH1-14-SS2
1413124-02	BH2-14-SS3

Approved By:



Mark Foto, M.Sc. For Dale Robertson, BSc  
Laboratory Director

**Certificate of Analysis**

Report Date: 31-Mar-2014

Client: **Paterson Group Consulting Engineers**

Order Date: 25-Mar-2014

Client PO: 14833

Project Description: PE3241

**Analysis Summary Table**

Analysis	Method Reference/Description	Extraction Date	Analysis Date
BTEX by P&T GC-MS	EPA 8260 - P&T GC-MS	26-Mar-14	26-Mar-14
PHC F1	CWS Tier 1 - P&T GC-FID	26-Mar-14	26-Mar-14
PHC F2 - F4	CWS Tier 1 - GC-FID, extraction	26-Mar-14	27-Mar-14
Solids, %	Gravimetric, calculation	26-Mar-14	26-Mar-14

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Mississauga, ON L5N 6J3

**NIAGARA FALLS**  
5415 Morning Glory Cr.  
Niagara Falls, ON L2J 0A3

**SARNIA**  
123 Christina St. N.  
Sarnia, ON N7T 5T7

**Certificate of Analysis**

Report Date: 31-Mar-2014

Order Date: 25-Mar-2014

Client: Paterson Group Consulting Engineers

Project Description: PE3241

Client PO: 14833

<b>Client ID:</b>	BH1-14-SS2	BH2-14-SS3	-	-
<b>Sample Date:</b>	24-Mar-14	24-Mar-14	-	-
<b>Sample ID:</b>	1413124-01	1413124-02	-	-
<b>MDL/Units</b>	Soil	Soil	-	-

**Physical Characteristics**

% Solids	0.1 % by Wt.	76.9	85.7	-	-
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**Volatiles**

Benzene	0.02 ug/g dry	<0.02	<0.02	-	-
Ethylbenzene	0.05 ug/g dry	<0.05	<0.05	-	-
Toluene	0.05 ug/g dry	<0.05	<0.05	-	-
m,p-Xylenes	0.05 ug/g dry	<0.05	<0.05	-	-
o-Xylene	0.05 ug/g dry	<0.05	<0.05	-	-
Xylenes, total	0.05 ug/g dry	<0.05	<0.05	-	-
Toluene-d8	Surrogate	99.2%	98.4%	-	-

**Hydrocarbons**

F1 PHCs (C6-C10)	7 ug/g dry	<7	<7	-	-
F2 PHCs (C10-C16)	4 ug/g dry	<4	65	-	-
F3 PHCs (C16-C34)	8 ug/g dry	<8	78	-	-
F4 PHCs (C34-C50)	6 ug/g dry	<6	<6	-	-

**Certificate of Analysis**

Report Date: 31-Mar-2014

Client: **Paterson Group Consulting Engineers**

Order Date: 25-Mar-2014

Client PO: 14833

Project Description: PE3241

**Method Quality Control: Blank**

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
<b>Hydrocarbons</b>									
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						
<b>Volatiles</b>									
Benzene	ND	0.02	ug/g						
Ethylbenzene	ND	0.05	ug/g						
Toluene	ND	0.05	ug/g						
m,p-Xylenes	ND	0.05	ug/g						
o-Xylene	ND	0.05	ug/g						
Xylenes, total	ND	0.05	ug/g						
Surrogate: Toluene-d8	7.99		ug/g		99.9	50-140			

**Certificate of Analysis**

Report Date: 31-Mar-2014

Client: Paterson Group Consulting Engineers

Order Date: 25-Mar-2014

Client PO: 14833

Project Description: PE3241

**Method Quality Control: Duplicate**

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
<b>Hydrocarbons</b>									
F1 PHCs (C6-C10)	ND	7	ug/g dry	ND				40	
F2 PHCs (C10-C16)	ND	4	ug/g dry	ND				30	
F3 PHCs (C16-C34)	ND	8	ug/g dry	ND				30	
F4 PHCs (C34-C50)	ND	6	ug/g dry	ND				30	
<b>Physical Characteristics</b>									
% Solids	65.1	0.1	% by Wt.	63.7			2.2	25	
<b>Volatiles</b>									
Benzene	ND	0.02	ug/g dry	ND				50	
Ethylbenzene	ND	0.05	ug/g dry	ND				50	
Toluene	ND	0.05	ug/g dry	ND				50	
m,p-Xylenes	ND	0.05	ug/g dry	ND				50	
o-Xylene	ND	0.05	ug/g dry	ND				50	
Surrogate: Toluene-d8	7.71		ug/g dry	ND	99.3	50-140			

**Certificate of Analysis**

Report Date: 31-Mar-2014

Client: **Paterson Group Consulting Engineers**

Order Date: 25-Mar-2014

Client PO: 14833

Project Description: PE3241

**Method Quality Control: Spike**

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
<b>Hydrocarbons</b>									
F1 PHCs (C6-C10)	204	7	ug/g	ND	102	80-120			
F2 PHCs (C10-C16)	111	4	ug/g	ND	113	60-140			
F3 PHCs (C16-C34)	215	8	ug/g	ND	106	60-140			
F4 PHCs (C34-C50)	158	6	ug/g	ND	118	60-140			
<b>Volatiles</b>									
Benzene	4.38	0.02	ug/g	ND	109	60-130			
Ethylbenzene	4.42	0.05	ug/g	ND	111	60-130			
Toluene	4.13	0.05	ug/g	ND	103	60-130			
m,p-Xylenes	8.55	0.05	ug/g	ND	107	60-130			
o-Xylene	4.29	0.05	ug/g	ND	107	60-130			
Surrogate: Toluene-d8	8.01		ug/g		100	50-140			

**Certificate of Analysis**

Client: **Paterson Group Consulting Engineers**  
Client PO: 14833

Project Description: PE3241

Report Date: 31-Mar-2014  
Order Date: 25-Mar-2014

**Qualifier Notes:**

None

**Sample Data Revisions**

None

**Work Order Revisions / Comments:**

None

**Other Report Notes:**

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

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

*CCME PHC additional information:*

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

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Page \_\_\_ of \_\_\_

Client Name: <i>PATERSON GROUP INC.</i>	Project Reference: <i>PE3241</i>	TAT: <input checked="" type="checkbox"/> Regular <input type="checkbox"/> 3 Day <input type="checkbox"/> 2 Day <input type="checkbox"/> 1 Day Date Required: _____
Contact Name: <i>ERIC LEVEQUE</i>	Quote #	
Address: <i>154 COLONNADE ROAD SOUTH OTTAWA ONT</i>	PO # <i>14833</i>	
Telephone: <i>226-7381</i>	Email Address: <i>e.levéque@patersongroup.ca</i>	

Criteria:  O. Reg. 153/04 (As Amended) Table \_\_\_  RSC Filing  O. Reg. 558/00  PWQO  CCME  SUB (Storm)  SUB (Sanitary) Municipality: \_\_\_\_\_  Other: \_\_\_\_\_

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

Required Analyses

Sample ID/Location Name	Matrix	Air Volume	# of Containers	Sample Taken		PHCs F1-F4+BTEX	VOCs	PAHs	Metals by ICP			B (HWS)							
				Date	Time				Hg	CrVI									
1 <i>BH1-14-SS2</i>	<i>S</i>		<i>2</i>	<i>March 24/14</i>		<input checked="" type="checkbox"/>													
2 <i>BH2-14-SS3</i>	<i>S</i>		<i>2</i>	<i>"</i>	<i>"</i>	<input checked="" type="checkbox"/>													<i>250 + vial</i>
3																			<i>120 + vial</i>
4																			
5																			
6																			
7																			
8																			
9																			
10																			

Comments: \_\_\_\_\_

Method of Delivery: *Paracel*

Relinquished By (Sign):	Received by Driver/Depot: <i>A. HOUSE</i>	Received at Lab: <i>SCOL</i>	Verified By: <i>SCOL</i>
Relinquished By (Print):	Date/Time: <i>25/03/14 1:57 PM</i>	Date/Time: <i>Mar 25/14</i>	Date/Time: <i>Mar 25/14</i>
Date/Time:	Temperature: _____ °C	Temperature: <i>13.2 °C</i>	pH Verified <input type="checkbox"/> By: <i>N/A</i>

*2:45p*

## Certificate of Analysis

Paterson Group Consulting Engineers

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

Client PO: 17229  
Project: PE3540  
Custody: 105136

Report Date: 24-Jul-2015  
Order Date: 20-Jul-2015

**Order #: 1530098**

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

<b>Parcel ID</b>	<b>Client ID</b>
1530098-01	BH1-GW2
1530098-02	BH2-GW2
1530098-03	BH3-GW2

Approved By:



Mark Foto, M.Sc.  
Lab Supervisor

Certificate of Analysis

Client: Paterson Group Consulting Engineers  
Client PO: 17229

Report Date: 24-Jul-2015  
Order Date: 20-Jul-2015  
Project Description: PE3540

**Analysis Summary Table**

Analysis	Method Reference/Description	Extraction Date	Analysis Date
PHC F1	CWS Tier 1 - P&T GC-FID	22-Jul-15	22-Jul-15
PHC F2 - F4	CWS Tier 1 - GC-FID, extraction	21-Jul-15	21-Jul-15
REG 153: VOCs by P&T GC/MS	EPA 624 - P&T GC-MS	22-Jul-15	22-Jul-15

**Certificate of Analysis**

 Client: Paterson Group Consulting Engineers  
 Client PO: 17229

 Report Date: 24-Jul-2015  
 Order Date: 20-Jul-2015  
 Project Description: PE3540

<b>Client ID:</b>	BH1-GW2	BH2-GW2	BH3-GW2	-
<b>Sample Date:</b>	20-Jul-15	20-Jul-15	20-Jul-15	-
<b>Sample ID:</b>	1530098-01	1530098-02	1530098-03	-
<b>MDL/Units</b>	Water	Water	Water	-

**Volatiles**

Compound	MDL/Units	BH1-GW2	BH2-GW2	BH3-GW2	Result
Acetone	5.0 ug/L	<5.0	<5.0	<5.0	-
Benzene	0.5 ug/L	<0.5	<0.5	<0.5	-
Bromodichloromethane	0.5 ug/L	<0.5	<0.5	<0.5	-
Bromoform	0.5 ug/L	<0.5	<0.5	<0.5	-
Bromomethane	0.5 ug/L	<0.5	<0.5	<0.5	-
Carbon Tetrachloride	0.2 ug/L	<0.2	<0.2	<0.2	-
Chlorobenzene	0.5 ug/L	<0.5	<0.5	<0.5	-
Chloroform	0.5 ug/L	3.0	<0.5	<0.5	-
Dibromochloromethane	0.5 ug/L	<0.5	<0.5	<0.5	-
Dichlorodifluoromethane	1.0 ug/L	<1.0	<1.0	<1.0	-
1,2-Dichlorobenzene	0.5 ug/L	<0.5	<0.5	<0.5	-
1,3-Dichlorobenzene	0.5 ug/L	<0.5	<0.5	<0.5	-
1,4-Dichlorobenzene	0.5 ug/L	<0.5	<0.5	<0.5	-
1,1-Dichloroethane	0.5 ug/L	<0.5	<0.5	<0.5	-
1,2-Dichloroethane	0.5 ug/L	<0.5	<0.5	<0.5	-
1,1-Dichloroethylene	0.5 ug/L	<0.5	<0.5	<0.5	-
cis-1,2-Dichloroethylene	0.5 ug/L	<0.5	<0.5	<0.5	-
trans-1,2-Dichloroethylene	0.5 ug/L	<0.5	<0.5	<0.5	-
1,2-Dichloropropane	0.5 ug/L	<0.5	<0.5	<0.5	-
cis-1,3-Dichloropropylene	0.5 ug/L	<0.5	<0.5	<0.5	-
trans-1,3-Dichloropropylene	0.5 ug/L	<0.5	<0.5	<0.5	-
1,3-Dichloropropene, total	0.5 ug/L	<0.5	<0.5	<0.5	-
Ethylbenzene	0.5 ug/L	<0.5	<0.5	<0.5	-
Ethylene dibromide (dibromoethane)	0.2 ug/L	<0.2	<0.2	<0.2	-
Hexane	1.0 ug/L	<1.0	<1.0	<1.0	-
Methyl Ethyl Ketone (2-Butanone)	5.0 ug/L	<5.0	<5.0	<5.0	-
Methyl Isobutyl Ketone	5.0 ug/L	<5.0	<5.0	<5.0	-
Methyl tert-butyl ether	2.0 ug/L	<2.0	<2.0	<2.0	-
Methylene Chloride	5.0 ug/L	<5.0	<5.0	<5.0	-
Styrene	0.5 ug/L	<0.5	<0.5	<0.5	-
1,1,1,2-Tetrachloroethane	0.5 ug/L	<0.5	<0.5	<0.5	-
1,1,1,2,2-Tetrachloroethane	0.5 ug/L	<0.5	<0.5	<0.5	-
Tetrachloroethylene	0.5 ug/L	<0.5	<0.5	<0.5	-
Toluene	0.5 ug/L	<0.5	<0.5	<0.5	-
1,1,1-Trichloroethane	0.5 ug/L	<0.5	<0.5	<0.5	-

**Certificate of Analysis**

 Client: Paterson Group Consulting Engineers  
 Client PO: 17229

 Report Date: 24-Jul-2015  
 Order Date: 20-Jul-2015  
 Project Description: PE3540

	Client ID: Sample Date: Sample ID:	BH1-GW2 20-Jul-15 1530098-01 Water	BH2-GW2 20-Jul-15 1530098-02 Water	BH3-GW2 20-Jul-15 1530098-03 Water	- - - -
	MDL/Units				
1,1,2-Trichloroethane	0.5 ug/L	<0.5	<0.5	<0.5	-
Trichloroethylene	0.5 ug/L	<0.5	<0.5	<0.5	-
Trichlorofluoromethane	1.0 ug/L	<1.0	<1.0	<1.0	-
Vinyl chloride	0.5 ug/L	<0.5	<0.5	<0.5	-
m,p-Xylenes	0.5 ug/L	0.7	<0.5	<0.5	-
o-Xylene	0.5 ug/L	<0.5	<0.5	<0.5	-
Xylenes, total	0.5 ug/L	0.7	<0.5	<0.5	-
4-Bromofluorobenzene	Surrogate	95.5%	85.1%	106%	-
Dibromofluoromethane	Surrogate	92.6%	94.0%	92.5%	-
Toluene-d8	Surrogate	113%	110%	114%	-

**Hydrocarbons**

F1 PHCs (C6-C10)	25 ug/L	<25	748	25	-
F2 PHCs (C10-C16)	100 ug/L	157	665	501	-
F3 PHCs (C16-C34)	100 ug/L	<100	<100	<100	-
F4 PHCs (C34-C50)	100 ug/L	<100	<100	<100	-
F1 + F2 PHCs	125 ug/L	157	1410	526	-
F3 + F4 PHCs	200 ug/L	<200	<200	<200	-

**Certificate of Analysis**

Client: Paterson Group Consulting Engineers  
Client PO: 17229

Report Date: 24-Jul-2015  
Order Date: 20-Jul-2015  
Project Description: PE3540

**Method Quality Control: Blank**

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
<b>Hydrocarbons</b>									
F1 PHCs (C6-C10)	ND	25	ug/L						
F2 PHCs (C10-C16)	ND	100	ug/L						
F3 PHCs (C16-C34)	ND	100	ug/L						
F4 PHCs (C34-C50)	ND	100	ug/L						
<b>Volatiles</b>									
Acetone	ND	5.0	ug/L						
Benzene	ND	0.5	ug/L						
Bromodichloromethane	ND	0.5	ug/L						
Bromoform	ND	0.5	ug/L						
Bromomethane	ND	0.5	ug/L						
Carbon Tetrachloride	ND	0.2	ug/L						
Chlorobenzene	ND	0.5	ug/L						
Chloroform	ND	0.5	ug/L						
Dibromochloromethane	ND	0.5	ug/L						
Dichlorodifluoromethane	ND	1.0	ug/L						
1,2-Dichlorobenzene	ND	0.5	ug/L						
1,3-Dichlorobenzene	ND	0.5	ug/L						
1,4-Dichlorobenzene	ND	0.5	ug/L						
1,1-Dichloroethane	ND	0.5	ug/L						
1,2-Dichloroethane	ND	0.5	ug/L						
1,1-Dichloroethylene	ND	0.5	ug/L						
cis-1,2-Dichloroethylene	ND	0.5	ug/L						
trans-1,2-Dichloroethylene	ND	0.5	ug/L						
1,2-Dichloropropane	ND	0.5	ug/L						
cis-1,3-Dichloropropylene	ND	0.5	ug/L						
trans-1,3-Dichloropropylene	ND	0.5	ug/L						
1,3-Dichloropropene, total	ND	0.5	ug/L						
Ethylbenzene	ND	0.5	ug/L						
Ethylene dibromide (dibromoethane)	ND	0.2	ug/L						
Hexane	ND	1.0	ug/L						
Methyl Ethyl Ketone (2-Butanone)	ND	5.0	ug/L						
Methyl Isobutyl Ketone	ND	5.0	ug/L						
Methyl tert-butyl ether	ND	2.0	ug/L						
Methylene Chloride	ND	5.0	ug/L						
Styrene	ND	0.5	ug/L						
1,1,1,2-Tetrachloroethane	ND	0.5	ug/L						
1,1,2,2-Tetrachloroethane	ND	0.5	ug/L						
Tetrachloroethylene	ND	0.5	ug/L						
Toluene	ND	0.5	ug/L						
1,1,1-Trichloroethane	ND	0.5	ug/L						
1,1,2-Trichloroethane	ND	0.5	ug/L						
Trichloroethylene	ND	0.5	ug/L						
Trichlorofluoromethane	ND	1.0	ug/L						
Vinyl chloride	ND	0.5	ug/L						
m,p-Xylenes	ND	0.5	ug/L						
o-Xylene	ND	0.5	ug/L						
Xylenes, total	ND	0.5	ug/L						
Surrogate: 4-Bromofluorobenzene	91.5		ug/L		114	50-140			
Surrogate: Dibromofluoromethane	76.5		ug/L		95.6	50-140			
Surrogate: Toluene-d8	73.3		ug/L		91.7	50-140			

**Certificate of Analysis**

Client: Paterson Group Consulting Engineers  
Client PO: 17229

Report Date: 24-Jul-2015  
Order Date: 20-Jul-2015  
Project Description: PE3540

**Method Quality Control: Duplicate**

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
<b>Hydrocarbons</b>									
F1 PHCs (C6-C10)	ND	25	ug/L	ND				30	
<b>Volatiles</b>									
Acetone	ND	5.0	ug/L	ND				30	
Benzene	ND	0.5	ug/L	ND				30	
Bromodichloromethane	ND	0.5	ug/L	ND				30	
Bromoform	ND	0.5	ug/L	ND				30	
Bromomethane	ND	0.5	ug/L	ND				30	
Carbon Tetrachloride	ND	0.2	ug/L	ND				30	
Chlorobenzene	ND	0.5	ug/L	ND				30	
Chloroform	4.80	0.5	ug/L	4.89			1.9	30	
Dibromochloromethane	ND	0.5	ug/L	ND				30	
Dichlorodifluoromethane	ND	1.0	ug/L	ND				30	
1,2-Dichlorobenzene	ND	0.5	ug/L	ND				30	
1,3-Dichlorobenzene	ND	0.5	ug/L	ND				30	
1,4-Dichlorobenzene	ND	0.5	ug/L	ND				30	
1,1-Dichloroethane	ND	0.5	ug/L	ND				30	
1,2-Dichloroethane	ND	0.5	ug/L	ND				30	
1,1-Dichloroethylene	ND	0.5	ug/L	ND				30	
cis-1,2-Dichloroethylene	ND	0.5	ug/L	ND				30	
trans-1,2-Dichloroethylene	ND	0.5	ug/L	ND				30	
1,2-Dichloropropane	ND	0.5	ug/L	ND				30	
cis-1,3-Dichloropropylene	ND	0.5	ug/L	ND				30	
trans-1,3-Dichloropropylene	ND	0.5	ug/L	ND				30	
Ethylbenzene	ND	0.5	ug/L	ND				30	
Ethylene dibromide (dibromoethane)	ND	0.2	ug/L	ND				30	
Hexane	ND	1.0	ug/L	ND				30	
Methyl Ethyl Ketone (2-Butanone)	ND	5.0	ug/L	ND				30	
Methyl Isobutyl Ketone	ND	5.0	ug/L	ND				30	
Methyl tert-butyl ether	ND	2.0	ug/L	ND				30	
Methylene Chloride	ND	5.0	ug/L	ND				30	
Styrene	ND	0.5	ug/L	ND				30	
1,1,1,2-Tetrachloroethane	ND	0.5	ug/L	ND				30	
1,1,2,2-Tetrachloroethane	ND	0.5	ug/L	ND				30	
Tetrachloroethylene	ND	0.5	ug/L	ND				30	
Toluene	ND	0.5	ug/L	ND				30	
1,1,1-Trichloroethane	ND	0.5	ug/L	ND				30	
1,1,2-Trichloroethane	ND	0.5	ug/L	ND				30	
Trichloroethylene	ND	0.5	ug/L	ND				30	
Trichlorofluoromethane	ND	1.0	ug/L	ND				30	
Vinyl chloride	ND	0.5	ug/L	ND				30	
m,p-Xylenes	ND	0.5	ug/L	ND				30	
o-Xylene	ND	0.5	ug/L	ND				30	
Surrogate: 4-Bromofluorobenzene	92.6		ug/L	ND	116	50-140			
Surrogate: Dibromofluoromethane	73.1		ug/L	ND	91.4	50-140			
Surrogate: Toluene-d8	91.8		ug/L	ND	115	50-140			

**Certificate of Analysis**

 Client: Paterson Group Consulting Engineers  
 Client PO: 17229

 Report Date: 24-Jul-2015  
 Order Date: 20-Jul-2015  
 Project Description: PE3540

**Method Quality Control: Spike**

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
<b>Hydrocarbons</b>									
F1 PHCs (C6-C10)	1840	25	ug/L	ND	91.9	68-117			
F2 PHCs (C10-C16)	1030	100	ug/L	ND	57.1	60-140			QS-02
F3 PHCs (C16-C34)	3310	100	ug/L	ND	89.0	60-140			
F4 PHCs (C34-C50)	2540	100	ug/L	ND	102	60-140			
<b>Volatiles</b>									
Acetone	117	5.0	ug/L	ND	117	50-140			
Benzene	49.6	0.5	ug/L	ND	124	50-140			
Bromodichloromethane	48.5	0.5	ug/L	ND	121	50-140			
Bromoform	53.6	0.5	ug/L	ND	134	50-140			
Bromomethane	45.7	0.5	ug/L	ND	114	50-140			
Carbon Tetrachloride	56.8	0.2	ug/L	ND	142	50-140			
Chlorobenzene	47.8	0.5	ug/L	ND	119	50-140			
Chloroform	52.6	0.5	ug/L	ND	131	50-140			
Dibromochloromethane	51.5	0.5	ug/L	ND	129	50-140			
Dichlorodifluoromethane	40.7	1.0	ug/L	ND	102	50-140			
1,2-Dichlorobenzene	57.1	0.5	ug/L	ND	143	50-140			
1,3-Dichlorobenzene	55.3	0.5	ug/L	ND	138	50-140			
1,4-Dichlorobenzene	56.4	0.5	ug/L	ND	141	50-140			
1,1-Dichloroethane	51.4	0.5	ug/L	ND	128	50-140			
1,2-Dichloroethane	53.6	0.5	ug/L	ND	134	50-140			
1,1-Dichloroethylene	50.6	0.5	ug/L	ND	126	50-140			
cis-1,2-Dichloroethylene	50.1	0.5	ug/L	ND	125	50-140			
trans-1,2-Dichloroethylene	50.2	0.5	ug/L	ND	125	50-140			
1,2-Dichloropropane	50.4	0.5	ug/L	ND	126	50-140			
cis-1,3-Dichloropropylene	30.9	0.5	ug/L	ND	77.2	50-140			
trans-1,3-Dichloropropylene	36.5	0.5	ug/L	ND	91.2	50-140			
Ethylbenzene	52.6	0.5	ug/L	ND	131	50-140			
Ethylene dibromide (dibromoethane)	54.4	0.2	ug/L	ND	136	50-140			
Hexane	50.8	1.0	ug/L	ND	127	50-140			
Methyl Ethyl Ketone (2-Butanone)	116	5.0	ug/L	ND	116	50-140			
Methyl Isobutyl Ketone	133	5.0	ug/L	ND	133	50-140			
Methyl tert-butyl ether	115	2.0	ug/L	ND	115	50-140			
Methylene Chloride	47.4	5.0	ug/L	ND	118	50-140			
Styrene	52.2	0.5	ug/L	ND	131	50-140			
1,1,1,2-Tetrachloroethane	54.7	0.5	ug/L	ND	137	50-140			
1,1,2,2-Tetrachloroethane	57.4	0.5	ug/L	ND	143	50-140			
Tetrachloroethylene	50.2	0.5	ug/L	ND	125	50-140			
Toluene	50.3	0.5	ug/L	ND	126	50-140			
1,1,1-Trichloroethane	52.8	0.5	ug/L	ND	132	50-140			
1,1,2-Trichloroethane	51.0	0.5	ug/L	ND	128	50-140			
Trichloroethylene	43.6	0.5	ug/L	ND	109	50-140			
Trichlorofluoromethane	55.5	1.0	ug/L	ND	139	50-140			
Vinyl chloride	47.0	0.5	ug/L	ND	118	50-140			
m,p-Xylenes	105	0.5	ug/L	ND	132	50-140			
o-Xylene	53.6	0.5	ug/L	ND	134	50-140			
Surrogate: 4-Bromofluorobenzene	71.7		ug/L		89.6	50-140			

Certificate of Analysis

Client: Paterson Group Consulting Engineers  
Client PO: 17229

Report Date: 24-Jul-2015  
Order Date: 20-Jul-2015  
Project Description: PE3540

**Qualifier Notes:**

**QC Qualifiers :**

QS-02 : Spike level outside of control limits. Analysis batch accepted based on other QC included in the batch.

**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.

*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.



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**Chain of Custody**  
(Lab Use Only)  
**No 105136**

Page \_\_\_ of \_\_\_

Client Name: <b>PATERSON GROUP</b>	Project Reference: <b>PE3540</b>	TAT: <input checked="" type="checkbox"/> Regular [ ] 3 Day  <input type="checkbox"/> 2 Day [ ] 1 Day  Date Required: _____
Contact Name: <b>MARK D'ARCY</b>	Quote # <del>17229</del> <del>17229</del>	
Address: <b>154 COLONNADE RD. S. OTTAWA, ON</b>	PO # <b>17229</b>	
Telephone: <b>613-226-7881</b>	Email Address: <b>mdarcy@patersongroup.ca</b>	

Criteria:  O. Reg. 153/04 (As Amended) Table \_\_\_ [ ] RSC Filing [ ] O. Reg. 558/00 [ ] PWQO [ ] CCME [ ] SUB (Storm) [ ] SUB (Sanitary) Municipality: \_\_\_\_\_ [ ] Other: \_\_\_\_\_

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

**Required Analyses**

Parcel Order Number: <b>1530098</b>		Matrix	Air Volume	# of Containers	Sample Taken		PHCs F1-F4+BTEX	VOCs	PAHs	Metals by ICP	Hg	CrVI	B (HWS)							
Sample ID/Location Name					Date	Time														
1	BH1 - GW 2	GW		3	July 20/15		✓	✓												
2	BH 2 - GW 2	GW		3	July 20/15		✓	✓												
3	BH 2 - GW 2	GW		3	July 20/15		✓	✓												
4																				
5																				
6																				
7																				
8																				
9																				
10																				

Comments: \_\_\_\_\_ Method of Delivery: **Walkin**

Relinquished By (Sign):	Received by Driver/Depot:	Received at Lab: <b>D. Choulebois</b>	Verified By: <b>D. Choulebois</b>
Relinquished By (Print):	Date/Time:	Date/Time: <b>July 20 5:57</b>	Date/Time: <b>July 21 9:42</b>
Date/Time:	Temperature: _____ °C	Temperature: <b>20.4</b> °C	pH Verified By: <b>NA</b>

## *Certificate of Analysis*

### **Paterson Group Consulting Engineers**

154 Colonnade Road South  
Nepean, ON K2E 7J5  
Attn: Eric Leveque

Phone: (613) 226-7381  
Fax: (613) 226-6344

Client PO: 17799  
Project: PE3540  
Custody: 104702

Report Date: 19-May-2015  
Order Date: 12-May-2015

**Order #: 1520161**

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

<b>Paracel ID</b>	<b>Client ID</b>
1520161-01	BH1-GW1
1520161-02	BH2-GW1
1520161-03	BH3-GW1
1520161-04	BH6-GW1

Approved By:



Mark Foto, M.Sc. For Dale Robertson, BSc  
Laboratory Director

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 circumstances be liable to you in connection with this work

**Certificate of Analysis**

Report Date: 19-May-2015  
Order Date: 12-May-2015

Client: **Paterson Group Consulting Engineers**  
Client PO: 17799

Project Description: PE3540

**Analysis Summary Table**

Analysis	Method Reference/Description	Extraction Date	Analysis Date
BTEX by P&T GC-MS	EPA 624 - P&T GC-MS	14-May-15	15-May-15
PHC F1	CWS Tier 1 - P&T GC-FID	14-May-15	15-May-15
PHC F2 - F4	CWS Tier 1 - GC-FID, extraction	14-May-15	14-May-15
REG 153 - VOCs by P&T GC/MS	EPA 624 - P&T GC-MS	14-May-15	15-May-15

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**MISSISSAUGA**  
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**SARNIA**  
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Point Edward, ON N7V 1X4

**NIAGARA**  
360 York Rd. Unit 16B  
Niagara-on-the-Lake, ON L0S 1J0

**KINGSTON**  
1058 Gardiners Rd.  
Kingston, ON K7P 1R7

**Certificate of Analysis**

Report Date: 19-May-2015

Order Date: 12-May-2015

 Client: **Paterson Group Consulting Engineers**

Client PO: 17799

Project Description: PE3540

Client ID:	BH1-GW1	BH2-GW1	BH3-GW1	BH6-GW1
Sample Date:	12-May-15	12-May-15	12-May-15	12-May-15
Sample ID:	1520161-01	1520161-02	1520161-03	1520161-04
MDL/Units	Water	Water	Water	Water

**Volatiles**

Compound	MDL/Units	BH1-GW1	BH2-GW1	BH3-GW1	BH6-GW1
Acetone	5.0 ug/L	21.2	-	<5.0	-
Benzene	0.5 ug/L	0.7	-	<0.5	-
Bromodichloromethane	0.5 ug/L	<0.5	-	<0.5	-
Bromoform	0.5 ug/L	<0.5	-	<0.5	-
Bromomethane	0.5 ug/L	<0.5	-	<0.5	-
Carbon Tetrachloride	0.2 ug/L	<0.2	-	<0.2	-
Chlorobenzene	0.5 ug/L	<0.5	-	<0.5	-
Chloroform	0.5 ug/L	16.1	-	7.4	-
Dibromochloromethane	0.5 ug/L	<0.5	-	<0.5	-
Dichlorodifluoromethane	1.0 ug/L	<1.0	-	<1.0	-
1,2-Dichlorobenzene	0.5 ug/L	<0.5	-	<0.5	-
1,3-Dichlorobenzene	0.5 ug/L	<0.5	-	<0.5	-
1,4-Dichlorobenzene	0.5 ug/L	<0.5	-	<0.5	-
1,1-Dichloroethane	0.5 ug/L	<0.5	-	<0.5	-
1,2-Dichloroethane	0.5 ug/L	<0.5	-	<0.5	-
1,1-Dichloroethylene	0.5 ug/L	<0.5	-	<0.5	-
cis-1,2-Dichloroethylene	0.5 ug/L	<0.5	-	<0.5	-
trans-1,2-Dichloroethylene	0.5 ug/L	<0.5	-	<0.5	-
1,2-Dichloropropane	0.5 ug/L	<0.5	-	<0.5	-
cis-1,3-Dichloropropylene	0.5 ug/L	<0.5	-	<0.5	-
trans-1,3-Dichloropropylene	0.5 ug/L	<0.5	-	<0.5	-
1,3-Dichloropropene, total	0.5 ug/L	<0.5	-	<0.5	-
Ethylbenzene	0.5 ug/L	4.0	-	<0.5	-
Ethylene dibromide (dibromoethane)	0.2 ug/L	<0.2	-	<0.2	-
Hexane	1.0 ug/L	6.6	-	<1.0	-
Methyl Ethyl Ketone (2-Butanone)	5.0 ug/L	<5.0	-	<5.0	-
Methyl Isobutyl Ketone	5.0 ug/L	<5.0	-	<5.0	-
Methyl tert-butyl ether	2.0 ug/L	<2.0	-	<2.0	-
Methylene Chloride	5.0 ug/L	<5.0	-	<5.0	-
Styrene	0.5 ug/L	<0.5	-	<0.5	-
1,1,1,2-Tetrachloroethane	0.5 ug/L	<0.5	-	<0.5	-
1,1,2,2-Tetrachloroethane	0.5 ug/L	<0.5	-	<0.5	-
Tetrachloroethylene	0.5 ug/L	<0.5	-	<0.5	-

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**Certificate of Analysis**

Report Date: 19-May-2015

Order Date: 12-May-2015

 Client: **Paterson Group Consulting Engineers**

Client PO: 17799

Project Description: PE3540

	Client ID:	BH1-GW1	BH2-GW1	BH3-GW1	BH6-GW1
	Sample Date:	12-May-15	12-May-15	12-May-15	12-May-15
	Sample ID:	1520161-01	1520161-02	1520161-03	1520161-04
	MDL/Units	Water	Water	Water	Water
Toluene	0.5 ug/L	0.9	-	<0.5	-
1,1,1-Trichloroethane	0.5 ug/L	<0.5	-	<0.5	-
1,1,2-Trichloroethane	0.5 ug/L	<0.5	-	<0.5	-
Trichloroethylene	0.5 ug/L	<0.5	-	<0.5	-
Trichlorofluoromethane	1.0 ug/L	<1.0	-	<1.0	-
Vinyl chloride	0.5 ug/L	<0.5	-	<0.5	-
m,p-Xylenes	0.5 ug/L	10.2	-	<0.5	-
o-Xylene	0.5 ug/L	<0.5	-	<0.5	-
Xylenes, total	0.5 ug/L	10.2	-	<0.5	-
4-Bromofluorobenzene	Surrogate	97.0%	-	99.3%	-
Dibromofluoromethane	Surrogate	110%	-	86.1%	-
Toluene-d8	Surrogate	82.9%	-	86.8%	-
Benzene	0.5 ug/L	-	<0.5	-	<0.5
Ethylbenzene	0.5 ug/L	-	<0.5	-	<0.5
Toluene	0.5 ug/L	-	<0.5	-	<0.5
m,p-Xylenes	0.5 ug/L	-	<0.5	-	<0.5
o-Xylene	0.5 ug/L	-	<0.5	-	<0.5
Xylenes, total	0.5 ug/L	-	<0.5	-	<0.5
Toluene-d8	Surrogate	-	84.0%	-	83.5%

**Hydrocarbons**

F1 PHCs (C6-C10)	25 ug/L	450	280	<25	52
F2 PHCs (C10-C16)	100 ug/L	967	261	174	27500
F3 PHCs (C16-C34)	100 ug/L	918	299	224	29800
F4 PHCs (C34-C50)	100 ug/L	<100	<100	<100	<100
F1 + F2 PHCs	125 ug/L	-	541	-	27600
F1 + F2 PHCs	125 ug/L	1420	-	174	-
F3 + F4 PHCs	200 ug/L	-	299	-	29800
F3 + F4 PHCs	200 ug/L	918	-	224	-

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**Certificate of Analysis**

Report Date: 19-May-2015

Client: **Paterson Group Consulting Engineers**

Order Date: 12-May-2015

Client PO: 17799

Project Description: PE3540

**Method Quality Control: Blank**

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
<b>Hydrocarbons</b>									
F1 PHCs (C6-C10)	ND	25	ug/L						
F2 PHCs (C10-C16)	ND	100	ug/L						
F3 PHCs (C16-C34)	ND	100	ug/L						
F4 PHCs (C34-C50)	ND	100	ug/L						
<b>Volatiles</b>									
Acetone	ND	5.0	ug/L						
Benzene	ND	0.5	ug/L						
Bromodichloromethane	ND	0.5	ug/L						
Bromoform	ND	0.5	ug/L						
Bromomethane	ND	0.5	ug/L						
Carbon Tetrachloride	ND	0.2	ug/L						
Chlorobenzene	ND	0.5	ug/L						
Chloroform	ND	0.5	ug/L						
Dibromochloromethane	ND	0.5	ug/L						
Dichlorodifluoromethane	ND	1.0	ug/L						
1,2-Dichlorobenzene	ND	0.5	ug/L						
1,3-Dichlorobenzene	ND	0.5	ug/L						
1,4-Dichlorobenzene	ND	0.5	ug/L						
1,1-Dichloroethane	ND	0.5	ug/L						
1,2-Dichloroethane	ND	0.5	ug/L						
1,1-Dichloroethylene	ND	0.5	ug/L						
cis-1,2-Dichloroethylene	ND	0.5	ug/L						
trans-1,2-Dichloroethylene	ND	0.5	ug/L						
1,2-Dichloropropane	ND	0.5	ug/L						
cis-1,3-Dichloropropylene	ND	0.5	ug/L						
trans-1,3-Dichloropropylene	ND	0.5	ug/L						
1,3-Dichloropropene, total	ND	0.5	ug/L						
Ethylbenzene	ND	0.5	ug/L						
Ethylene dibromide (dibromoethane)	ND	0.2	ug/L						
Hexane	ND	1.0	ug/L						
Methyl Ethyl Ketone (2-Butanone)	ND	5.0	ug/L						
Methyl Isobutyl Ketone	ND	5.0	ug/L						
Methyl tert-butyl ether	ND	2.0	ug/L						
Methylene Chloride	ND	5.0	ug/L						
Styrene	ND	0.5	ug/L						
1,1,1,2-Tetrachloroethane	ND	0.5	ug/L						
1,1,2,2-Tetrachloroethane	ND	0.5	ug/L						
Tetrachloroethylene	ND	0.5	ug/L						
Toluene	ND	0.5	ug/L						
1,1,1-Trichloroethane	ND	0.5	ug/L						
1,1,2-Trichloroethane	ND	0.5	ug/L						
Trichloroethylene	ND	0.5	ug/L						
Trichlorofluoromethane	ND	1.0	ug/L						
Vinyl chloride	ND	0.5	ug/L						
m,p-Xylenes	ND	0.5	ug/L						
o-Xylene	ND	0.5	ug/L						
Xylenes, total	ND	0.5	ug/L						
Surrogate: 4-Bromofluorobenzene	31.4		ug/L		98.2	50-140			
Surrogate: Dibromofluoromethane	30.9		ug/L		96.5	50-140			
Surrogate: Toluene-d8	28.9		ug/L		90.2	50-140			
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						

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**Certificate of Analysis**

Report Date: 19-May-2015  
Order Date: 12-May-2015

Client: **Paterson Group Consulting Engineers**  
Client PO: 17799

Project Description: PE3540

**Method Quality Control: Blank**

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Surrogate: Toluene-d8	28.9		ug/L		90.2	50-140			

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**Certificate of Analysis**

Report Date: 19-May-2015

Client: **Paterson Group Consulting Engineers**

Order Date: 12-May-2015

Client PO: 17799

Project Description: PE3540

**Method Quality Control: Duplicate**

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
<b>Hydrocarbons</b>									
F1 PHCs (C6-C10)	1120	25	ug/L	1180			5.5	30	
<b>Volatiles</b>									
Acetone	ND	5.0	ug/L	ND				30	
Benzene	ND	0.5	ug/L	ND				30	
Bromodichloromethane	ND	0.5	ug/L	ND				30	
Bromoform	ND	0.5	ug/L	ND				30	
Bromomethane	ND	0.5	ug/L	ND				30	
Carbon Tetrachloride	ND	0.2	ug/L	ND				30	
Chlorobenzene	ND	0.5	ug/L	ND				30	
Chloroform	2.30	0.5	ug/L	2.40			4.3	30	
Dibromochloromethane	0.62	0.5	ug/L	1.05			51.5	30	QR-01
Dichlorodifluoromethane	ND	1.0	ug/L	ND				30	
1,2-Dichlorobenzene	ND	0.5	ug/L	ND				30	
1,3-Dichlorobenzene	ND	0.5	ug/L	ND				30	
1,4-Dichlorobenzene	ND	0.5	ug/L	ND				30	
1,1-Dichloroethane	ND	0.5	ug/L	ND				30	
1,2-Dichloroethane	ND	0.5	ug/L	ND				30	
1,1-Dichloroethylene	ND	0.5	ug/L	ND				30	
cis-1,2-Dichloroethylene	ND	0.5	ug/L	ND				30	
trans-1,2-Dichloroethylene	ND	0.5	ug/L	ND				30	
1,2-Dichloropropane	ND	0.5	ug/L	ND				30	
cis-1,3-Dichloropropylene	ND	0.5	ug/L	ND				30	
trans-1,3-Dichloropropylene	ND	0.5	ug/L	ND				30	
Ethylbenzene	36.5	0.5	ug/L	44.2			19.0	30	
Ethylene dibromide (dibromoethane)	ND	0.2	ug/L	ND				30	
Hexane	143	1.0	ug/L	146			2.5	30	
Methyl Ethyl Ketone (2-Butanone)	ND	5.0	ug/L	ND				30	
Methyl Isobutyl Ketone	5.00	5.0	ug/L	ND			0.0	30	
Methyl tert-butyl ether	ND	2.0	ug/L	ND				30	
Methylene Chloride	ND	5.0	ug/L	ND				30	
Styrene	ND	0.5	ug/L	ND				30	
1,1,1,2-Tetrachloroethane	ND	0.5	ug/L	ND				30	
1,1,2,2-Tetrachloroethane	0.74	0.5	ug/L	ND			0.0	30	
Tetrachloroethylene	ND	0.5	ug/L	ND				30	
Toluene	1.29	0.5	ug/L	1.21			6.4	30	
1,1,1-Trichloroethane	ND	0.5	ug/L	ND				30	
1,1,2-Trichloroethane	ND	0.5	ug/L	ND				30	
Trichloroethylene	ND	0.5	ug/L	ND				30	
Trichlorofluoromethane	ND	1.0	ug/L	ND				30	
Vinyl chloride	ND	0.5	ug/L	ND				30	
m,p-Xylenes	1.68	0.5	ug/L	1.74			3.5	30	
o-Xylene	2.08	0.5	ug/L	2.38			13.5	30	
Surrogate: 4-Bromofluorobenzene	34.3		ug/L	ND	107	50-140			
Surrogate: Dibromofluoromethane	27.3		ug/L	ND	85.4	50-140			
Surrogate: Toluene-d8	31.5		ug/L	ND	98.3	50-140			
Benzene	ND	0.5	ug/L	ND				30	
Ethylbenzene	36.5	0.5	ug/L	44.2			19.0	30	
Toluene	1.29	0.5	ug/L	1.21			6.4	30	
m,p-Xylenes	1.68	0.5	ug/L	1.74			3.5	30	
o-Xylene	2.08	0.5	ug/L	2.38			13.5	30	
Surrogate: Toluene-d8	31.5		ug/L	ND	98.3	50-140			

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**Certificate of Analysis**

Client: **Paterson Group Consulting Engineers**  
Client PO: 17799

Project Description: PE3540

Report Date: 19-May-2015  
Order Date: 12-May-2015

**Method Quality Control: Spike**

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
<b>Hydrocarbons</b>									
F1 PHCs (C6-C10)	2080	25	ug/L	ND	104	68-117			
F2 PHCs (C10-C16)	1930	100	ug/L	ND	107	60-140			
F3 PHCs (C16-C34)	4080	100	ug/L	ND	110	60-140			
F4 PHCs (C34-C50)	2810	100	ug/L	ND	113	60-140			
<b>Volatiles</b>									
Acetone	131	5.0	ug/L	ND	131	50-140			
Benzene	48.8	0.5	ug/L	11.4	93.6	50-140			
Bromodichloromethane	37.4	0.5	ug/L	ND	93.6	50-140			
Bromoform	37.9	0.5	ug/L	ND	94.8	50-140			
Bromomethane	36.8	0.5	ug/L	ND	92.0	50-140			
Carbon Tetrachloride	31.4	0.2	ug/L	ND	78.4	50-140			
Chlorobenzene	34.8	0.5	ug/L	ND	87.1	50-140			
Chloroform	36.8	0.5	ug/L	ND	92.0	50-140			
Dibromochloromethane	41.2	0.5	ug/L	ND	103	50-140			
Dichlorodifluoromethane	39.9	1.0	ug/L	ND	99.7	50-140			
1,2-Dichlorobenzene	38.8	0.5	ug/L	ND	96.9	50-140			
1,3-Dichlorobenzene	38.1	0.5	ug/L	ND	95.4	50-140			
1,4-Dichlorobenzene	38.5	0.5	ug/L	ND	96.2	50-140			
1,1-Dichloroethane	40.0	0.5	ug/L	ND	100	50-140			
1,2-Dichloroethane	40.7	0.5	ug/L	ND	102	50-140			
1,1-Dichloroethylene	32.8	0.5	ug/L	ND	82.1	50-140			
cis-1,2-Dichloroethylene	35.2	0.5	ug/L	ND	88.0	50-140			
trans-1,2-Dichloroethylene	31.8	0.5	ug/L	ND	79.5	50-140			
1,2-Dichloropropane	41.4	0.5	ug/L	ND	104	50-140			
cis-1,3-Dichloropropylene	38.4	0.5	ug/L	ND	96.1	50-140			
trans-1,3-Dichloropropylene	28.6	0.5	ug/L	ND	71.5	50-140			
Ethylbenzene	164	0.5	ug/L	142	55.1	50-140			
Ethylene dibromide (dibromoethane)	36.7	0.2	ug/L	ND	91.8	50-140			
Hexane	27.8	1.0	ug/L	ND	69.5	60-130			
Methyl Ethyl Ketone (2-Butanone)	94.4	5.0	ug/L	ND	94.4	50-140			
Methyl Isobutyl Ketone	114	5.0	ug/L	ND	114	50-140			
Methyl tert-butyl ether	104	2.0	ug/L	ND	104	50-140			
Methylene Chloride	35.3	5.0	ug/L	ND	88.2	50-140			
Styrene	42.7	0.5	ug/L	ND	107	50-140			
1,1,1,2-Tetrachloroethane	36.6	0.5	ug/L	ND	91.5	50-140			
1,1,1,2,2-Tetrachloroethane	38.6	0.5	ug/L	ND	96.4	50-140			
Tetrachloroethylene	30.1	0.5	ug/L	ND	75.3	50-140			
Toluene	68.8	0.5	ug/L	34.4	86.0	50-140			
1,1,1-Trichloroethane	38.3	0.5	ug/L	ND	95.8	50-140			
1,1,2-Trichloroethane	36.9	0.5	ug/L	ND	92.2	50-140			
Trichloroethylene	34.3	0.5	ug/L	ND	85.8	50-140			
Trichlorofluoromethane	34.3	1.0	ug/L	ND	85.7	50-140			
Vinyl chloride	31.8	0.5	ug/L	ND	79.6	50-140			
m,p-Xylenes	69.6	0.5	ug/L	ND	87.0	60-130			
o-Xylene	37.8	0.5	ug/L	ND	94.4	60-130			
<i>Surrogate: 4-Bromofluorobenzene</i>	<i>28.9</i>		<i>ug/L</i>		<i>90.2</i>	<i>50-140</i>			
Benzene	48.8	0.5	ug/L	11.4	93.6	50-140			
Ethylbenzene	164	0.5	ug/L	142	55.1	50-140			

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**Certificate of Analysis**

Report Date: 19-May-2015  
Order Date: 12-May-2015

Client: **Paterson Group Consulting Engineers**  
Client PO: 17799

Project Description: PE3540

**Method Quality Control: Spike**

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Toluene	68.8	0.5	ug/L	34.4	86.0	50-140			
m,p-Xylenes	599	0.5	ug/L	680	-101	50-140			
o-Xylene	231	0.5	ug/L	228	7.43	50-140			

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**NIAGARA**  
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Niagara-on-the-Lake, ON L0S 1J0

**KINGSTON**  
1058 Gardiners Rd.  
Kingston, ON K7P 1R7

**Certificate of Analysis**

Report Date: 19-May-2015  
Order Date: 12-May-2015

Client: **Paterson Group Consulting Engineers**  
Client PO: 17799

Project Description: PE3540

**Qualifier Notes:**

**QC Qualifiers :**

QR-01 : Duplicate RPD is high, however, the sample result is less than 10x the MDL.

**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.

*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.

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**KINGSTON**  
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Client Name: <del>XXXXXXXXXX</del> PATERSON	Project Reference: PE 3540	Page ___ of ___
Contact Name: ERIC LEVEQUE	Quote #	
Address: 154 COLONNADE ROAD	PO # 17799	
Telephone: 613-226-7381	Email Address: eleveque@paterongroup.ca	
TAT: <input checked="" type="checkbox"/> Regular <input type="checkbox"/> 3 Day <input type="checkbox"/> 2 Day <input type="checkbox"/> 1 Day		
Date Required: _____		

Criteria:  O. Reg. 153/04 (As Amended) Table \_\_\_  RSC Filing  O. Reg. 558/00  PWQO  CCME  SUB (Storm)  SUB (Sanitary) Municipality: \_\_\_\_\_  Other: \_\_\_\_\_

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

Parcel Order Number: 1520161		Matrix	Air Volume	# of Containers	Sample Taken		PHCs F1-F4+BTEX	VOCs	PAHs	Metals by ICP	Hg	CrVI	B (HIWS)
Sample ID/Location Name	Date				Time								
1	BH1 - GW1	GW		3	May 12, 2015		X	X					
2	BH2 - GW2	↓		↓			X	X					
3	BH3 - GW1	↓		↓			X	X					
4	BH6 - GW1	↓		↓			X						
5													
6													
7													
8													
9													
10													

Comments: \_\_\_\_\_ Method of Delivery: **Paracel**

Relinquished By (Sign): <i>Xavier Radhead</i>	Received by Driver/Depot: <i>A. FLOUSE</i>	Received at Lab: <i>MJC</i>	Verified By: <i>MJC</i>
Relinquished By (Print): Xavier Radhead	Date/Time: 12/05/15 4:25 PM	Date/Time: MAY 12/15 5:45	Date/Time: MAY 12/15 5:53
Date/Time: May 12, 2015	Temperature: _____ °C	Temperature: 14.0 °C	pH Verified <input type="checkbox"/> By: N/A

## *Certificate of Analysis*

### **Paterson Group Consulting Engineers**

154 Colonnade Road South  
Nepean, ON K2E 7J5

Attn: Mark D'Arcy

Client PO: 17754

Project: PE3540

Custody: 104651

Phone: (613) 226-7381

Fax: (613) 226-6344

Report Date: 15-May-2015

Order Date: 7-May-2015

Revised Report **Order #: 1519321**

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

<b>Paracel ID</b>	<b>Client ID</b>
1519321-01	BH3-SS2
1519321-02	BH4-SS1

Approved By:



Mark Foto, M.Sc. For Dale Robertson, BSc  
Laboratory Director

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 circumstances be liable to you in connection with this work

**Certificate of Analysis**

Report Date: 15-May-2015

Order Date: 7-May-2015

 Client: **Paterson Group Consulting Engineers**

Client PO: 17754

Project Description: PE3540

**Analysis Summary Table**

Analysis	Method Reference/Description	Extraction Date	Analysis Date
BTEX by P&T GC-MS	EPA 8260 - P&T GC-MS	7-May-15	9-May-15
MOE Metals by ICP-OES, soil Reg 153	based on MOE E3470, ICP-OES	13-May-15	13-May-15
PHC F1	CWS Tier 1 - P&T GC-FID	7-May-15	9-May-15
PHC F2 - F4	CWS Tier 1 - GC-FID, extraction	11-May-15	12-May-15
Solids, %	Gravimetric, calculation	9-May-15	9-May-15

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**Certificate of Analysis**

Report Date: 15-May-2015

Order Date: 7-May-2015

 Client: **Paterson Group Consulting Engineers**

Client PO: 17754

Project Description: PE3540

<b>Client ID:</b>	BH3-SS2	BH4-SS1	-	-
<b>Sample Date:</b>	06-May-15	06-May-15	-	-
<b>Sample ID:</b>	1519321-01	1519321-02	-	-
<b>MDL/Units</b>	Soil	Soil	-	-

**Physical Characteristics**

% Solids	0.1 % by Wt.	85.9	86.7	-	-
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**Metals**

Antimony	1.0 ug/g dry	<1.0	<1.0	-	-
Arsenic	1.0 ug/g dry	10.0	5.8	-	-
Barium	1.0 ug/g dry	120	127	-	-
Beryllium	1.0 ug/g dry	<1.0	<1.0	-	-
Boron	1.0 ug/g dry	4.8	4.0	-	-
Cadmium	0.5 ug/g dry	<0.5	<0.5	-	-
Chromium	1.0 ug/g dry	22.9	20.7	-	-
Cobalt	1.0 ug/g dry	6.8	6.5	-	-
Copper	1.0 ug/g dry	14.9	17.1	-	-
Lead	1.0 ug/g dry	71.8	183	-	-
Molybdenum	1.0 ug/g dry	<1.0	<1.0	-	-
Nickel	1.0 ug/g dry	13.3	12.7	-	-
Selenium	1.0 ug/g dry	1.2	<1.0	-	-
Silver	0.5 ug/g dry	<0.5	<0.5	-	-
Thallium	1.0 ug/g dry	<1.0	<1.0	-	-
Uranium	1.0 ug/g dry	<1.0	<1.0	-	-
Vanadium	1.0 ug/g dry	30.3	27.1	-	-
Zinc	1.0 ug/g dry	77.2	152	-	-

**Volatiles**

Benzene	0.02 ug/g dry	<0.02	<0.02	-	-
Ethylbenzene	0.05 ug/g dry	<0.05	<0.05	-	-
Toluene	0.05 ug/g dry	<0.05	<0.05	-	-
m,p-Xylenes	0.05 ug/g dry	<0.05	<0.05	-	-
o-Xylene	0.05 ug/g dry	<0.05	<0.05	-	-
Xylenes, total	0.05 ug/g dry	<0.05	<0.05	-	-
Toluene-d8	Surrogate	105%	105%	-	-

**Hydrocarbons**

F1 PHCs (C6-C10)	7 ug/g dry	<7	<7	-	-
F2 PHCs (C10-C16)	4 ug/g dry	<4	<4	-	-
F3 PHCs (C16-C34)	8 ug/g dry	<8	61	-	-
F4 PHCs (C34-C50)	6 ug/g dry	<6	66	-	-

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**Certificate of Analysis**

Report Date: 15-May-2015  
Order Date: 7-May-2015

Client: **Paterson Group Consulting Engineers**  
Client PO: 17754

Project Description: PE3540

**Method Quality Control: Blank**

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
<b>Hydrocarbons</b>									
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						
<b>Metals</b>									
Antimony	ND	1.0	ug/g						
Arsenic	ND	1.0	ug/g						
Barium	ND	1.0	ug/g						
Beryllium	ND	1.0	ug/g						
Boron	ND	1.0	ug/g						
Cadmium	ND	0.5	ug/g						
Chromium	ND	1.0	ug/g						
Cobalt	ND	1.0	ug/g						
Copper	ND	1.0	ug/g						
Lead	ND	1.0	ug/g						
Molybdenum	ND	1.0	ug/g						
Nickel	ND	1.0	ug/g						
Selenium	ND	1.0	ug/g						
Silver	ND	0.5	ug/g						
Thallium	ND	1.0	ug/g						
Uranium	ND	1.0	ug/g						
Vanadium	ND	1.0	ug/g						
Zinc	ND	1.0	ug/g						
<b>Volatiles</b>									
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	8.41		ug/g		105	50-140			

**Certificate of Analysis**

Report Date: 15-May-2015

Client: Paterson Group Consulting Engineers

Order Date: 7-May-2015

Client PO: 17754

Project Description: PE3540

**Method Quality Control: Duplicate**

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
<b>Hydrocarbons</b>									
F1 PHCs (C6-C10)	ND	7	ug/g dry	ND				40	
F2 PHCs (C10-C16)	ND	4	ug/g dry	ND				30	
F3 PHCs (C16-C34)	ND	8	ug/g dry	ND				30	
F4 PHCs (C34-C50)	ND	6	ug/g dry	ND				30	
<b>Metals</b>									
Antimony	1.33	1.0	ug/g dry	ND			0.0	30	
Arsenic	2.78	1.0	ug/g dry	1.95			34.7	30	QR-01
Barium	122	1.0	ug/g dry	125			2.6	30	
Beryllium	ND	1.0	ug/g dry	ND			0.0	30	
Boron	20.9	1.0	ug/g dry	18.1			14.3	30	
Cadmium	ND	0.5	ug/g dry	ND			0.0	30	
Chromium	16.6	1.0	ug/g dry	15.7			5.5	30	
Cobalt	5.83	1.0	ug/g dry	5.96			2.2	30	
Copper	7.60	1.0	ug/g dry	7.86			3.4	30	
Lead	5.62	1.0	ug/g dry	6.63			16.5	30	
Molybdenum	ND	1.0	ug/g dry	ND			0.0	30	
Nickel	12.3	1.0	ug/g dry	12.9			4.6	30	
Selenium	ND	1.0	ug/g dry	ND			0.0	30	
Silver	ND	0.5	ug/g dry	ND			0.0	30	
Thallium	1.22	1.0	ug/g dry	ND			0.0	30	
Uranium	ND	1.0	ug/g dry	ND			0.0	30	
Vanadium	15.4	1.0	ug/g dry	15.1			1.7	30	
Zinc	19.1	1.0	ug/g dry	20.0			4.4	30	
<b>Physical Characteristics</b>									
% Solids	90.5	0.1	% by Wt.	90.7			0.3	25	
<b>Volatiles</b>									
Benzene	ND	0.02	ug/g dry	ND				50	
Ethylbenzene	ND	0.05	ug/g dry	ND				50	
Toluene	ND	0.05	ug/g dry	ND				50	
m,p-Xylenes	ND	0.05	ug/g dry	ND				50	
o-Xylene	ND	0.05	ug/g dry	ND				50	
Surrogate: Toluene-d8	4.81		ug/g dry	ND	105	50-140			

**Certificate of Analysis**

Report Date: 15-May-2015  
Order Date: 7-May-2015

Client: **Paterson Group Consulting Engineers**  
Client PO: 17754

Project Description: PE3540

**Method Quality Control: Spike**

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
<b>Hydrocarbons</b>									
F1 PHCs (C6-C10)	194	7	ug/g	ND	96.9	80-120			
F2 PHCs (C10-C16)	106	4	ug/g	ND	101	60-140			
F3 PHCs (C16-C34)	270	8	ug/g	ND	124	60-140			
F4 PHCs (C34-C50)	171	6	ug/g	ND	118	60-140			
<b>Metals</b>									
Antimony	262		ug/L	ND	105	70-130			
Arsenic	260		ug/L	39.1	88.2	70-130			
Barium	266		ug/L	ND	106	70-130			
Beryllium	224		ug/L	2.35	88.5	70-130			
Boron	570		ug/L	363	82.9	70-130			
Cadmium	210		ug/L	ND	84.1	70-130			
Chromium	498		ug/L	315	73.2	70-130			
Cobalt	299		ug/L	119	71.9	70-130			
Copper	374		ug/L	157	86.7	70-130			
Lead	326		ug/L	133	77.5	70-130			
Molybdenum	205		ug/L	8.18	78.8	70-130			
Nickel	432		ug/L	257	69.7	70-130			QM-07
Selenium	206		ug/L	19.9	74.5	70-130			
Silver	208		ug/L	0.39	83.2	70-130			
Thallium	192		ug/L	ND	76.9	70-130			QM-07
Uranium	166		ug/L	14.5	60.6	70-130			QM-07
Vanadium	488		ug/L	302	74.1	70-130			
Zinc	584		ug/L	399	73.9	70-130			
<b>Volatiles</b>									
Benzene	3.64	0.02	ug/g	ND	91.0	60-130			
Ethylbenzene	3.69	0.05	ug/g	ND	92.1	60-130			
Toluene	3.91	0.05	ug/g	ND	97.8	60-130			
m,p-Xylenes	7.28	0.05	ug/g	ND	91.0	60-130			
o-Xylene	4.02	0.05	ug/g	ND	100	60-130			
Surrogate: Toluene-d8	7.59		ug/g		94.9	50-140			

**Certificate of Analysis**

Report Date: 15-May-2015

Client: **Paterson Group Consulting Engineers**

Order Date: 7-May-2015

Client PO: 17754

Project Description: PE3540

**Qualifier Notes:**

**QC Qualifiers :**

QM-07 : The spike recovery was outside acceptance limits for the MS and/or MSD. The batch was accepted based on other acceptable QC.

QR-01 : Duplicate RPD is high, however, the sample result is less than 10x the MDL.

**Sample Data Revisions**

None

**Work Order Revisions / Comments:**

Revision 1 - This report includes an updated client Project reference.

**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.

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

**CCME PHC additional information:**

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



## ***Certificate of Analysis***

### **Paterson Group Consulting Engineers**

154 Colonnade Road South  
Nepean, ON K2E 7J5  
Attn: Sean Moggridge

Phone: (613) 226-7381  
Fax: (613) 226-6344

Client PO: 17724  
Project: PE3533  
Custody: 104708

Report Date: 22-May-2015  
Order Date: 15-May-2015  
Revised Report **Order #: 1520415**

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

<b>Paracel ID</b>	<b>Client ID</b>
1520415-01	BH1-GW1
1520415-02	BH3-GW1

Approved By:



Mark Foto, M.Sc. For Dale Robertson, BSc  
Laboratory Director

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**Certificate of Analysis**

Report Date: 22-May-2015  
Order Date: 15-May-2015

Client: **Paterson Group Consulting Engineers**  
Client PO: 17724

Project Description: PE3533

**Analysis Summary Table**

Analysis	Method Reference/Description	Extraction Date	Analysis Date
PHC F1	CWS Tier 1 - P&T GC-FID	19-May-15	20-May-15
PHC F2 - F4	CWS Tier 1 - GC-FID, extraction	21-May-15	21-May-15
REG 153 - VOCs by P&T GC/MS	EPA 624 - P&T GC-MS	19-May-15	20-May-15

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**Certificate of Analysis**

Report Date: 22-May-2015

Order Date: 15-May-2015

 Client: **Paterson Group Consulting Engineers**

Client PO: 17724

Project Description: PE3533

<b>Client ID:</b>	BH1-GW1	BH3-GW1	-	-
<b>Sample Date:</b>	15-May-15	15-May-15	-	-
<b>Sample ID:</b>	1520415-01	1520415-02	-	-
<b>MDL/Units</b>	Water	Water	-	-

**Volatiles**

Acetone	5.0 ug/L	<5.0	<5.0	-	-
Benzene	0.5 ug/L	<0.5	<0.5	-	-
Bromodichloromethane	0.5 ug/L	<0.5	<0.5	-	-
Bromoform	0.5 ug/L	<0.5	<0.5	-	-
Bromomethane	0.5 ug/L	<0.5	<0.5	-	-
Carbon Tetrachloride	0.2 ug/L	<0.2	<0.2	-	-
Chlorobenzene	0.5 ug/L	<0.5	<0.5	-	-
Chloroform	0.5 ug/L	<0.5	1.5	-	-
Dibromochloromethane	0.5 ug/L	<0.5	<0.5	-	-
Dichlorodifluoromethane	1.0 ug/L	<1.0	<1.0	-	-
1,2-Dichlorobenzene	0.5 ug/L	<0.5	<0.5	-	-
1,3-Dichlorobenzene	0.5 ug/L	<0.5	<0.5	-	-
1,4-Dichlorobenzene	0.5 ug/L	<0.5	<0.5	-	-
1,1-Dichloroethane	0.5 ug/L	<0.5	<0.5	-	-
1,2-Dichloroethane	0.5 ug/L	<0.5	<0.5	-	-
1,1-Dichloroethylene	0.5 ug/L	<0.5	<0.5	-	-
cis-1,2-Dichloroethylene	0.5 ug/L	<0.5	<0.5	-	-
trans-1,2-Dichloroethylene	0.5 ug/L	<0.5	<0.5	-	-
1,2-Dichloropropane	0.5 ug/L	<0.5	<0.5	-	-
cis-1,3-Dichloropropylene	0.5 ug/L	<0.5	<0.5	-	-
trans-1,3-Dichloropropylene	0.5 ug/L	<0.5	<0.5	-	-
1,3-Dichloropropene, total	0.5 ug/L	<0.5	<0.5	-	-
Ethylbenzene	0.5 ug/L	<0.5	<0.5	-	-
Ethylene dibromide (dibromoethane)	0.2 ug/L	<0.2	<0.2	-	-
Hexane	1.0 ug/L	3.9	4.8	-	-
Methyl Ethyl Ketone (2-Butanone)	5.0 ug/L	<5.0	<5.0	-	-
Methyl Isobutyl Ketone	5.0 ug/L	<5.0	<5.0	-	-
Methyl tert-butyl ether	2.0 ug/L	<2.0	<2.0	-	-
Methylene Chloride	5.0 ug/L	<5.0	<5.0	-	-
Styrene	0.5 ug/L	<0.5	<0.5	-	-
1,1,1,2-Tetrachloroethane	0.5 ug/L	<0.5	<0.5	-	-
1,1,2,2-Tetrachloroethane	0.5 ug/L	<0.5	<0.5	-	-
Tetrachloroethylene	0.5 ug/L	<0.5	<0.5	-	-

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Point Edward, ON N7V 1X4

**NIAGARA**  
360 York Rd. Unit 16B  
Niagara-on-the-Lake, ON L0S 1J0

**KINGSTON**  
1058 Gardiners Rd.  
Kingston, ON K7P 1R7

**Certificate of Analysis**

Report Date: 22-May-2015

Order Date: 15-May-2015

 Client: **Paterson Group Consulting Engineers**

Client PO: 17724

Project Description: PE3533

	MDL/Units	Client ID:	BH1-GW1	BH3-GW1		
		Sample Date:	15-May-15	15-May-15		
		Sample ID:	1520415-01	1520415-02		
			Water	Water		
Toluene	0.5 ug/L		<0.5	<0.5	-	-
1,1,1-Trichloroethane	0.5 ug/L		<0.5	<0.5	-	-
1,1,2-Trichloroethane	0.5 ug/L		<0.5	<0.5	-	-
Trichloroethylene	0.5 ug/L		<0.5	<0.5	-	-
Trichlorofluoromethane	1.0 ug/L		<1.0	<1.0	-	-
Vinyl chloride	0.5 ug/L		<0.5	<0.5	-	-
m,p-Xylenes	0.5 ug/L		<0.5	<0.5	-	-
o-Xylene	0.5 ug/L		<0.5	<0.5	-	-
Xylenes, total	0.5 ug/L		<0.5	<0.5	-	-
4-Bromofluorobenzene	Surrogate		94.0%	96.2%	-	-
Dibromofluoromethane	Surrogate		106%	102%	-	-
Toluene-d8	Surrogate		116%	117%	-	-

**Hydrocarbons**

F1 PHCs (C6-C10)	25 ug/L	108	123	-	-
F2 PHCs (C10-C16)	100 ug/L	1440	364	-	-
F3 PHCs (C16-C34)	100 ug/L	1110	<100	-	-
F4 PHCs (C34-C50)	100 ug/L	<100	<100	-	-
F1 + F2 PHCs	125 ug/L	1550	487	-	-
F3 + F4 PHCs	200 ug/L	1110	<200	-	-

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**Certificate of Analysis**

Report Date: 22-May-2015

Client: **Paterson Group Consulting Engineers**

Order Date: 15-May-2015

Client PO: 17724

Project Description: PE3533

**Method Quality Control: Blank**

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
<b>Hydrocarbons</b>									
F1 PHCs (C6-C10)	ND	25	ug/L						
F2 PHCs (C10-C16)	ND	100	ug/L						
F3 PHCs (C16-C34)	ND	100	ug/L						
F4 PHCs (C34-C50)	ND	100	ug/L						
<b>Volatiles</b>									
Acetone	ND	5.0	ug/L						
Benzene	ND	0.5	ug/L						
Bromodichloromethane	ND	0.5	ug/L						
Bromoform	ND	0.5	ug/L						
Bromomethane	ND	0.5	ug/L						
Carbon Tetrachloride	ND	0.2	ug/L						
Chlorobenzene	ND	0.5	ug/L						
Chloroform	ND	0.5	ug/L						
Dibromochloromethane	ND	0.5	ug/L						
Dichlorodifluoromethane	ND	1.0	ug/L						
1,2-Dichlorobenzene	ND	0.5	ug/L						
1,3-Dichlorobenzene	ND	0.5	ug/L						
1,4-Dichlorobenzene	ND	0.5	ug/L						
1,1-Dichloroethane	ND	0.5	ug/L						
1,2-Dichloroethane	ND	0.5	ug/L						
1,1-Dichloroethylene	ND	0.5	ug/L						
cis-1,2-Dichloroethylene	ND	0.5	ug/L						
trans-1,2-Dichloroethylene	ND	0.5	ug/L						
1,2-Dichloropropane	ND	0.5	ug/L						
cis-1,3-Dichloropropylene	ND	0.5	ug/L						
trans-1,3-Dichloropropylene	ND	0.5	ug/L						
1,3-Dichloropropene, total	ND	0.5	ug/L						
Ethylbenzene	ND	0.5	ug/L						
Ethylene dibromide (dibromoethane)	ND	0.2	ug/L						
Hexane	ND	1.0	ug/L						
Methyl Ethyl Ketone (2-Butanone)	ND	5.0	ug/L						
Methyl Isobutyl Ketone	ND	5.0	ug/L						
Methyl tert-butyl ether	ND	2.0	ug/L						
Methylene Chloride	ND	5.0	ug/L						
Styrene	ND	0.5	ug/L						
1,1,1,2-Tetrachloroethane	ND	0.5	ug/L						
1,1,1,2,2-Tetrachloroethane	ND	0.5	ug/L						
Tetrachloroethylene	ND	0.5	ug/L						
Toluene	ND	0.5	ug/L						
1,1,1-Trichloroethane	ND	0.5	ug/L						
1,1,2-Trichloroethane	ND	0.5	ug/L						
Trichloroethylene	ND	0.5	ug/L						
Trichlorofluoromethane	ND	1.0	ug/L						
Vinyl chloride	ND	0.5	ug/L						
m,p-Xylenes	ND	0.5	ug/L						
o-Xylene	ND	0.5	ug/L						
Xylenes, total	ND	0.5	ug/L						
Surrogate: 4-Bromofluorobenzene	36.0		ug/L		113	50-140			
Surrogate: Dibromofluoromethane	32.4		ug/L		101	50-140			
Surrogate: Toluene-d8	35.7		ug/L		112	50-140			

**Certificate of Analysis**

Report Date: 22-May-2015

Client: Paterson Group Consulting Engineers

Order Date: 15-May-2015

Client PO: 17724

Project Description: PE3533

**Method Quality Control: Duplicate**

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
<b>Hydrocarbons</b>									
F1 PHCs (C6-C10)	ND	25	ug/L	ND				30	
<b>Volatiles</b>									
Acetone	ND	5.0	ug/L	ND				30	
Benzene	ND	0.5	ug/L	ND				30	
Bromodichloromethane	ND	0.5	ug/L	ND				30	
Bromoform	ND	0.5	ug/L	ND				30	
Bromomethane	ND	0.5	ug/L	ND				30	
Carbon Tetrachloride	ND	0.2	ug/L	ND				30	
Chlorobenzene	ND	0.5	ug/L	ND				30	
Chloroform	ND	0.5	ug/L	ND				30	
Dibromochloromethane	ND	0.5	ug/L	ND				30	
Dichlorodifluoromethane	ND	1.0	ug/L	ND				30	
1,2-Dichlorobenzene	ND	0.5	ug/L	ND				30	
1,3-Dichlorobenzene	ND	0.5	ug/L	ND				30	
1,4-Dichlorobenzene	ND	0.5	ug/L	ND				30	
1,1-Dichloroethane	ND	0.5	ug/L	ND				30	
1,2-Dichloroethane	ND	0.5	ug/L	ND				30	
1,1-Dichloroethylene	ND	0.5	ug/L	ND				30	
cis-1,2-Dichloroethylene	ND	0.5	ug/L	ND				30	
trans-1,2-Dichloroethylene	ND	0.5	ug/L	ND				30	
1,2-Dichloropropane	ND	0.5	ug/L	ND				30	
cis-1,3-Dichloropropylene	ND	0.5	ug/L	ND				30	
trans-1,3-Dichloropropylene	ND	0.5	ug/L	ND				30	
Ethylbenzene	ND	0.5	ug/L	ND				30	
Ethylene dibromide (dibromoethane)	ND	0.2	ug/L	ND				30	
Hexane	ND	1.0	ug/L	ND				30	
Methyl Ethyl Ketone (2-Butanone)	ND	5.0	ug/L	ND				30	
Methyl Isobutyl Ketone	ND	5.0	ug/L	ND				30	
Methyl tert-butyl ether	ND	2.0	ug/L	ND				30	
Methylene Chloride	ND	5.0	ug/L	ND				30	
Styrene	ND	0.5	ug/L	ND				30	
1,1,1,2-Tetrachloroethane	ND	0.5	ug/L	ND				30	
1,1,2,2-Tetrachloroethane	ND	0.5	ug/L	ND				30	
Tetrachloroethylene	ND	0.5	ug/L	ND				30	
Toluene	ND	0.5	ug/L	ND				30	
1,1,1-Trichloroethane	ND	0.5	ug/L	ND				30	
1,1,2-Trichloroethane	ND	0.5	ug/L	ND				30	
Trichloroethylene	ND	0.5	ug/L	ND				30	
Trichlorofluoromethane	ND	1.0	ug/L	ND				30	
Vinyl chloride	ND	0.5	ug/L	ND				30	
m,p-Xylenes	ND	0.5	ug/L	ND				30	
o-Xylene	ND	0.5	ug/L	ND				30	
Surrogate: 4-Bromofluorobenzene	32.1		ug/L	ND	100	50-140			
Surrogate: Dibromofluoromethane	28.5		ug/L	ND	88.9	50-140			
Surrogate: Toluene-d8	35.7		ug/L	ND	112	50-140			

**Certificate of Analysis**

Report Date: 22-May-2015

Client: **Paterson Group Consulting Engineers**

Order Date: 15-May-2015

Client PO: 17724

Project Description: PE3533

**Method Quality Control: Spike**

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
<b>Hydrocarbons</b>									
F1 PHCs (C6-C10)	1910	25	ug/L	ND	95.6	68-117			
F2 PHCs (C10-C16)	1240	100	ug/L	ND	68.8	60-140			
F3 PHCs (C16-C34)	2580	100	ug/L	ND	69.5	60-140			
F4 PHCs (C34-C50)	2310	100	ug/L	ND	93.3	60-140			
<b>Volatiles</b>									
Acetone	97.1	5.0	ug/L	ND	97.1	50-140			
Benzene	37.6	0.5	ug/L	ND	94.0	50-140			
Bromodichloromethane	39.1	0.5	ug/L	ND	97.8	50-140			
Bromoform	45.4	0.5	ug/L	ND	114	50-140			
Bromomethane	35.6	0.5	ug/L	ND	89.0	50-140			
Carbon Tetrachloride	37.9	0.2	ug/L	ND	94.8	50-140			
Chlorobenzene	35.7	0.5	ug/L	ND	89.3	50-140			
Chloroform	41.7	0.5	ug/L	ND	104	50-140			
Dibromochloromethane	42.4	0.5	ug/L	ND	106	50-140			
Dichlorodifluoromethane	31.4	1.0	ug/L	ND	78.5	50-140			
1,2-Dichlorobenzene	40.9	0.5	ug/L	ND	102	50-140			
1,3-Dichlorobenzene	40.3	0.5	ug/L	ND	101	50-140			
1,4-Dichlorobenzene	40.8	0.5	ug/L	ND	102	50-140			
1,1-Dichloroethane	40.9	0.5	ug/L	ND	102	50-140			
1,2-Dichloroethane	39.3	0.5	ug/L	ND	98.3	50-140			
1,1-Dichloroethylene	37.0	0.5	ug/L	ND	92.6	50-140			
cis-1,2-Dichloroethylene	37.6	0.5	ug/L	ND	93.9	50-140			
trans-1,2-Dichloroethylene	34.7	0.5	ug/L	ND	86.8	50-140			
1,2-Dichloropropane	38.2	0.5	ug/L	ND	95.5	50-140			
cis-1,3-Dichloropropylene	40.7	0.5	ug/L	ND	102	50-140			
trans-1,3-Dichloropropylene	39.3	0.5	ug/L	ND	98.2	50-140			
Ethylbenzene	45.2	0.5	ug/L	ND	113	50-140			
Ethylene dibromide (dibromoethane)	41.0	0.2	ug/L	ND	103	50-140			
Hexane	20.8	1.0	ug/L	ND	52.0	50-140			
Methyl Ethyl Ketone (2-Butanone)	88.5	5.0	ug/L	ND	88.5	50-140			
Methyl Isobutyl Ketone	104	5.0	ug/L	ND	104	50-140			
Methyl tert-butyl ether	89.3	2.0	ug/L	ND	89.3	50-140			
Methylene Chloride	40.8	5.0	ug/L	ND	102	50-140			
Styrene	42.7	0.5	ug/L	ND	107	50-140			
1,1,1,2-Tetrachloroethane	42.0	0.5	ug/L	ND	105	50-140			
1,1,1,2,2-Tetrachloroethane	45.8	0.5	ug/L	ND	114	50-140			
Tetrachloroethylene	37.5	0.5	ug/L	ND	93.8	50-140			
Toluene	35.9	0.5	ug/L	ND	89.8	50-140			
1,1,1-Trichloroethane	38.1	0.5	ug/L	ND	95.2	50-140			
1,1,2-Trichloroethane	41.9	0.5	ug/L	ND	105	50-140			
Trichloroethylene	37.2	0.5	ug/L	ND	92.9	50-140			
Trichlorofluoromethane	36.8	1.0	ug/L	ND	92.0	50-140			
Vinyl chloride	40.0	0.5	ug/L	ND	100	50-140			
m,p-Xylenes	75.4	0.5	ug/L	ND	94.2	50-140			
o-Xylene	45.3	0.5	ug/L	ND	113	50-140			
Surrogate: 4-Bromofluorobenzene	22.9		ug/L		71.6	50-140			

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Kingston, ON K7P 1R7

**Certificate of Analysis**

Report Date: 22-May-2015  
Order Date: 15-May-2015

Client: **Paterson Group Consulting Engineers**  
Client PO: 17724

Project Description: PE3533

**Qualifier Notes:**

None

**Sample Data Revisions**

None

**Work Order Revisions / Comments:**

Revision 1 - this report includes an updated client Project reference.

**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.

*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.

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1058 Gardiners Rd.  
Kingston, ON K7P 1R7

Client Name: <b>PATERSON GROUP.</b>	Project Reference: <b>PE3533</b>	TAT: <input checked="" type="checkbox"/> Regular [ ] 3 Day <input type="checkbox"/> 2 Day [ ] 1 Day Date Required: _____
Contact Name: <b>SEAN MOGGIDGE.</b>	Quote #	
Address: <b>154 COLONNADE RD. S.</b>	PO# <b>17724</b>	
Telephone: <b>(613) - 226-7381</b>	Email Address: <b>SMOGGIDGE@PATERSONGROUP.CA.</b>	

Criteria:  O. Reg. 153/04 (As Amended) Table [ ] RSC Filing [ ] O. Reg. 558/00 [ ] PWQO [ ] CCME [ ] SUB (Storm) [ ] SUB (Sanitary) Municipality: \_\_\_\_\_ [ ] Other: \_\_\_\_\_

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

Parcel Order Number: <b>1520415</b>		Matrix	Air Volume	# of Containers	Sample Taken		PHCS F1-F4+BTEX	VOCs	PAHs	Metals by ICP	Hg	CrVI	B (HWS)
Sample ID/Location Name					Date	Time							
1	BH1 - GW1	BW		3	MAY 15/15	8:25 AM	X	X					
2	BH3 - GW1	BW		3	"	9:00 AM	X	X					
3													
4													
5													
6													
7													
8													
9													
10													

Comments: \_\_\_\_\_ Method of Delivery: **Paracel Courier**

Relinquished By (Sign): <i>[Signature]</i>	Received by Driver/Depot: <i>[Signature]</i>	Received at Lab: <b>SUNEERDORN DOKMAS</b>	Verified By: <i>[Signature]</i>
Relinquished By (Print): <b>RYAN MATHESON</b>	Date/Time: <b>15/05/15 4:15 PM</b>	Date/Time: <b>MAY 15, 2015 05:05</b>	Date/Time: <b>MAY 15/15 0:58</b>
Date/Time: <b>MAY 15/15 10:07 AM</b>	Temperature: _____ °C	Temperature: <b>14.3 °C</b>	pH Verified [ ] By: <b>N/A</b>

## Certificate of Analysis

Paterson Group Consulting Engineers

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

Client PO: 17228  
Project: PE3533  
Custody: 105135

Report Date: 24-Jul-2015  
Order Date: 20-Jul-2015

**Order #: 1530099**

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

<b>Parcel ID</b>	<b>Client ID</b>
1530099-01	BH3-GW2
1530099-02	BH7-GW1
1530099-03	BH6-GW1
1530099-04	BH5-GW1

Approved By:



Mark Foto, M.Sc.  
Lab Supervisor

**Certificate of Analysis**

Client: Paterson Group Consulting Engineers  
Client PO: 17228

Report Date: 24-Jul-2015  
Order Date: 20-Jul-2015  
Project Description: PE3533

**Analysis Summary Table**

Analysis	Method Reference/Description	Extraction Date	Analysis Date
PHC F1	CWS Tier 1 - P&T GC-FID	22-Jul-15	22-Jul-15
PHC F2 - F4	CWS Tier 1 - GC-FID, extraction	21-Jul-15	21-Jul-15
REG 153: VOCs by P&T GC/MS	EPA 624 - P&T GC-MS	22-Jul-15	22-Jul-15

**Certificate of Analysis**

 Client: Paterson Group Consulting Engineers  
 Client PO: 17228

 Report Date: 24-Jul-2015  
 Order Date: 20-Jul-2015  
 Project Description: PE3533

Client ID:	BH3-GW2	BH7-GW1	BH6-GW1	BH5-GW1
Sample Date:	20-Jul-15	20-Jul-15	20-Jul-15	20-Jul-15
Sample ID:	1530099-01	1530099-02	1530099-03	1530099-04
MDL/Units	Water	Water	Water	Water

**Volatiles**

	MDL/Units	BH3-GW2	BH7-GW1	BH6-GW1	BH5-GW1
Acetone	5.0 ug/L	<5.0	<5.0	<5.0	<5.0
Benzene	0.5 ug/L	<0.5	<0.5	<0.5	170
Bromodichloromethane	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
Bromoform	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
Bromomethane	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
Carbon Tetrachloride	0.2 ug/L	<0.2	<0.2	<0.2	<0.2
Chlorobenzene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
Chloroform	0.5 ug/L	<0.5	<0.5	2.0	<0.5
Dibromochloromethane	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
Dichlorodifluoromethane	1.0 ug/L	<1.0	<1.0	<1.0	<1.0
1,2-Dichlorobenzene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
1,3-Dichlorobenzene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
1,4-Dichlorobenzene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
1,1-Dichloroethane	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
1,2-Dichloroethane	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
1,1-Dichloroethylene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
cis-1,2-Dichloroethylene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
trans-1,2-Dichloroethylene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
1,2-Dichloropropane	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
cis-1,3-Dichloropropylene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
trans-1,3-Dichloropropylene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
1,3-Dichloropropene, total	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	0.5 ug/L	<0.5	<0.5	<0.5	406
Ethylene dibromide (dibromoethane)	0.2 ug/L	<0.2	<0.2	<0.2	<0.2
Hexane	1.0 ug/L	<1.0	<1.0	<1.0	97.0
Methyl Ethyl Ketone (2-Butanone)	5.0 ug/L	<5.0	<5.0	<5.0	<5.0
Methyl Isobutyl Ketone	5.0 ug/L	<5.0	<5.0	<5.0	<5.0
Methyl tert-butyl ether	2.0 ug/L	<2.0	<2.0	<2.0	<2.0
Methylene Chloride	5.0 ug/L	<5.0	<5.0	<5.0	<5.0
Styrene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
1,1,1,2-Tetrachloroethane	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
1,1,2,2-Tetrachloroethane	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
Tetrachloroethylene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
Toluene	0.5 ug/L	<0.5	<0.5	<0.5	143
1,1,1-Trichloroethane	0.5 ug/L	<0.5	<0.5	<0.5	<0.5

**Certificate of Analysis**

 Client: Paterson Group Consulting Engineers  
 Client PO: 17228

 Report Date: 24-Jul-2015  
 Order Date: 20-Jul-2015  
 Project Description: PE3533

	Client ID: Sample Date: Sample ID:	BH3-GW2 20-Jul-15 1530099-01 Water	BH7-GW1 20-Jul-15 1530099-02 Water	BH6-GW1 20-Jul-15 1530099-03 Water	BH5-GW1 20-Jul-15 1530099-04 Water
	MDL/Units				
1,1,2-Trichloroethane	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
Trichloroethylene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
Trichlorofluoromethane	1.0 ug/L	<1.0	<1.0	<1.0	<1.0
Vinyl chloride	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
m,p-Xylenes	0.5 ug/L	<0.5	<0.5	<0.5	539
o-Xylene	0.5 ug/L	<0.5	<0.5	<0.5	37.0
Xylenes, total	0.5 ug/L	<0.5	<0.5	<0.5	576
4-Bromofluorobenzene	Surrogate	98.6%	105%	114%	96.1%
Dibromofluoromethane	Surrogate	92.8%	91.9%	93.8%	93.0%
Toluene-d8	Surrogate	105%	109%	111%	107%

**Hydrocarbons**

F1 PHCs (C6-C10)	25 ug/L	664	1050	404	29700
F2 PHCs (C10-C16)	100 ug/L	179	550	1060	1490
F3 PHCs (C16-C34)	100 ug/L	<100	<100	629	<100
F4 PHCs (C34-C50)	100 ug/L	<100	<100	<100	<100
F1 + F2 PHCs	125 ug/L	843	1600	1470	-
F1 + F2 PHCs	1350 ug/L	-	-	-	31200
F3 + F4 PHCs	200 ug/L	<200	<200	629	<200

**Certificate of Analysis**

 Client: Paterson Group Consulting Engineers  
 Client PO: 17228

 Report Date: 24-Jul-2015  
 Order Date: 20-Jul-2015  
 Project Description: PE3533

**Method Quality Control: Blank**

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
<b>Hydrocarbons</b>									
F1 PHCs (C6-C10)	ND	25	ug/L						
F2 PHCs (C10-C16)	ND	100	ug/L						
F3 PHCs (C16-C34)	ND	100	ug/L						
F4 PHCs (C34-C50)	ND	100	ug/L						
<b>Volatiles</b>									
Acetone	ND	5.0	ug/L						
Benzene	ND	0.5	ug/L						
Bromodichloromethane	ND	0.5	ug/L						
Bromoform	ND	0.5	ug/L						
Bromomethane	ND	0.5	ug/L						
Carbon Tetrachloride	ND	0.2	ug/L						
Chlorobenzene	ND	0.5	ug/L						
Chloroform	ND	0.5	ug/L						
Dibromochloromethane	ND	0.5	ug/L						
Dichlorodifluoromethane	ND	1.0	ug/L						
1,2-Dichlorobenzene	ND	0.5	ug/L						
1,3-Dichlorobenzene	ND	0.5	ug/L						
1,4-Dichlorobenzene	ND	0.5	ug/L						
1,1-Dichloroethane	ND	0.5	ug/L						
1,2-Dichloroethane	ND	0.5	ug/L						
1,1-Dichloroethylene	ND	0.5	ug/L						
cis-1,2-Dichloroethylene	ND	0.5	ug/L						
trans-1,2-Dichloroethylene	ND	0.5	ug/L						
1,2-Dichloropropane	ND	0.5	ug/L						
cis-1,3-Dichloropropylene	ND	0.5	ug/L						
trans-1,3-Dichloropropylene	ND	0.5	ug/L						
1,3-Dichloropropene, total	ND	0.5	ug/L						
Ethylbenzene	ND	0.5	ug/L						
Ethylene dibromide (dibromoethane)	ND	0.2	ug/L						
Hexane	ND	1.0	ug/L						
Methyl Ethyl Ketone (2-Butanone)	ND	5.0	ug/L						
Methyl Isobutyl Ketone	ND	5.0	ug/L						
Methyl tert-butyl ether	ND	2.0	ug/L						
Methylene Chloride	ND	5.0	ug/L						
Styrene	ND	0.5	ug/L						
1,1,1,2-Tetrachloroethane	ND	0.5	ug/L						
1,1,2,2-Tetrachloroethane	ND	0.5	ug/L						
Tetrachloroethylene	ND	0.5	ug/L						
Toluene	ND	0.5	ug/L						
1,1,1-Trichloroethane	ND	0.5	ug/L						
1,1,2-Trichloroethane	ND	0.5	ug/L						
Trichloroethylene	ND	0.5	ug/L						
Trichlorofluoromethane	ND	1.0	ug/L						
Vinyl chloride	ND	0.5	ug/L						
m,p-Xylenes	ND	0.5	ug/L						
o-Xylene	ND	0.5	ug/L						
Xylenes, total	ND	0.5	ug/L						
Surrogate: 4-Bromofluorobenzene	91.5		ug/L		114	50-140			
Surrogate: Dibromofluoromethane	76.5		ug/L		95.6	50-140			
Surrogate: Toluene-d8	73.3		ug/L		91.7	50-140			

**Certificate of Analysis**

Client: Paterson Group Consulting Engineers  
Client PO: 17228

Report Date: 24-Jul-2015  
Order Date: 20-Jul-2015  
Project Description: PE3533

**Method Quality Control: Duplicate**

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
<b>Hydrocarbons</b>									
F1 PHCs (C6-C10)	ND	25	ug/L	ND				30	
<b>Volatiles</b>									
Acetone	ND	5.0	ug/L	ND				30	
Benzene	ND	0.5	ug/L	ND				30	
Bromodichloromethane	ND	0.5	ug/L	ND				30	
Bromoform	ND	0.5	ug/L	ND				30	
Bromomethane	ND	0.5	ug/L	ND				30	
Carbon Tetrachloride	ND	0.2	ug/L	ND				30	
Chlorobenzene	ND	0.5	ug/L	ND				30	
Chloroform	4.80	0.5	ug/L	4.89			1.9	30	
Dibromochloromethane	ND	0.5	ug/L	ND				30	
Dichlorodifluoromethane	ND	1.0	ug/L	ND				30	
1,2-Dichlorobenzene	ND	0.5	ug/L	ND				30	
1,3-Dichlorobenzene	ND	0.5	ug/L	ND				30	
1,4-Dichlorobenzene	ND	0.5	ug/L	ND				30	
1,1-Dichloroethane	ND	0.5	ug/L	ND				30	
1,2-Dichloroethane	ND	0.5	ug/L	ND				30	
1,1-Dichloroethylene	ND	0.5	ug/L	ND				30	
cis-1,2-Dichloroethylene	ND	0.5	ug/L	ND				30	
trans-1,2-Dichloroethylene	ND	0.5	ug/L	ND				30	
1,2-Dichloropropane	ND	0.5	ug/L	ND				30	
cis-1,3-Dichloropropylene	ND	0.5	ug/L	ND				30	
trans-1,3-Dichloropropylene	ND	0.5	ug/L	ND				30	
Ethylbenzene	ND	0.5	ug/L	ND				30	
Ethylene dibromide (dibromoethane)	ND	0.2	ug/L	ND				30	
Hexane	ND	1.0	ug/L	ND				30	
Methyl Ethyl Ketone (2-Butanone)	ND	5.0	ug/L	ND				30	
Methyl Isobutyl Ketone	ND	5.0	ug/L	ND				30	
Methyl tert-butyl ether	ND	2.0	ug/L	ND				30	
Methylene Chloride	ND	5.0	ug/L	ND				30	
Styrene	ND	0.5	ug/L	ND				30	
1,1,1,2-Tetrachloroethane	ND	0.5	ug/L	ND				30	
1,1,2,2-Tetrachloroethane	ND	0.5	ug/L	ND				30	
Tetrachloroethylene	ND	0.5	ug/L	ND				30	
Toluene	ND	0.5	ug/L	ND				30	
1,1,1-Trichloroethane	ND	0.5	ug/L	ND				30	
1,1,2-Trichloroethane	ND	0.5	ug/L	ND				30	
Trichloroethylene	ND	0.5	ug/L	ND				30	
Trichlorofluoromethane	ND	1.0	ug/L	ND				30	
Vinyl chloride	ND	0.5	ug/L	ND				30	
m,p-Xylenes	ND	0.5	ug/L	ND				30	
o-Xylene	ND	0.5	ug/L	ND				30	
Surrogate: 4-Bromofluorobenzene	92.6		ug/L	ND	116	50-140			
Surrogate: Dibromofluoromethane	73.1		ug/L	ND	91.4	50-140			
Surrogate: Toluene-d8	91.8		ug/L	ND	115	50-140			

**Certificate of Analysis**

 Client: Paterson Group Consulting Engineers  
 Client PO: 17228

 Report Date: 24-Jul-2015  
 Order Date: 20-Jul-2015  
 Project Description: PE3533

**Method Quality Control: Spike**

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
<b>Hydrocarbons</b>									
F1 PHCs (C6-C10)	1840	25	ug/L	ND	91.9	68-117			
F2 PHCs (C10-C16)	1030	100	ug/L	ND	57.1	60-140			QS-02
F3 PHCs (C16-C34)	3310	100	ug/L	ND	89.0	60-140			
F4 PHCs (C34-C50)	2540	100	ug/L	ND	102	60-140			
<b>Volatiles</b>									
Acetone	117	5.0	ug/L	ND	117	50-140			
Benzene	49.6	0.5	ug/L	ND	124	50-140			
Bromodichloromethane	48.5	0.5	ug/L	ND	121	50-140			
Bromoform	53.6	0.5	ug/L	ND	134	50-140			
Bromomethane	45.7	0.5	ug/L	ND	114	50-140			
Carbon Tetrachloride	56.8	0.2	ug/L	ND	142	50-140			
Chlorobenzene	47.8	0.5	ug/L	ND	119	50-140			
Chloroform	52.6	0.5	ug/L	ND	131	50-140			
Dibromochloromethane	51.5	0.5	ug/L	ND	129	50-140			
Dichlorodifluoromethane	40.7	1.0	ug/L	ND	102	50-140			
1,2-Dichlorobenzene	57.1	0.5	ug/L	ND	143	50-140			
1,3-Dichlorobenzene	55.3	0.5	ug/L	ND	138	50-140			
1,4-Dichlorobenzene	56.4	0.5	ug/L	ND	141	50-140			
1,1-Dichloroethane	51.4	0.5	ug/L	ND	128	50-140			
1,2-Dichloroethane	53.6	0.5	ug/L	ND	134	50-140			
1,1-Dichloroethylene	50.6	0.5	ug/L	ND	126	50-140			
cis-1,2-Dichloroethylene	50.1	0.5	ug/L	ND	125	50-140			
trans-1,2-Dichloroethylene	50.2	0.5	ug/L	ND	125	50-140			
1,2-Dichloropropane	50.4	0.5	ug/L	ND	126	50-140			
cis-1,3-Dichloropropylene	30.9	0.5	ug/L	ND	77.2	50-140			
trans-1,3-Dichloropropylene	36.5	0.5	ug/L	ND	91.2	50-140			
Ethylbenzene	52.6	0.5	ug/L	ND	131	50-140			
Ethylene dibromide (dibromoethane)	54.4	0.2	ug/L	ND	136	50-140			
Hexane	50.8	1.0	ug/L	ND	127	50-140			
Methyl Ethyl Ketone (2-Butanone)	116	5.0	ug/L	ND	116	50-140			
Methyl Isobutyl Ketone	133	5.0	ug/L	ND	133	50-140			
Methyl tert-butyl ether	115	2.0	ug/L	ND	115	50-140			
Methylene Chloride	47.4	5.0	ug/L	ND	118	50-140			
Styrene	52.2	0.5	ug/L	ND	131	50-140			
1,1,1,2-Tetrachloroethane	54.7	0.5	ug/L	ND	137	50-140			
1,1,2,2-Tetrachloroethane	57.4	0.5	ug/L	ND	143	50-140			
Tetrachloroethylene	50.2	0.5	ug/L	ND	125	50-140			
Toluene	50.3	0.5	ug/L	ND	126	50-140			
1,1,1-Trichloroethane	52.8	0.5	ug/L	ND	132	50-140			
1,1,2-Trichloroethane	51.0	0.5	ug/L	ND	128	50-140			
Trichloroethylene	43.6	0.5	ug/L	ND	109	50-140			
Trichlorofluoromethane	55.5	1.0	ug/L	ND	139	50-140			
Vinyl chloride	47.0	0.5	ug/L	ND	118	50-140			
m,p-Xylenes	105	0.5	ug/L	ND	132	50-140			
o-Xylene	53.6	0.5	ug/L	ND	134	50-140			
Surrogate: 4-Bromofluorobenzene	71.7		ug/L		89.6	50-140			

Certificate of Analysis

Client: Paterson Group Consulting Engineers  
Client PO: 17228

Report Date: 24-Jul-2015  
Order Date: 20-Jul-2015  
Project Description: PE3533

**Qualifier Notes:**

**QC Qualifiers :**

QS-02 : Spike level outside of control limits. Analysis batch accepted based on other QC included in the batch.

**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.

*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.

Client Name: <b>PATERSON GROUP</b>	Project Reference: <b>PE3533</b>	TAT: <input checked="" type="checkbox"/> Regular <input type="checkbox"/> 3 Day
Contact Name: <b>MARK D'ARCY</b>	Quote # <del>1728</del>	<input type="checkbox"/> 2 Day <input type="checkbox"/> 1 Day
Address: <b>154 COLONNADE RD. S. OTTAWA, ON</b>	PO # <b>1728</b>	Date Required: _____
Telephone: <b>813-266-7381</b>	Email Address: <b>mdarcy@patersongroup.ca</b>	

Criteria:  O. Reg. 153/04 (As Amended) Table \_\_\_  RSC Filing  O. Reg. 558/00  PWQO  CCME  SUB (Storm)  SUB (Sanitary) Municipality: \_\_\_\_\_  Other: \_\_\_\_\_

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

**Required Analyses**

Paracel Order Number: <b>1530099</b>		Matrix	Air Volume	# of Containers	Sample Taken		PHCs F1-F4+BTEX	VOCs	PAHs	Metals by ICP	Hg	CrVI	B (HWS)							
Sample ID/Location Name					Date	Time														
1	BH3-GW2	GW		3	July 20/15		✓	✓												
2	BH7-GW1	GW		3	"		✓	✓												
3	BH6-GW1	GW		3	"		✓	✓												
4	BH5-GW1	GW		3	"		✓	✓												
5																				
6																				
7																				
8																				
9																				
10																				

Comments: \_\_\_\_\_ Method of Delivery: **Walkin**

Relinquished By (Sign):	Received by Driver/Depot:	Received at Lab: <b>D. Cherebois</b>	Verified By: <b>D. Cherebois</b>
Relinquished By (Print):	Date/Time:	Date/Time: <b>July 20 5:52</b>	Date/Time: <b>July 21 9:49</b>
Date/Time:	Temperature: _____ °C	Temperature: <b>8.4</b> °C	pH Verified By: <b>DKR</b>

## *Certificate of Analysis*

### **Paterson Group Consulting Engineers**

154 Colonnade Road South  
Nepean, ON K2E 7J5

Attn: Mark D'Arcy

Client PO: 17207

Project: PE3533

Custody: 21463

Phone: (613) 226-7381

Fax: (613) 226-6344

Report Date: 14-May-2015

Order Date: 8-May-2015

**Order #: 1519389**

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

<b>Paracel ID</b>	<b>Client ID</b>
1519389-01	BH2-SS2
1519389-02	BH3-SS1

Approved By:



Mark Foto, M.Sc. For Dale Robertson, BSc  
Laboratory Director

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 circumstances be liable to you in connection with this work

**Certificate of Analysis**

Report Date: 14-May-2015

Order Date: 8-May-2015

Client: **Paterson Group Consulting Engineers**

Client PO: 17207

Project Description: PE3533

**Analysis Summary Table**

Analysis	Method Reference/Description	Extraction Date	Analysis Date
BTEX by P&T GC-MS	EPA 8260 - P&T GC-MS	8-May-15	12-May-15
PHC F1	CWS Tier 1 - P&T GC-FID	8-May-15	12-May-15
PHC F2 - F4	CWS Tier 1 - GC-FID, extraction	11-May-15	12-May-15
Solids, %	Gravimetric, calculation	11-May-15	11-May-15

P: 1-800-749-1947  
E: PARACEL@PARACELLABS.COM

WWW.PARACELLABS.COM

**OTTAWA - EAST**  
300-2319 St. Laurent Blvd.  
Ottawa, ON K1G 4J8

**OTTAWA - WEST**  
104-195 Stafford Rd. W.  
Nepean, ON K2H 9C1

**MISSISSAUGA**  
6645 Kitimat Rd. Unit #27  
Mississauga, ON L5N 6J3

**SARNIA**  
218-704 Mara St.  
Point Edward, ON N7V 1X4

**NIAGARA**  
360 York Rd. Unit 16B  
Niagara-on-the-Lake, ON L0S 1J0

**KINGSTON**  
1058 Gardiners Rd.  
Kingston, ON K7P 1R7

**Certificate of Analysis**

Report Date: 14-May-2015

Order Date: 8-May-2015

 Client: **Paterson Group Consulting Engineers**

Client PO: 17207

Project Description: PE3533

<b>Client ID:</b>	BH2-SS2	BH3-SS1	-	-
<b>Sample Date:</b>	08-May-15	08-May-15	-	-
<b>Sample ID:</b>	1519389-01	1519389-02	-	-
<b>MDL/Units</b>	Soil	Soil	-	-

**Physical Characteristics**

% Solids	0.1 % by Wt.	96.5	76.1	-	-
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**Volatiles**

Benzene	0.02 ug/g dry	<0.02	<0.02	-	-
Ethylbenzene	0.05 ug/g dry	<0.05	<0.05	-	-
Toluene	0.05 ug/g dry	<0.05	<0.05	-	-
m,p-Xylenes	0.05 ug/g dry	<0.05	<0.05	-	-
o-Xylene	0.05 ug/g dry	<0.05	<0.05	-	-
Xylenes, total	0.05 ug/g dry	<0.05	<0.05	-	-
Toluene-d8	Surrogate	101%	103%	-	-

**Hydrocarbons**

F1 PHCs (C6-C10)	7 ug/g dry	<7	<7	-	-
F2 PHCs (C10-C16)	4 ug/g dry	<4	<4	-	-
F3 PHCs (C16-C34)	8 ug/g dry	113	9	-	-
F4 PHCs (C34-C50)	6 ug/g dry	458	29	-	-

**Certificate of Analysis**

Report Date: 14-May-2015

Order Date: 8-May-2015

Client: **Paterson Group Consulting Engineers**

Client PO: 17207

Project Description: PE3533

**Method Quality Control: Blank**

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
<b>Hydrocarbons</b>									
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						
<b>Volatiles</b>									
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	8.41		ug/g		105	50-140			

**Certificate of Analysis**

Report Date: 14-May-2015

Order Date: 8-May-2015

Client: Paterson Group Consulting Engineers

Client PO: 17207

Project Description: PE3533

**Method Quality Control: Duplicate**

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
<b>Hydrocarbons</b>									
F1 PHCs (C6-C10)	ND	7	ug/g dry	ND				40	
F2 PHCs (C10-C16)	ND	4	ug/g dry	ND				30	
F3 PHCs (C16-C34)	ND	8	ug/g dry	ND				30	
F4 PHCs (C34-C50)	ND	6	ug/g dry	ND				30	
<b>Physical Characteristics</b>									
% Solids	93.7	0.1	% by Wt.	96.5			3.0	25	
<b>Volatiles</b>									
Benzene	ND	0.02	ug/g dry	ND				50	
Ethylbenzene	ND	0.05	ug/g dry	ND				50	
Toluene	ND	0.05	ug/g dry	ND				50	
m,p-Xylenes	ND	0.05	ug/g dry	ND				50	
o-Xylene	ND	0.05	ug/g dry	ND				50	
Surrogate: Toluene-d8	4.81		ug/g dry	ND	105	50-140			

**Certificate of Analysis**

Report Date: 14-May-2015  
Order Date: 8-May-2015

Client: **Paterson Group Consulting Engineers**  
Client PO: 17207

Project Description: PE3533

**Method Quality Control: Spike**

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
<b>Hydrocarbons</b>									
F1 PHCs (C6-C10)	194	7	ug/g	ND	96.9	80-120			
F2 PHCs (C10-C16)	106	4	ug/g	ND	101	60-140			
F3 PHCs (C16-C34)	270	8	ug/g	ND	124	60-140			
F4 PHCs (C34-C50)	171	6	ug/g	ND	118	60-140			
<b>Volatiles</b>									
Benzene	3.64	0.02	ug/g	ND	91.0	60-130			
Ethylbenzene	3.69	0.05	ug/g	ND	92.1	60-130			
Toluene	3.91	0.05	ug/g	ND	97.8	60-130			
m,p-Xylenes	7.28	0.05	ug/g	ND	91.0	60-130			
o-Xylene	4.02	0.05	ug/g	ND	100	60-130			
Surrogate: Toluene-d8	7.59		ug/g		94.9	50-140			

**Certificate of Analysis**

Report Date: 14-May-2015

Client: Paterson Group Consulting Engineers

Order Date: 8-May-2015

Client PO: 17207

Project Description: PE3533

**Qualifier Notes:**

None

**Sample Data Revisions**

None

**Work Order Revisions / Comments:**

None

**Other Report Notes:**

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

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

*CCME PHC additional information:*

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

P: 1-800-749-1947  
E: PARACEL@PARACELLABS.COM

WWW.PARACELLABS.COM

**OTTAWA - EAST**  
300-2319 St. Laurent Blvd.  
Ottawa, ON K1G 4J8

**OTTAWA - WEST**  
104-195 Stafford Rd. W.  
Nepean, ON K2H 9C1

**MISSISSAUGA**  
6645 Kitimat Rd. Unit #27  
Mississauga, ON L5N 6J3

**SARNIA**  
218-704 Mara St.  
Point Edward, ON N7V 1X4

**NIAGARA**  
360 York Rd. Unit 16B  
Niagara-on-the-Lake, ON L0S 1J0

**KINGSTON**  
1058 Gardiners Rd.  
Kingston, ON K7P 1R7

Client Name: <u>PATERSON Group</u>	Project Reference: <u>PE3533</u>	TAT: <input checked="" type="checkbox"/> Regular <input type="checkbox"/> 3 Day
Contact Name: <u>MARK DARCY</u>	Quote #	<input type="checkbox"/> 2 Day <input type="checkbox"/> 1 Day
Address: <u>154 COLONNADE ROAD SOUTH</u>	PO # <u>17207</u>	Date Required: _____
Telephone: <u>(613) 226-7381</u>	Email Address: <u>MDARCY@PATERSONGROUP.CA</u> <u>SMOGLIO@PATERSONGROUP.CA</u>	

Criteria:  O. Reg. 153/04 (As Amended) Table 7  RSC Filing  O. Reg. 558/00  PWQO  CCME  SUB (Storm)  SUB (Sanitary) Municipality: \_\_\_\_\_  Other: \_\_\_\_\_

Matrix Type: S (Soil/Sed.) GW (Ground Water) SW (Surface Water) SS (Storm Sanitary Sewer) P (Paint) A (Air) O (Other)				Required Analyses											
Parcel Order Number: <u>1519389</u>		Matrix	Air Volume	# of Containers	Sample Taken		BTX	PCG (F-F)							
Sample ID/Location Name					Date	Time									
1	<u>BH2-SS2</u>	<u>S</u>		<u>2</u>	<u>MAY 8/15</u>		<u>X</u>	<u>X</u>							<u>-120ml + 1 vial -</u>
2	<u>BH3-SS1</u>	<u>S</u>		<u>2</u>	<u>" " "</u>		<u>X</u>	<u>X</u>							<u>V</u>
3															
4															
5															
6															
7															
8															
9															
10															

Comments:			Method of Delivery: <u>Paracel Courier</u>		
Relinquished By (Sign): <u>[Signature]</u>	Received by Driver/Depot: <u>[Signature]</u>	Received at Lab: <u>SUNDEPORN DAKMAS</u>	Verified By: <u>[Signature]</u>		
Relinquished By (Print): <u>SEAN MULLER 1062</u>	Date/Time: <u>08/05/15 3:25PM</u>	Date/Time: <u>MAY 08, 2015 04:25</u>	Date/Time: <u>MAY 8/15</u>		
Date/Time: <u>MAY 8, 2015 - 3:20PM</u>	Temperature: _____ °C	Temperature: <u>21.7 °C</u>	pH Verified   By: <u>N/A</u>		

4:34p

## Certificate of Analysis

Paterson Group Consulting Engineers

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

Client PO: 18037  
Project: PE3533  
Custody: 104855

Report Date: 21-Jul-2015  
Order Date: 15-Jul-2015

**Order #: 1529206**

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

Parcel ID	Client ID
1529206-01	BH6-GR2
1529206-02	BH7-GR2

Approved By:



Mark Foto, M.Sc.  
Lab Supervisor

## Analysis Summary Table

Analysis	Method Reference/Description	Extraction Date	Analysis Date
BTEX by P&T GC-MS	EPA 8260 - P&T GC-MS	16-Jul-15	17-Jul-15
MOE Metals by ICP-OES, soil Reg 153	based on MOE E3470, ICP-OES	20-Jul-15	20-Jul-15
PHC F1	CWS Tier 1 - P&T GC-FID	16-Jul-15	17-Jul-15
PHC F2 - F4	CWS Tier 1 - GC-FID, extraction	16-Jul-15	16-Jul-15
Solids, %	Gravimetric, calculation	16-Jul-15	16-Jul-15

<b>Client ID:</b>	BH6-GR2	BH7-GR2	-	-
<b>Sample Date:</b>	13-Jul-15	14-Jul-15	-	-
<b>Sample ID:</b>	1529206-01	1529206-02	-	-
<b>MDL/Units</b>	Soil	Soil	-	-

**Physical Characteristics**

% Solids	0.1 % by Wt.	82.7	90.2	-	-
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**Metals**

Antimony	1.0 ug/g dry	<1.0	<1.0	-	-
Arsenic	1.0 ug/g dry	4.4	10.5	-	-
Barium	1.0 ug/g dry	92.4	62.8	-	-
Beryllium	1.0 ug/g dry	<1.0	<1.0	-	-
Boron	1.0 ug/g dry	13.4	3.4	-	-
Cadmium	0.5 ug/g dry	<0.5	<0.5	-	-
Chromium	1.0 ug/g dry	16.9	18.7	-	-
Cobalt	1.0 ug/g dry	5.8	4.6	-	-
Copper	1.0 ug/g dry	11.3	10.2	-	-
Lead	1.0 ug/g dry	30.1	57.3	-	-
Molybdenum	1.0 ug/g dry	<1.0	<1.0	-	-
Nickel	1.0 ug/g dry	10.8	9.2	-	-
Selenium	1.0 ug/g dry	<1.0	<1.0	-	-
Silver	0.5 ug/g dry	<0.5	<0.5	-	-
Thallium	1.0 ug/g dry	<1.0	<1.0	-	-
Uranium	1.0 ug/g dry	<1.0	<1.0	-	-
Vanadium	1.0 ug/g dry	22.0	31.1	-	-
Zinc	1.0 ug/g dry	64.7	42.7	-	-

**Volatiles**

Benzene	0.02 ug/g dry	<0.02	<0.02	-	-
Ethylbenzene	0.05 ug/g dry	<0.05	<0.05	-	-
Toluene	0.05 ug/g dry	<0.05	<0.05	-	-
m,p-Xylenes	0.05 ug/g dry	<0.05	<0.05	-	-
o-Xylene	0.05 ug/g dry	<0.05	<0.05	-	-
Xylenes, total	0.05 ug/g dry	<0.05	<0.05	-	-
Toluene-d8	Surrogate	98.1%	98.8%	-	-

**Hydrocarbons**

F1 PHCs (C6-C10)	7 ug/g dry	<7	<7	-	-
F2 PHCs (C10-C16)	4 ug/g dry	<4	<4	-	-
F3 PHCs (C16-C34)	8 ug/g dry	<8	66	-	-
F4 PHCs (C34-C50)	6 ug/g dry	<6	142	-	-

**Method Quality Control: Blank**

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
<b>Hydrocarbons</b>									
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						
<b>Metals</b>									
Antimony	ND	1.0	ug/g						
Arsenic	ND	1.0	ug/g						
Barium	ND	1.0	ug/g						
Beryllium	ND	1.0	ug/g						
Boron	ND	1.0	ug/g						
Cadmium	ND	0.5	ug/g						
Chromium	ND	1.0	ug/g						
Cobalt	ND	1.0	ug/g						
Copper	ND	1.0	ug/g						
Lead	ND	1.0	ug/g						
Molybdenum	ND	1.0	ug/g						
Nickel	ND	1.0	ug/g						
Selenium	ND	1.0	ug/g						
Silver	ND	0.5	ug/g						
Thallium	ND	1.0	ug/g						
Uranium	ND	1.0	ug/g						
Vanadium	ND	1.0	ug/g						
Zinc	ND	1.0	ug/g						
<b>Volatiles</b>									
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	8.08		ug/g		101	50-140			

**Method Quality Control: Duplicate**

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
<b>Hydrocarbons</b>									
F1 PHCs (C6-C10)	ND	7	ug/g dry	ND				40	
<b>Metals</b>									
Antimony	ND	1.0	ug/g dry	ND				30	
Arsenic	3.05	1.0	ug/g dry	3.46			12.6	30	
Barium	164	1.0	ug/g dry	169			3.3	30	
Beryllium	ND	1.0	ug/g dry	ND			0.0	30	
Boron	9.88	1.0	ug/g dry	10.7			8.3	30	
Cadmium	ND	0.5	ug/g dry	ND			0.0	30	
Chromium	34.5	1.0	ug/g dry	35.9			3.8	30	
Cobalt	10.4	1.0	ug/g dry	10.6			2.4	30	
Copper	25.3	1.0	ug/g dry	26.3			4.0	30	
Lead	9.42	1.0	ug/g dry	9.50			0.8	30	
Molybdenum	ND	1.0	ug/g dry	ND			0.0	30	
Nickel	22.9	1.0	ug/g dry	23.4			2.0	30	
Selenium	ND	1.0	ug/g dry	ND				30	
Silver	ND	0.5	ug/g dry	ND			0.0	30	
Thallium	ND	1.0	ug/g dry	ND				30	
Uranium	ND	1.0	ug/g dry	ND				30	
Vanadium	44.9	1.0	ug/g dry	46.7			4.0	30	
Zinc	69.6	1.0	ug/g dry	71.5			2.8	30	
<b>Physical Characteristics</b>									
% Solids	64.5	0.1	% by Wt.	70.9			9.5	25	
<b>Volatiles</b>									
Benzene	ND	0.02	ug/g dry	ND				50	
Ethylbenzene	ND	0.05	ug/g dry	ND				50	
Toluene	ND	0.05	ug/g dry	ND				50	
m,p-Xylenes	ND	0.05	ug/g dry	ND				50	
o-Xylene	ND	0.05	ug/g dry	ND				50	
Surrogate: Toluene-d8	5.93		ug/g dry	ND	100	50-140			

**Method Quality Control: Spike**

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
<b>Hydrocarbons</b>									
F1 PHCs (C6-C10)	187	7	ug/g	ND	93.3	80-120			
F2 PHCs (C10-C16)	109	4	ug/g	ND	100	60-140			
F3 PHCs (C16-C34)	225	8	ug/g	ND	100	60-140			
F4 PHCs (C34-C50)	140	6	ug/g	ND	93.5	60-140			
<b>Metals</b>									
Antimony	303		ug/L	ND	121	70-130			
Arsenic	340		ug/L	69.2	108	70-130			
Barium	269		ug/L	ND	108	70-130			
Beryllium	256		ug/L	ND	103	70-130			
Boron	470		ug/L	215	102	70-130			
Cadmium	244		ug/L	4.68	95.6	70-130			
Chromium	925		ug/L	717	83.1	70-130			
Cobalt	428		ug/L	213	86.3	70-130			
Copper	752		ug/L	526	90.2	70-130			
Lead	405		ug/L	190	86.1	70-130			
Molybdenum	259		ug/L	17.7	96.4	70-130			
Nickel	673		ug/L	468	82.1	70-130			
Selenium	215		ug/L	ND	86.0	70-130			
Silver	232		ug/L	0.08	92.8	70-130			
Thallium	219		ug/L	ND	87.5	70-130			
Uranium	226		ug/L	ND	90.4	70-130			
Vanadium	1130		ug/L	935	76.8	70-130			
Zinc	1570		ug/L	1430	56.6	70-130			QM-4X
<b>Volatiles</b>									
Benzene	4.03	0.02	ug/g	ND	101	60-130			
Ethylbenzene	4.00	0.05	ug/g	ND	100	60-130			
Toluene	3.99	0.05	ug/g	ND	99.8	60-130			
m,p-Xylenes	7.54	0.05	ug/g	ND	94.3	60-130			
o-Xylene	3.73	0.05	ug/g	ND	93.3	60-130			
Surrogate: Toluene-d8	6.82		ug/g		85.3	50-140			

**Qualifier Notes:**

**QC Qualifiers :**

QM-4X : The spike recovery was outside of QC acceptance limits due to elevated analyte concentration.

**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.

Soil results are reported on a dry weight basis when the units are denoted with 'dry'.

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

*CCME PHC additional information:*

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

Client Name: PATERSON Group INC Project Reference: PE3533  
 Contact Name: MARK D'ARCY Quote #  
 Address: 154 COLONNADE ROAD SOUTH PO # 18037  
 Telephone: 613 7226 7381 Email Address: MDARCY@PATERSONGROUP.CA  
SMOCCRODGE@PATERSONGROUP.CA

TAT:  Regular  3 Day  
 2 Day  1 Day  
 Date Required: \_\_\_\_\_

Criteria:  O. Reg. 153/04 (As Amended) Table 7  RSC Filing  O. Reg. 558/00  PWQO  CCME  SUB (Storm)  SUB (Sanitary) Municipality: \_\_\_\_\_  Other: \_\_\_\_\_

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

Sample ID/Location Name	Matrix	Air Volume	# of Containers	Sample Taken		PHCs F1-F4+BTEX	VOCs	PAHs	Metals by ICP				B (HWS)
				Date	Time				Hg	CrVI			
1 BH6-GR2	S		2	July 13/15		X			X				
2 BH7-GR2	S		2	July 14/15		X			X				
3													
4													
5													
6													
7													
8													
9													
10													

Comments: \_\_\_\_\_ Method of Delivery: Paracel

Relinquished By (Sign):	Received by Driver/Depot: <u>M. FLOUVE</u>	Received at Lab: <u>SUREPOIN DOKMAI</u>	Verified By: <u>D. Charlebois</u>
Relinquished By (Print): <u>SEAN MCKEOWN</u>	Date/Time: <u>15/07/15 12:05 PM</u>	Date/Time: <u>JUL 16 2015 01:55</u>	Date/Time: <u>JUL 15 2015 02:02</u>
Date/Time: <u>July 15, 2015 - 10:30 AM</u>	Temperature: _____ °C	Temperature: <u>19.9 °C</u>	pH Verified: <u>NA</u>

## Certificate of Analysis

Paterson Group Consulting Engineers

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

Client PO: 25113  
Project: PE4425  
Custody: 119355

Report Date: 30-Oct-2018  
Order Date: 24-Oct-2018

**Order #: 1843421**

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

<b>Parcel ID</b>	<b>Client ID</b>
1843421-01	BH8-SS2
1843421-02	BH8-SS3
1843421-03	BH9-AU1

Approved By:



Mark Foto, M.Sc.  
Lab Supervisor

Certificate of Analysis  
**Client: Paterson Group Consulting Engineers**  
**Client PO: 25113**

Report Date: 30-Oct-2018

Order Date: 24-Oct-2018

**Project Description: PE4425**

### Analysis Summary Table

Analysis	Method Reference/Description	Extraction Date	Analysis Date
Boron, available	MOE (HWE), EPA 200.7 - ICP-OES	26-Oct-18	29-Oct-18
BTEX by P&T GC-MS	EPA 8260 - P&T GC-MS	26-Oct-18	30-Oct-18
Chromium, hexavalent - soil	MOE E3056 - Extraction, colourimetric	25-Oct-18	29-Oct-18
Mercury by CVAA	EPA 7471B - CVAA, digestion	29-Oct-18	29-Oct-18
PHC F1	CWS Tier 1 - P&T GC-FID	26-Oct-18	30-Oct-18
PHCs F2 to F4	CWS Tier 1 - GC-FID, extraction	25-Oct-18	27-Oct-18
REG 153: Metals by ICP/MS, soil	EPA 6020 - Digestion - ICP-MS	26-Oct-18	26-Oct-18
Solids, %	Gravimetric, calculation	26-Oct-18	26-Oct-18

Certificate of Analysis  
 Client: Paterson Group Consulting Engineers  
 Client PO: 25113

Report Date: 30-Oct-2018

Order Date: 24-Oct-2018

Project Description: PE4425

<b>Client ID:</b>	BH8-SS2	BH8-SS3	BH9-AU1	-
<b>Sample Date:</b>	10/22/2018 09:00	10/22/2018 09:00	10/22/2018 09:00	-
<b>Sample ID:</b>	1843421-01	1843421-02	1843421-03	-
<b>MDL/Units</b>	Soil	Soil	Soil	-

**Physical Characteristics**

% Solids	0.1 % by Wt.	91.4	93.5	94.6	-
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**Metals**

Antimony	1.0 ug/g dry	<1.0	-	<1.0	-
Arsenic	1.0 ug/g dry	1.8	-	8.8	-
Barium	1.0 ug/g dry	78.0	-	122	-
Beryllium	0.5 ug/g dry	<0.5	-	<0.5	-
Boron	5.0 ug/g dry	<5.0	-	6.5	-
Boron, available	0.5 ug/g dry	<0.5	-	<0.5	-
Cadmium	0.5 ug/g dry	<0.5	-	0.6	-
Chromium	5.0 ug/g dry	14.4	-	22.4	-
Chromium (VI)	0.2 ug/g dry	<0.2	-	<0.2	-
Cobalt	1.0 ug/g dry	4.0	-	5.8	-
Copper	5.0 ug/g dry	7.0	-	17.4	-
Lead	1.0 ug/g dry	6.6	-	47.4	-
Mercury	0.1 ug/g dry	<0.1	-	<0.1	-
Molybdenum	1.0 ug/g dry	<1.0	-	1.3	-
Nickel	5.0 ug/g dry	9.4	-	13.5	-
Selenium	1.0 ug/g dry	<1.0	-	<1.0	-
Silver	0.3 ug/g dry	<0.3	-	<0.3	-
Thallium	1.0 ug/g dry	<1.0	-	<1.0	-
Uranium	1.0 ug/g dry	<1.0	-	<1.0	-
Vanadium	10.0 ug/g dry	23.3	-	28.8	-
Zinc	20.0 ug/g dry	20.4	-	73.7	-

**Volatiles**

Benzene	0.02 ug/g dry	-	<0.02	<0.02	-
Ethylbenzene	0.05 ug/g dry	-	<0.05	<0.05	-
Toluene	0.05 ug/g dry	-	<0.05	<0.05	-
m,p-Xylenes	0.05 ug/g dry	-	<0.05	<0.05	-
o-Xylene	0.05 ug/g dry	-	<0.05	<0.05	-
Xylenes, total	0.05 ug/g dry	-	<0.05	<0.05	-
Toluene-d8	Surrogate	-	97.5%	96.0%	-

**Hydrocarbons**

F1 PHCs (C6-C10)	7 ug/g dry	-	<7	<7	-
F2 PHCs (C10-C16)	4 ug/g dry	-	149	<4	-
F3 PHCs (C16-C34)	8 ug/g dry	-	180	58	-

Certificate of Analysis  
 Client: Paterson Group Consulting Engineers  
 Client PO: 25113

Report Date: 30-Oct-2018

Order Date: 24-Oct-2018

Project Description: PE4425

	Client ID:	BH8-SS2	BH8-SS3	BH9-AU1	-
	Sample Date:	10/22/2018 09:00	10/22/2018 09:00	10/22/2018 09:00	-
	Sample ID:	1843421-01	1843421-02	1843421-03	-
	MDL/Units	Soil	Soil	Soil	-
F4 PHCs (C34-C50)	6 ug/g dry	-	<6	65	-

Certificate of Analysis  
 Client: Paterson Group Consulting Engineers  
 Client PO: 25113

Report Date: 30-Oct-2018

Order Date: 24-Oct-2018

Project Description: PE4425

**Method Quality Control: Blank**

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
<b>Hydrocarbons</b>									
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						
<b>Metals</b>									
Antimony	ND	1.0	ug/g						
Arsenic	ND	1.0	ug/g						
Barium	ND	1.0	ug/g						
Beryllium	ND	0.5	ug/g						
Boron, available	ND	0.5	ug/g						
Boron	ND	5.0	ug/g						
Cadmium	ND	0.5	ug/g						
Chromium (VI)	ND	0.2	ug/g						
Chromium	ND	5.0	ug/g						
Cobalt	ND	1.0	ug/g						
Copper	ND	5.0	ug/g						
Lead	ND	1.0	ug/g						
Mercury	ND	0.1	ug/g						
Molybdenum	ND	1.0	ug/g						
Nickel	ND	5.0	ug/g						
Selenium	ND	1.0	ug/g						
Silver	ND	0.3	ug/g						
Thallium	ND	1.0	ug/g						
Uranium	ND	1.0	ug/g						
Vanadium	ND	10.0	ug/g						
Zinc	ND	20.0	ug/g						
<b>Volatiles</b>									
Benzene	ND	0.02	ug/g						
Ethylbenzene	ND	0.05	ug/g						
Toluene	ND	0.05	ug/g						
m,p-Xylenes	ND	0.05	ug/g						
o-Xylene	ND	0.05	ug/g						
Xylenes, total	ND	0.05	ug/g						
Surrogate: Toluene-d8	3.34		ug/g		104	50-140			

Certificate of Analysis  
 Client: Paterson Group Consulting Engineers  
 Client PO: 25113

Report Date: 30-Oct-2018

Order Date: 24-Oct-2018

Project Description: PE4425

**Method Quality Control: Duplicate**

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
<b>Hydrocarbons</b>									
F1 PHCs (C6-C10)	ND	7	ug/g dry	ND				40	
F2 PHCs (C10-C16)	ND	4	ug/g dry	4			0.0	30	
F3 PHCs (C16-C34)	80	8	ug/g dry	108			29.8	30	
F4 PHCs (C34-C50)	195	6	ug/g dry	311			45.8	30	QR-04
<b>Metals</b>									
Antimony	ND	1.0	ug/g dry	ND			0.0	30	
Arsenic	1.5	1.0	ug/g dry	1.4			5.2	30	
Barium	177	1.0	ug/g dry	180			1.3	30	
Beryllium	ND	0.5	ug/g dry	ND			0.0	30	
Boron, available	1.27	0.5	ug/g dry	1.24			2.4	35	
Boron	17.1	5.0	ug/g dry	15.5			10.3	30	
Cadmium	ND	0.5	ug/g dry	ND			0.0	30	
Chromium (VI)	ND	0.2	ug/g dry	ND				35	
Chromium	10.7	5.0	ug/g dry	11.0			3.4	30	
Cobalt	4.1	1.0	ug/g dry	4.0			3.0	30	
Copper	6.5	5.0	ug/g dry	6.0			8.1	30	
Lead	8.5	1.0	ug/g dry	8.2			3.8	30	
Mercury	ND	0.1	ug/g dry	ND			0.0	30	
Molybdenum	ND	1.0	ug/g dry	ND			0.0	30	
Nickel	10.0	5.0	ug/g dry	10.0			0.2	30	
Selenium	ND	1.0	ug/g dry	ND			0.0	30	
Silver	ND	0.3	ug/g dry	ND			0.0	30	
Thallium	ND	1.0	ug/g dry	ND			0.0	30	
Uranium	ND	1.0	ug/g dry	ND			0.0	30	
Vanadium	13.3	10.0	ug/g dry	13.7			2.6	30	
Zinc	ND	20.0	ug/g dry	ND			0.0	30	
<b>Physical Characteristics</b>									
% Solids	78.2	0.1	% by Wt.	76.1			2.7	25	
<b>Volatiles</b>									
Benzene	ND	0.02	ug/g dry	ND				50	
Ethylbenzene	ND	0.05	ug/g dry	ND				50	
Toluene	ND	0.05	ug/g dry	ND				50	
m,p-Xylenes	ND	0.05	ug/g dry	ND				50	
o-Xylene	ND	0.05	ug/g dry	ND				50	
Surrogate: Toluene-d8	4.57		ug/g dry		106	50-140			

Certificate of Analysis  
 Client: Paterson Group Consulting Engineers  
 Client PO: 25113

Report Date: 30-Oct-2018

Order Date: 24-Oct-2018

Project Description: PE4425

**Method Quality Control: Spike**

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
<b>Hydrocarbons</b>									
F1 PHCs (C6-C10)	205	7	ug/g		103	80-120			
F2 PHCs (C10-C16)	99	4	ug/g	4	109	60-140			
F3 PHCs (C16-C34)	404	8	ug/g	108	140	60-140			
F4 PHCs (C34-C50)	565	6	ug/g	311	189	60-140			QM-06
<b>Metals</b>									
Antimony	44.5		ug/L	ND	88.7	70-130			
Arsenic	47.5		ug/L	ND	93.8	70-130			
Barium	124		ug/L	71.9	104	70-130			
Beryllium	47.0		ug/L	ND	93.9	70-130			
Boron, available	4.45	0.5	ug/g		88.9	70-122			
Boron	50.2		ug/L	6.2	88.1	70-130			
Cadmium	46.3		ug/L	ND	92.5	70-130			
Chromium (VI)	4.3	0.2	ug/g	ND	76.5	70-130			
Chromium	57.8		ug/L	ND	107	70-130			
Cobalt	50.9		ug/L	1.6	98.6	70-130			
Copper	51.7		ug/L	ND	98.6	70-130			
Lead	47.8		ug/L	3.3	89.0	70-130			
Mercury	1.28	0.1	ug/g	ND	85.1	70-130			
Molybdenum	48.4		ug/L	ND	96.2	70-130			
Nickel	54.3		ug/L	ND	101	70-130			
Selenium	45.0		ug/L	ND	89.7	70-130			
Silver	45.3		ug/L	ND	90.7	70-130			
Thallium	45.2		ug/L	ND	90.2	70-130			
Uranium	45.1		ug/L	ND	89.9	70-130			
Vanadium	59.8		ug/L	ND	109	70-130			
Zinc	48.7		ug/L	ND	89.4	70-130			
<b>Volatiles</b>									
Benzene	3.04	0.02	ug/g		76.1	60-130			
Ethylbenzene	3.16	0.05	ug/g		79.1	60-130			
Toluene	3.66	0.05	ug/g		91.5	60-130			
m,p-Xylenes	7.57	0.05	ug/g		94.7	60-130			
o-Xylene	4.00	0.05	ug/g		99.9	60-130			
Surrogate: Toluene-d8	2.74		ug/g		85.7	50-140			

Certificate of Analysis  
Client: Paterson Group Consulting Engineers  
Client PO: 25113

Report Date: 30-Oct-2018  
Order Date: 24-Oct-2018  
Project Description: PE4425

**Qualifier Notes:**

**QC Qualifiers :**

- QM-06 : Due to noted non-homogeneity of the QC sample matrix, the spike recoveries were out side the accepted range. Batch data accepted based on other QC.
- QR-04 : Duplicate results exceeds RPD limits due to non-homogeneous matrix.

**Sample Data Revisions**

None

**Work Order Revisions / Comments:**

None

**Other Report Notes:**

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

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

*CCME PHC additional information:*

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



Client Name: <u>Peterson Group</u>	Project Reference: <u>PE4425</u>	<b>Turnaround Time:</b> <input type="checkbox"/> 1 Day <input type="checkbox"/> 3 Day <input type="checkbox"/> 2 Day <input checked="" type="checkbox"/> Regular Date Required: _____
Contact Name: <u>Mark D'Arcy</u>	Quote #	
Address: <u>154 Colomade Rd</u>	PO # <u>25113</u>	
Telephone: <u>613 226 7351</u>	Email Address: <u>mdarcy@petersongroup.ca</u>	

Criteria:  O. Reg. 153/04 (As Amended) Table \_\_\_  RSC Filing  O. Reg. 558/00  PWQO  CCME  SUB (Storm)  SUB (Sanitary) Municipality: \_\_\_\_\_  Other: \_\_\_\_\_

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

**Required Analyses**

Sample ID/Location Name	Matrix	Air Volume	# of Containers	Sample Taken		PHCS F1-F4+BTEX	VOCs	PAHs	Metals by ICP			B (HWS)							
				Date	Time				Hg	Cd	Pb								
1 BH8-SS2	SW		2	Oct 22					/	/	/								- 250ml + 1 vial ✓
2 BH8-SS3	SW		2	Oct 22		/													- 250ml + 1 vial ✓
3 BH9-AU1	SW		2	Oct 22		/			/	/	/								- 250ml + 1 vial ✓
4																			
5																			
6																			
7																			
8																			
9																			
10																			

Comments: \_\_\_\_\_ Method of Delivery: Paracel

Relinquished By (Sign): <u>[Signature]</u>	Received by Driver/Depot: <u>[Signature]</u>	Received at Lab: <u>SUMNERSON OAK MAI</u>	Verified By: <u>[Signature]</u>
Relinquished By (Print): <u>PHILIP PRICE</u>	Date/Time: <u>24/10/18 4:10 PM</u>	Date/Time: <u>OCT 24, 2018 05:17</u>	Date/Time: <u>24/10/18 6:29</u>
Date/Time:	Temperature: _____ °C	Temperature: <u>18.1</u> °C	pH Verified     By: _____

## Review Items

Lab Number	Analysis	Analyte	Exception
			Default Report (not modified) Error in Query(0):  3010 - Table 'OutRepSampleAnalyte' already exists. create_OutRepSampleA  CREATE TABLE OutRepSampleAnalyte(Wrk CHAR,Sample CHAR,Analysis CHAR,Analyte CHAR,Laboratory CHAR,nMDL Numeric,nMRL Numeric,tMDL CHAR,tMRL CHAR); VERSION 6.18:2002
1829718-DUP1	PHCs F2 to F4 - SOIL	F4 PHCs (C34-C50)	Exceeds RPD control limit
1829718-DUP1	PHCs F2 to F4 - SOIL	F4 PHCs (C34-C50)	QR-04: Duplicate results exceeds RPD limits due to non-homogeneous matrix.
1829718-MS1	PHCs F2 to F4 - SOIL	F4 PHCs (C34-C50)	Exceeds upper control limit
1829718-MS1	PHCs F2 to F4 - SOIL	F4 PHCs (C34-C50)	QM-06: Due to noted non-homogeneity of the QC sample matrix, the spike recoveries were out side the accepted range. Batch data accepted based on other QC.
1829942-DUP2	BTEX by P&T GC-MS	Benzene	No source result for 1843216-01
1829942-DUP2	BTEX by P&T GC-MS	Ethylbenzene	No source result for 1843216-01
1829942-DUP2	BTEX by P&T GC-MS	m,p-Xylenes	No source result for 1843216-01
1829942-DUP2	BTEX by P&T GC-MS	o-Xylene	No source result for 1843216-01
1829942-DUP2	BTEX by P&T GC-MS	Toluene	No source result for 1843216-01

## Certificate of Analysis

Paterson Group Consulting Engineers

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

Client PO: 24606  
Project: PE4425  
Custody: 113628

Report Date: 7-Nov-2018  
Order Date: 1-Nov-2018

**Order #: 1844509**

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

<b>Parcel ID</b>	<b>Client ID</b>
1844509-01	BH1-GW
1844509-02	BH2-GW
1844509-03	BH3-GW
1844509-04	BH6-GW
1844509-05	BH7-GW
1844509-06	BH8-GW1
1844509-07	BH9-GW1

Approved By:



Dale Robertson, BSc  
Laboratory Director

Certificate of Analysis  
Client: Paterson Group Consulting Engineers  
Client PO: 24606

Report Date: 07-Nov-2018

Order Date: 1-Nov-2018

Project Description: PE4425

## Analysis Summary Table

Analysis	Method Reference/Description	Extraction Date	Analysis Date
BTEX by P&T GC-MS	EPA 624 - P&T GC-MS	5-Nov-18	5-Nov-18
PHC F1	CWS Tier 1 - P&T GC-FID	2-Nov-18	5-Nov-18
PHCs F2 to F4	CWS Tier 1 - GC-FID, extraction	2-Nov-18	2-Nov-18
REG 153: VOCs by P&T GC/MS	EPA 624 - P&T GC-MS	2-Nov-18	5-Nov-18

Certificate of Analysis  
 Client: Paterson Group Consulting Engineers  
 Client PO: 24606

Report Date: 07-Nov-2018

Order Date: 1-Nov-2018

**Project Description: PE4425**

<b>Client ID:</b>	BH1-GW	BH2-GW	BH3-GW	BH6-GW
<b>Sample Date:</b>	10/31/2018 09:00	10/31/2018 09:00	10/31/2018 09:00	10/31/2018 09:00
<b>Sample ID:</b>	1844509-01	1844509-02	1844509-03	1844509-04
<b>MDL/Units</b>	Water	Water	Water	Water

**Volatiles**

Benzene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	0.5 ug/L	1.0	<0.5	<0.5	<0.5
Toluene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
m,p-Xylenes	0.5 ug/L	1.0	<0.5	<0.5	<0.5
o-Xylene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
Xylenes, total	0.5 ug/L	1.0	<0.5	<0.5	<0.5
Toluene-d8	Surrogate	99.9%	94.3%	98.6%	99.6%

**Hydrocarbons**

F1 PHCs (C6-C10)	25 ug/L	<25	743	309	<25
F2 PHCs (C10-C16)	100 ug/L	530	<100	<100	<100
F3 PHCs (C16-C34)	100 ug/L	368	<100	<100	<100
F4 PHCs (C34-C50)	100 ug/L	<100	<100	<100	<100

Certificate of Analysis  
 Client: Paterson Group Consulting Engineers  
 Client PO: 24606

Report Date: 07-Nov-2018

Order Date: 1-Nov-2018

Project Description: PE4425

Client ID:	BH7-GW	BH8-GW1	BH9-GW1	-
Sample Date:	10/31/2018 09:00	10/31/2018 09:00	10/31/2018 09:00	-
Sample ID:	1844509-05	1844509-06	1844509-07	-
MDL/Units	Water	Water	Water	-

**Volatiles**

	MDL/Units	BH7-GW	BH8-GW1	BH9-GW1	
Acetone	5.0 ug/L	-	<5.0	<5.0	-
Benzene	0.5 ug/L	-	<0.5	<0.5	-
Bromodichloromethane	0.5 ug/L	-	<0.5	<0.5	-
Bromoform	0.5 ug/L	-	<0.5	<0.5	-
Bromomethane	0.5 ug/L	-	<0.5	<0.5	-
Carbon Tetrachloride	0.2 ug/L	-	<0.2	<0.2	-
Chlorobenzene	0.5 ug/L	-	<0.5	<0.5	-
Chloroform	0.5 ug/L	-	<0.5	2.0	-
Dibromochloromethane	0.5 ug/L	-	<0.5	<0.5	-
Dichlorodifluoromethane	1.0 ug/L	-	<1.0	<1.0	-
1,2-Dichlorobenzene	0.5 ug/L	-	<0.5	<0.5	-
1,3-Dichlorobenzene	0.5 ug/L	-	<0.5	<0.5	-
1,4-Dichlorobenzene	0.5 ug/L	-	<0.5	<0.5	-
1,1-Dichloroethane	0.5 ug/L	-	<0.5	<0.5	-
1,2-Dichloroethane	0.5 ug/L	-	<0.5	<0.5	-
1,1-Dichloroethylene	0.5 ug/L	-	<0.5	<0.5	-
cis-1,2-Dichloroethylene	0.5 ug/L	-	<0.5	<0.5	-
trans-1,2-Dichloroethylene	0.5 ug/L	-	<0.5	<0.5	-
1,2-Dichloropropane	0.5 ug/L	-	<0.5	<0.5	-
cis-1,3-Dichloropropylene	0.5 ug/L	-	<0.5	<0.5	-
trans-1,3-Dichloropropylene	0.5 ug/L	-	<0.5	<0.5	-
1,3-Dichloropropene, total	0.5 ug/L	-	<0.5	<0.5	-
Ethylbenzene	0.5 ug/L	-	<0.5	<0.5	-
Ethylene dibromide (dibromoethar	0.2 ug/L	-	<0.2	<0.2	-
Hexane	1.0 ug/L	-	<1.0	<1.0	-
Methyl Ethyl Ketone (2-Butanone)	5.0 ug/L	-	<5.0	<5.0	-
Methyl Isobutyl Ketone	5.0 ug/L	-	<5.0	<5.0	-
Methyl tert-butyl ether	2.0 ug/L	-	<2.0	<2.0	-
Methylene Chloride	5.0 ug/L	-	<5.0	<5.0	-
Styrene	0.5 ug/L	-	<0.5	<0.5	-
1,1,1,2-Tetrachloroethane	0.5 ug/L	-	<0.5	<0.5	-
1,1,2,2-Tetrachloroethane	0.5 ug/L	-	<0.5	<0.5	-
Tetrachloroethylene	0.5 ug/L	-	<0.5	<0.5	-
Toluene	0.5 ug/L	-	5.6	<0.5	-

Certificate of Analysis  
 Client: Paterson Group Consulting Engineers  
 Client PO: 24606

Report Date: 07-Nov-2018

Order Date: 1-Nov-2018

Project Description: PE4425

	Client ID:	BH7-GW	BH8-GW1	BH9-GW1	-
	Sample Date:	10/31/2018 09:00	10/31/2018 09:00	10/31/2018 09:00	-
	Sample ID:	1844509-05	1844509-06	1844509-07	-
	MDL/Units	Water	Water	Water	-
1,1,1-Trichloroethane	0.5 ug/L	-	<0.5	<0.5	-
1,1,2-Trichloroethane	0.5 ug/L	-	<0.5	<0.5	-
Trichloroethylene	0.5 ug/L	-	<0.5	<0.5	-
Trichlorofluoromethane	1.0 ug/L	-	<1.0	<1.0	-
Vinyl chloride	0.5 ug/L	-	<0.5	<0.5	-
m,p-Xylenes	0.5 ug/L	-	<0.5	<0.5	-
o-Xylene	0.5 ug/L	-	<0.5	<0.5	-
Xylenes, total	0.5 ug/L	-	<0.5	<0.5	-
4-Bromofluorobenzene	Surrogate	-	110%	105%	-
Dibromofluoromethane	Surrogate	-	80.7%	80.7%	-
Toluene-d8	Surrogate	-	102%	99.7%	-
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	-	-	-
Xylenes, total	0.5 ug/L	<0.5	-	-	-
Toluene-d8	Surrogate	96.2%	-	-	-

**Hydrocarbons**

F1 PHCs (C6-C10)	25 ug/L	340	<25	<25	-
F2 PHCs (C10-C16)	100 ug/L	<100	<100	<100	-
F3 PHCs (C16-C34)	100 ug/L	<100	<100	<100	-
F4 PHCs (C34-C50)	100 ug/L	<100	<100	<100	-

Certificate of Analysis  
 Client: Paterson Group Consulting Engineers  
 Client PO: 24606

Report Date: 07-Nov-2018

Order Date: 1-Nov-2018

Project Description: PE4425

### Method Quality Control: Blank

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
<b>Hydrocarbons</b>									
F1 PHCs (C6-C10)	ND	25	ug/L						
F2 PHCs (C10-C16)	ND	100	ug/L						
F3 PHCs (C16-C34)	ND	100	ug/L						
F4 PHCs (C34-C50)	ND	100	ug/L						
<b>Volatiles</b>									
Acetone	ND	5.0	ug/L						
Benzene	ND	0.5	ug/L						
Bromodichloromethane	ND	0.5	ug/L						
Bromoform	ND	0.5	ug/L						
Bromomethane	ND	0.5	ug/L						
Carbon Tetrachloride	ND	0.2	ug/L						
Chlorobenzene	ND	0.5	ug/L						
Chloroform	ND	0.5	ug/L						
Dibromochloromethane	ND	0.5	ug/L						
Dichlorodifluoromethane	ND	1.0	ug/L						
1,2-Dichlorobenzene	ND	0.5	ug/L						
1,3-Dichlorobenzene	ND	0.5	ug/L						
1,4-Dichlorobenzene	ND	0.5	ug/L						
1,1-Dichloroethane	ND	0.5	ug/L						
1,2-Dichloroethane	ND	0.5	ug/L						
1,1-Dichloroethylene	ND	0.5	ug/L						
cis-1,2-Dichloroethylene	ND	0.5	ug/L						
trans-1,2-Dichloroethylene	ND	0.5	ug/L						
1,2-Dichloropropane	ND	0.5	ug/L						
cis-1,3-Dichloropropylene	ND	0.5	ug/L						
trans-1,3-Dichloropropylene	ND	0.5	ug/L						
1,3-Dichloropropene, total	ND	0.5	ug/L						
Ethylbenzene	ND	0.5	ug/L						
Ethylene dibromide (dibromoethane)	ND	0.2	ug/L						
Hexane	ND	1.0	ug/L						
Methyl Ethyl Ketone (2-Butanone)	ND	5.0	ug/L						
Methyl Isobutyl Ketone	ND	5.0	ug/L						
Methyl tert-butyl ether	ND	2.0	ug/L						
Methylene Chloride	ND	5.0	ug/L						
Styrene	ND	0.5	ug/L						
1,1,1,2-Tetrachloroethane	ND	0.5	ug/L						
1,1,2,2-Tetrachloroethane	ND	0.5	ug/L						
Tetrachloroethylene	ND	0.5	ug/L						
Toluene	ND	0.5	ug/L						
1,1,1-Trichloroethane	ND	0.5	ug/L						
1,1,2-Trichloroethane	ND	0.5	ug/L						
Trichloroethylene	ND	0.5	ug/L						
Trichlorofluoromethane	ND	1.0	ug/L						
Vinyl chloride	ND	0.5	ug/L						
m,p-Xylenes	ND	0.5	ug/L						
o-Xylene	ND	0.5	ug/L						
Xylenes, total	ND	0.5	ug/L						
Surrogate: 4-Bromofluorobenzene	91.1		ug/L		114	50-140			
Surrogate: Dibromofluoromethane	66.6		ug/L		83.2	50-140			
Surrogate: Toluene-d8	78.9		ug/L		98.6	50-140			
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	78.9		ug/L		98.6	50-140			

Certificate of Analysis  
 Client: Paterson Group Consulting Engineers  
 Client PO: 24606

Report Date: 07-Nov-2018

Order Date: 1-Nov-2018

Project Description: PE4425

### Method Quality Control: Duplicate

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
<b>Hydrocarbons</b>									
F1 PHCs (C6-C10)	ND	25	ug/L	ND				30	
<b>Volatiles</b>									
Acetone	ND	5.0	ug/L	ND				30	
Benzene	ND	0.5	ug/L	ND				30	
Bromodichloromethane	ND	0.5	ug/L	ND				30	
Bromoform	ND	0.5	ug/L	ND				30	
Bromomethane	ND	0.5	ug/L	ND				30	
Carbon Tetrachloride	ND	0.2	ug/L	ND				30	
Chlorobenzene	ND	0.5	ug/L	ND				30	
Chloroform	ND	0.5	ug/L	ND				30	
Dibromochloromethane	ND	0.5	ug/L	ND				30	
Dichlorodifluoromethane	ND	1.0	ug/L	ND				30	
1,2-Dichlorobenzene	ND	0.5	ug/L	ND				30	
1,3-Dichlorobenzene	ND	0.5	ug/L	ND				30	
1,4-Dichlorobenzene	ND	0.5	ug/L	ND				30	
1,1-Dichloroethane	ND	0.5	ug/L	ND				30	
1,2-Dichloroethane	ND	0.5	ug/L	ND				30	
1,1-Dichloroethylene	ND	0.5	ug/L	ND				30	
cis-1,2-Dichloroethylene	ND	0.5	ug/L	ND				30	
trans-1,2-Dichloroethylene	ND	0.5	ug/L	ND				30	
1,2-Dichloropropane	ND	0.5	ug/L	ND				30	
cis-1,3-Dichloropropylene	ND	0.5	ug/L	ND				30	
trans-1,3-Dichloropropylene	ND	0.5	ug/L	ND				30	
Ethylbenzene	ND	0.5	ug/L	ND				30	
Ethylene dibromide (dibromoethane)	ND	0.2	ug/L	ND				30	
Hexane	ND	1.0	ug/L	ND				30	
Methyl Ethyl Ketone (2-Butanone)	ND	5.0	ug/L	ND				30	
Methyl Isobutyl Ketone	ND	5.0	ug/L	ND				30	
Methyl tert-butyl ether	ND	2.0	ug/L	ND				30	
Methylene Chloride	ND	5.0	ug/L	ND				30	
Styrene	ND	0.5	ug/L	ND				30	
1,1,1,2-Tetrachloroethane	ND	0.5	ug/L	ND				30	
1,1,2,2-Tetrachloroethane	ND	0.5	ug/L	ND				30	
Tetrachloroethylene	ND	0.5	ug/L	ND				30	
Toluene	ND	0.5	ug/L	ND				30	
1,1,1-Trichloroethane	ND	0.5	ug/L	ND				30	
1,1,2-Trichloroethane	ND	0.5	ug/L	ND				30	
Trichloroethylene	ND	0.5	ug/L	ND				30	
Trichlorofluoromethane	ND	1.0	ug/L	ND				30	
Vinyl chloride	ND	0.5	ug/L	ND				30	
m,p-Xylenes	ND	0.5	ug/L	ND				30	
o-Xylene	ND	0.5	ug/L	ND				30	
Surrogate: 4-Bromofluorobenzene	92.6		ug/L		116	50-140			
Surrogate: Dibromofluoromethane	68.6		ug/L		85.7	50-140			
Surrogate: Toluene-d8	79.5		ug/L		99.4	50-140			
Benzene	ND	0.5	ug/L	ND				30	
Ethylbenzene	ND	0.5	ug/L	ND				30	
Toluene	ND	0.5	ug/L	ND				30	
m,p-Xylenes	ND	0.5	ug/L	ND				30	
o-Xylene	ND	0.5	ug/L	ND				30	
Surrogate: Toluene-d8	79.5		ug/L		99.4	50-140			

Certificate of Analysis  
 Client: Paterson Group Consulting Engineers  
 Client PO: 24606

Report Date: 07-Nov-2018

Order Date: 1-Nov-2018

Project Description: PE4425

### Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
<b>Hydrocarbons</b>									
F1 PHCs (C6-C10)	1940	25	ug/L		96.9	68-117			
F2 PHCs (C10-C16)	1400	100	ug/L		87.7	60-140			
F3 PHCs (C16-C34)	3440	100	ug/L		87.8	60-140			
F4 PHCs (C34-C50)	2190	100	ug/L		88.1	60-140			
<b>Volatiles</b>									
Acetone	68.7	5.0	ug/L		68.7	50-140			
Benzene	27.2	0.5	ug/L		67.9	60-130			
Bromodichloromethane	27.6	0.5	ug/L		68.9	60-130			
Bromoform	32.2	0.5	ug/L		80.6	60-130			
Bromomethane	27.2	0.5	ug/L		68.0	50-140			
Carbon Tetrachloride	27.8	0.2	ug/L		69.4	60-130			
Chlorobenzene	36.8	0.5	ug/L		91.9	60-130			
Chloroform	27.1	0.5	ug/L		67.8	60-130			
Dibromochloromethane	31.7	0.5	ug/L		79.3	60-130			
Dichlorodifluoromethane	27.1	1.0	ug/L		67.8	50-140			
1,2-Dichlorobenzene	31.5	0.5	ug/L		78.7	60-130			
1,3-Dichlorobenzene	34.2	0.5	ug/L		85.4	60-130			
1,4-Dichlorobenzene	33.9	0.5	ug/L		84.8	60-130			
1,1-Dichloroethane	27.9	0.5	ug/L		69.8	60-130			
1,2-Dichloroethane	28.7	0.5	ug/L		71.7	60-130			
1,1-Dichloroethylene	30.7	0.5	ug/L		76.8	60-130			
cis-1,2-Dichloroethylene	29.5	0.5	ug/L		73.7	60-130			
trans-1,2-Dichloroethylene	30.6	0.5	ug/L		76.4	60-130			
1,2-Dichloropropane	27.2	0.5	ug/L		68.1	60-130			
cis-1,3-Dichloropropylene	34.8	0.5	ug/L		87.1	60-130			
trans-1,3-Dichloropropylene	40.8	0.5	ug/L		102	60-130			
Ethylbenzene	37.4	0.5	ug/L		93.6	60-130			
Ethylene dibromide (dibromoethane)	29.2	0.2	ug/L		72.9	60-130			
Hexane	51.3	1.0	ug/L		128	60-130			
Methyl Ethyl Ketone (2-Butanone)	91.5	5.0	ug/L		91.5	50-140			
Methyl Isobutyl Ketone	61.0	5.0	ug/L		61.0	50-140			
Methyl tert-butyl ether	53.3	2.0	ug/L		53.3	50-140			
Methylene Chloride	28.8	5.0	ug/L		72.0	60-130			
Styrene	34.8	0.5	ug/L		86.9	60-130			
1,1,1,2-Tetrachloroethane	34.6	0.5	ug/L		86.5	60-130			
1,1,2,2-Tetrachloroethane	28.5	0.5	ug/L		71.3	60-130			
Tetrachloroethylene	36.7	0.5	ug/L		91.8	60-130			
Toluene	36.8	0.5	ug/L		91.9	60-130			
1,1,1-Trichloroethane	27.7	0.5	ug/L		69.2	60-130			
1,1,2-Trichloroethane	30.1	0.5	ug/L		75.3	60-130			
Trichloroethylene	40.3	0.5	ug/L		101	60-130			
Trichlorofluoromethane	31.7	1.0	ug/L		79.2	60-130			
Vinyl chloride	30.6	0.5	ug/L		76.6	50-140			
m,p-Xylenes	82.0	0.5	ug/L		103	60-130			
o-Xylene	42.0	0.5	ug/L		105	60-130			
Surrogate: 4-Bromofluorobenzene	82.8		ug/L		103	50-140			
Benzene	27.2	0.5	ug/L		67.9	60-130			
Ethylbenzene	37.4	0.5	ug/L		93.6	60-130			
Toluene	36.8	0.5	ug/L		91.9	60-130			
m,p-Xylenes	82.0	0.5	ug/L		103	60-130			
o-Xylene	42.0	0.5	ug/L		105	60-130			

Certificate of Analysis  
Client: **Paterson Group Consulting Engineers**  
Client PO: **24606**

Report Date: 07-Nov-2018

Order Date: 1-Nov-2018

Project Description: **PE4425**

**Qualifier Notes:**

None

**Sample Data Revisions**

None

**Work Order Revisions / Comments:**

None

**Other Report Notes:**

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

*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.



Client Name: <b>PATERSON GROUP</b>	Project Reference: <b>PE4425</b>	<b>Turnaround Time:</b> <input type="checkbox"/> 1 Day <input type="checkbox"/> 3 Day <input type="checkbox"/> 2 Day <input checked="" type="checkbox"/> Regular Date Required: _____
Contact Name: <b>MARK D'ARCY</b>	Quote #	
Address: <b>154 COLONNADE RD.</b>	PO # <b>24606</b>	
Telephone: <b>613-226-7381</b>	Email Address: <b>mdarcy@patersongroup.ca</b>	

Criteria:  O. Reg. 153/04 (As Amended) Table     RSC Filing     O. Reg. 558/00     PWQO     CCME     SUB (Storm)     SUB (Sanitary)    Municipality: \_\_\_\_\_     Other: \_\_\_\_\_

Matrix Type: S (Soil/Sed.) GW (Ground Water) SW (Surface Water) SS (Storm Sanitary Sewer) P (Paint) A (Air) O (Other)				Required Analyses															
Sample ID/Location Name	Matrix	Air Volume	# of Containers	Sample Taken		MICS FI-1/4-BTEX	VOCs	PAHs	Metals by IC P	Hg	Cu/Pb	B (HWS)							
				Date	Time														
1 BH1-GW	GW		3	Oct. 3/18		✓													
2 BH2-GW	↓		↓	↓		✓													
3 BH3-GW	↓		↓	↓		✓													
4 BH6-GW	↓		↓	↓		✓													
5 BH7-GW	↓		↓	↓		✓	✓												
6 BH8-GW1	↓		↓	↓		✓	✓												
7 BH9-GW1	↓		↓	↓		✓	✓												
8																			
9																			
10																			

Comments: \_\_\_\_\_ Method of Delivery: **Parcel**

Relinquished By (Sign): <i>[Signature]</i>	Received by Driver/Depot: <i>[Signature]</i>	Received at Lab: <b>SUMMITON DENVER</b>	Verified By: <i>[Signature]</i>
Relinquished By (Print): <b>ERIC LEVINE</b>	Date/Time: <b>01/11/18 2:20</b>	Date/Time: <b>NOV 01 2018 08:05</b>	Date/Time: <b>NOV 01 4:18 PM</b>
Date/Time: <b>2:20 PM NOV 1st 2018</b>	Temperature: <b>7th</b>	Temperature: <b>16.1°C</b>	pH Verified   By: _____

## Certificate of Analysis

**Paterson Group Consulting Engineers (Ottawa)**

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

Client PO: 59955  
Project: PE4425  
Custody:

Report Date: 17-Apr-2024  
Order Date: 12-Apr-2024

**Order #: 2415502**

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

Parcel ID	Client ID
2415502-01	BH1-GW

Approved By:



Dale Robertson, BSc

Laboratory Director

Certificate of Analysis

Report Date: 17-Apr-2024

Client: Paterson Group Consulting Engineers (Ottawa)

Order Date: 12-Apr-2024

Client PO: 59955

Project Description: PE4425

**Analysis Summary Table**

Analysis	Method Reference/Description	Extraction Date	Analysis Date
PHC F1	CWS Tier 1 - P&T GC-FID	15-Apr-24	15-Apr-24
PHCs F2 to F4	CWS Tier 1 - GC-FID, extraction	16-Apr-24	16-Apr-24
REG 153: PAHs by GC-MS	EPA 625 - GC-MS, extraction	16-Apr-24	16-Apr-24
REG 153: VOCs by P&T GC/MS	EPA 624 - P&T GC-MS	15-Apr-24	15-Apr-24

Certificate of Analysis

Report Date: 17-Apr-2024

Client: Paterson Group Consulting Engineers (Ottawa)

Order Date: 12-Apr-2024

Client PO: 59955

Project Description: PE4425

<b>Client ID:</b>	BH1-GW	-	-	-	-
<b>Sample Date:</b>	11-Apr-24 09:00	-	-	-	-
<b>Sample ID:</b>	2415502-01	-	-	-	-
<b>Matrix:</b>	Ground Water	-	-	-	-
<b>MDL/Units</b>					

**Volatiles**

Acetone	5.0 ug/L	<5.0	-	-	-	-
Benzene	0.5 ug/L	1.5	-	-	-	-
Bromodichloromethane	0.5 ug/L	<0.5	-	-	-	-
Bromoform	0.5 ug/L	<0.5	-	-	-	-
Bromomethane	0.5 ug/L	<0.5	-	-	-	-
Carbon Tetrachloride	0.2 ug/L	<0.2	-	-	-	-
Chlorobenzene	0.5 ug/L	<0.5	-	-	-	-
Chloroform	0.5 ug/L	<0.5	-	-	-	-
Dibromochloromethane	0.5 ug/L	<0.5	-	-	-	-
Dichlorodifluoromethane	1.0 ug/L	<1.0	-	-	-	-
1,2-Dichlorobenzene	0.5 ug/L	<0.5	-	-	-	-
1,3-Dichlorobenzene	0.5 ug/L	<0.5	-	-	-	-
1,4-Dichlorobenzene	0.5 ug/L	<0.5	-	-	-	-
1,1-Dichloroethane	0.5 ug/L	<0.5	-	-	-	-
1,2-Dichloroethane	0.5 ug/L	<0.5	-	-	-	-
1,1-Dichloroethylene	0.5 ug/L	<0.5	-	-	-	-
cis-1,2-Dichloroethylene	0.5 ug/L	<0.5	-	-	-	-
trans-1,2-Dichloroethylene	0.5 ug/L	<0.5	-	-	-	-
1,2-Dichloropropane	0.5 ug/L	<0.5	-	-	-	-
cis-1,3-Dichloropropylene	0.5 ug/L	<0.5	-	-	-	-
trans-1,3-Dichloropropylene	0.5 ug/L	<0.5	-	-	-	-
1,3-Dichloropropene, total	0.5 ug/L	<0.5	-	-	-	-
Ethylene dibromide (dibromoethane)	0.2 ug/L	<0.2	-	-	-	-
Ethylbenzene	0.5 ug/L	<0.5	-	-	-	-
Hexane	1.0 ug/L	<1.0	-	-	-	-

Certificate of Analysis

Report Date: 17-Apr-2024

Client: Paterson Group Consulting Engineers (Ottawa)

Order Date: 12-Apr-2024

Client PO: 59955

Project Description: PE4425

<b>Client ID:</b>	BH1-GW	-	-	-	-
<b>Sample Date:</b>	11-Apr-24 09:00	-	-	-	-
<b>Sample ID:</b>	2415502-01	-	-	-	-
<b>Matrix:</b>	Ground Water	-	-	-	-
<b>MDL/Units</b>					

**Volatiles**

Methyl Ethyl Ketone (2-Butanone)	5.0 ug/L	<5.0	-	-	-	-
Methyl Isobutyl Ketone	5.0 ug/L	<5.0	-	-	-	-
Methyl tert-butyl ether	2.0 ug/L	<2.0	-	-	-	-
Methylene Chloride	5.0 ug/L	<5.0	-	-	-	-
Styrene	0.5 ug/L	<0.5	-	-	-	-
1,1,1,2-Tetrachloroethane	0.5 ug/L	<0.5	-	-	-	-
1,1,2,2-Tetrachloroethane	0.5 ug/L	<0.5	-	-	-	-
Tetrachloroethylene	0.5 ug/L	<0.5	-	-	-	-
Toluene	0.5 ug/L	<0.5	-	-	-	-
1,1,1-Trichloroethane	0.5 ug/L	<0.5	-	-	-	-
1,1,2-Trichloroethane	0.5 ug/L	<0.5	-	-	-	-
Trichloroethylene	0.5 ug/L	<0.5	-	-	-	-
Trichlorofluoromethane	1.0 ug/L	<1.0	-	-	-	-
Vinyl chloride	0.5 ug/L	<0.5	-	-	-	-
m,p-Xylenes	0.5 ug/L	<0.5	-	-	-	-
o-Xylene	0.5 ug/L	<0.5	-	-	-	-
Xylenes, total	0.5 ug/L	<0.5	-	-	-	-
Dibromofluoromethane	Surrogate	112%	-	-	-	-
Toluene-d8	Surrogate	102%	-	-	-	-
4-Bromofluorobenzene	Surrogate	103%	-	-	-	-

**Hydrocarbons**

F1 PHCs (C6-C10)	25 ug/L	<25	-	-	-	-
F2 PHCs (C10-C16)	100 ug/L	261	-	-	-	-
F3 PHCs (C16-C34)	100 ug/L	219	-	-	-	-
F4 PHCs (C34-C50)	100 ug/L	<100	-	-	-	-

Certificate of Analysis

Report Date: 17-Apr-2024

Client: Paterson Group Consulting Engineers (Ottawa)

Order Date: 12-Apr-2024

Client PO: 59955

Project Description: PE4425

<b>Client ID:</b>	BH1-GW	-	-	-	-
<b>Sample Date:</b>	11-Apr-24 09:00	-	-	-	-
<b>Sample ID:</b>	2415502-01	-	-	-	-
<b>Matrix:</b>	Ground Water	-	-	-	-
<b>MDL/Units</b>					

**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	-	-	-	-
Phenanthrene	0.05 ug/L	<0.05	-	-	-	-
Pyrene	0.01 ug/L	<0.01	-	-	-	-
2-Fluorobiphenyl	Surrogate	66.4%	-	-	-	-
Terphenyl-d14	Surrogate	78.9%	-	-	-	-

Certificate of Analysis

Report Date: 17-Apr-2024

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

Order Date: 12-Apr-2024

Client PO: 59955

Project Description: PE4425

**Method Quality Control: Blank**

Analyte	Result	Reporting Limit	Units	%REC	%REC Limit	RPD	RPD Limit	Notes
<b>Hydrocarbons</b>								
F1 PHCs (C6-C10)	ND	25	ug/L					
F2 PHCs (C10-C16)	ND	100	ug/L					
F3 PHCs (C16-C34)	ND	100	ug/L					
F4 PHCs (C34-C50)	ND	100	ug/L					
<b>Semi-Volatiles</b>								
Acenaphthene	ND	0.05	ug/L					
Acenaphthylene	ND	0.05	ug/L					
Anthracene	ND	0.01	ug/L					
Benzo [a] anthracene	ND	0.01	ug/L					
Benzo [a] pyrene	ND	0.01	ug/L					
Benzo [b] fluoranthene	ND	0.05	ug/L					
Benzo [g,h,i] perylene	ND	0.05	ug/L					
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	12.6		%	63.1	50-140			
Surrogate: Terphenyl-d14	17.5		%	87.6	50-140			
<b>Volatiles</b>								
Acetone	ND	5.0	ug/L					
Benzene	ND	0.5	ug/L					
Bromodichloromethane	ND	0.5	ug/L					
Bromoform	ND	0.5	ug/L					

Certificate of Analysis

Report Date: 17-Apr-2024

Client: Paterson Group Consulting Engineers (Ottawa)

Order Date: 12-Apr-2024

Client PO: 59955

Project Description: PE4425

**Method Quality Control: Blank**

Analyte	Result	Reporting Limit	Units	%REC	%REC Limit	RPD	RPD Limit	Notes
Bromomethane	ND	0.5	ug/L					
Carbon Tetrachloride	ND	0.2	ug/L					
Chlorobenzene	ND	0.5	ug/L					
Chloroform	ND	0.5	ug/L					
Dibromochloromethane	ND	0.5	ug/L					
Dichlorodifluoromethane	ND	1.0	ug/L					
1,2-Dichlorobenzene	ND	0.5	ug/L					
1,3-Dichlorobenzene	ND	0.5	ug/L					
1,4-Dichlorobenzene	ND	0.5	ug/L					
1,1-Dichloroethane	ND	0.5	ug/L					
1,2-Dichloroethane	ND	0.5	ug/L					
1,1-Dichloroethylene	ND	0.5	ug/L					
cis-1,2-Dichloroethylene	ND	0.5	ug/L					
trans-1,2-Dichloroethylene	ND	0.5	ug/L					
1,2-Dichloropropane	ND	0.5	ug/L					
cis-1,3-Dichloropropylene	ND	0.5	ug/L					
trans-1,3-Dichloropropylene	ND	0.5	ug/L					
1,3-Dichloropropene, total	ND	0.5	ug/L					
Ethylbenzene	ND	0.5	ug/L					
Ethylene dibromide (dibromoethane, 1,2-)	ND	0.2	ug/L					
Hexane	ND	1.0	ug/L					
Methyl Ethyl Ketone (2-Butanone)	ND	5.0	ug/L					
Methyl Isobutyl Ketone	ND	5.0	ug/L					
Methyl tert-butyl ether	ND	2.0	ug/L					
Methylene Chloride	ND	5.0	ug/L					
Styrene	ND	0.5	ug/L					
1,1,1,2-Tetrachloroethane	ND	0.5	ug/L					
1,1,2,2-Tetrachloroethane	ND	0.5	ug/L					
Tetrachloroethylene	ND	0.5	ug/L					
Toluene	ND	0.5	ug/L					
1,1,1-Trichloroethane	ND	0.5	ug/L					
1,1,2-Trichloroethane	ND	0.5	ug/L					
Trichloroethylene	ND	0.5	ug/L					

Certificate of Analysis

Report Date: 17-Apr-2024

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

Order Date: 12-Apr-2024

Client PO: 59955

Project Description: PE4425

**Method Quality Control: Blank**

Analyte	Result	Reporting Limit	Units	%REC	%REC Limit	RPD	RPD Limit	Notes
Trichlorofluoromethane	ND	1.0	ug/L					
Vinyl chloride	ND	0.5	ug/L					
m,p-Xylenes	ND	0.5	ug/L					
o-Xylene	ND	0.5	ug/L					
Xylenes, total	ND	0.5	ug/L					
<i>Surrogate: 4-Bromofluorobenzene</i>	76.5		%	95.6	50-140			
<i>Surrogate: Dibromofluoromethane</i>	62.7		%	78.4	50-140			
<i>Surrogate: Toluene-d8</i>	84.9		%	106	50-140			

Certificate of Analysis

Report Date: 17-Apr-2024

Client: Paterson Group Consulting Engineers (Ottawa)

Order Date: 12-Apr-2024

Client PO: 59955

Project Description: PE4425

**Method Quality Control: Duplicate**

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
<b>Hydrocarbons</b>									
F1 PHCs (C6-C10)	ND	25	ug/L	ND			NC	30	
<b>Volatiles</b>									
Acetone	ND	5.0	ug/L	ND			NC	30	
Benzene	ND	0.5	ug/L	ND			NC	30	
Bromodichloromethane	ND	0.5	ug/L	ND			NC	30	
Bromoform	ND	0.5	ug/L	ND			NC	30	
Bromomethane	ND	0.5	ug/L	ND			NC	30	
Carbon Tetrachloride	ND	0.2	ug/L	ND			NC	30	
Chlorobenzene	ND	0.5	ug/L	ND			NC	30	
Chloroform	ND	0.5	ug/L	ND			NC	30	
Dibromochloromethane	ND	0.5	ug/L	ND			NC	30	
Dichlorodifluoromethane	ND	1.0	ug/L	ND			NC	30	
1,2-Dichlorobenzene	ND	0.5	ug/L	ND			NC	30	
1,3-Dichlorobenzene	ND	0.5	ug/L	ND			NC	30	
1,4-Dichlorobenzene	ND	0.5	ug/L	ND			NC	30	
1,1-Dichloroethane	ND	0.5	ug/L	ND			NC	30	
1,2-Dichloroethane	ND	0.5	ug/L	ND			NC	30	
1,1-Dichloroethylene	ND	0.5	ug/L	ND			NC	30	
cis-1,2-Dichloroethylene	ND	0.5	ug/L	ND			NC	30	
trans-1,2-Dichloroethylene	ND	0.5	ug/L	ND			NC	30	
1,2-Dichloropropane	ND	0.5	ug/L	ND			NC	30	
cis-1,3-Dichloropropylene	ND	0.5	ug/L	ND			NC	30	
trans-1,3-Dichloropropylene	ND	0.5	ug/L	ND			NC	30	
Ethylbenzene	ND	0.5	ug/L	ND			NC	30	
Ethylene dibromide (dibromoethane, 1,2-)	ND	0.2	ug/L	ND			NC	30	
Hexane	ND	1.0	ug/L	ND			NC	30	
Methyl Ethyl Ketone (2-Butanone)	ND	5.0	ug/L	ND			NC	30	
Methyl Isobutyl Ketone	ND	5.0	ug/L	ND			NC	30	
Methyl tert-butyl ether	ND	2.0	ug/L	ND			NC	30	
Methylene Chloride	ND	5.0	ug/L	ND			NC	30	

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Client PO: 59955

Project Description: PE4425

**Method Quality Control: Duplicate**

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Styrene	ND	0.5	ug/L	ND			NC	30	
1,1,1,2-Tetrachloroethane	ND	0.5	ug/L	ND			NC	30	
1,1,2,2-Tetrachloroethane	ND	0.5	ug/L	ND			NC	30	
Tetrachloroethylene	ND	0.5	ug/L	ND			NC	30	
Toluene	ND	0.5	ug/L	ND			NC	30	
1,1,1-Trichloroethane	ND	0.5	ug/L	ND			NC	30	
1,1,2-Trichloroethane	ND	0.5	ug/L	ND			NC	30	
Trichloroethylene	ND	0.5	ug/L	ND			NC	30	
Trichlorofluoromethane	ND	1.0	ug/L	ND			NC	30	
Vinyl chloride	ND	0.5	ug/L	ND			NC	30	
m,p-Xylenes	ND	0.5	ug/L	ND			NC	30	
o-Xylene	ND	0.5	ug/L	ND			NC	30	
<i>Surrogate: 4-Bromofluorobenzene</i>	78.4		%		98.0	50-140			
<i>Surrogate: Dibromofluoromethane</i>	71.8		%		89.7	50-140			
<i>Surrogate: Toluene-d8</i>	83.8		%		105	50-140			

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Report Date: 17-Apr-2024

Client: Paterson Group Consulting Engineers (Ottawa)

Order Date: 12-Apr-2024

Client PO: 59955

Project Description: PE4425

**Method Quality Control: Spike**

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
<b>Hydrocarbons</b>									
F1 PHCs (C6-C10)	1800	25	ug/L	ND	105	85-115			
F2 PHCs (C10-C16)	1660	100	ug/L	ND	104	60-140			
F3 PHCs (C16-C34)	5020	100	ug/L	ND	128	60-140			
F4 PHCs (C34-C50)	3160	100	ug/L	ND	127	60-140			
<b>Semi-Volatiles</b>									
Acenaphthene	3.90	0.05	ug/L	ND	78.0	50-140			
Acenaphthylene	4.30	0.05	ug/L	ND	86.0	50-140			
Anthracene	4.71	0.01	ug/L	ND	94.2	50-140			
Benzo [a] anthracene	4.11	0.01	ug/L	ND	82.1	50-140			
Benzo [a] pyrene	3.44	0.01	ug/L	ND	68.8	50-140			
Benzo [b] fluoranthene	4.04	0.05	ug/L	ND	80.7	50-140			
Benzo [g,h,i] perylene	3.50	0.05	ug/L	ND	69.9	50-140			
Benzo [k] fluoranthene	4.50	0.05	ug/L	ND	90.0	50-140			
Chrysene	4.21	0.05	ug/L	ND	84.2	50-140			
Dibenzo [a,h] anthracene	3.53	0.05	ug/L	ND	70.7	50-140			
Fluoranthene	4.35	0.01	ug/L	ND	87.0	50-140			
Fluorene	3.95	0.05	ug/L	ND	79.1	50-140			
Indeno [1,2,3-cd] pyrene	3.79	0.05	ug/L	ND	75.8	50-140			
1-Methylnaphthalene	3.55	0.05	ug/L	ND	71.0	50-140			
2-Methylnaphthalene	3.78	0.05	ug/L	ND	75.6	50-140			
Naphthalene	3.85	0.05	ug/L	ND	77.0	50-140			
Phenanthrene	4.22	0.05	ug/L	ND	84.3	50-140			
Pyrene	4.78	0.01	ug/L	ND	95.6	50-140			
Surrogate: 2-Fluorobiphenyl	12.7		%		63.6	50-140			
Surrogate: Terphenyl-d14	17.1		%		85.5	50-140			
<b>Volatiles</b>									
Acetone	112	5.0	ug/L	ND	112	50-140			
Benzene	43.0	0.5	ug/L	ND	108	60-130			
Bromodichloromethane	34.9	0.5	ug/L	ND	87.2	60-130			
Bromoform	34.2	0.5	ug/L	ND	85.5	60-130			

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Client PO: 59955

Project Description: PE4425

**Method Quality Control: Spike**

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Bromomethane	46.0	0.5	ug/L	ND	115	50-140			
Carbon Tetrachloride	31.5	0.2	ug/L	ND	78.6	60-130			
Chlorobenzene	40.7	0.5	ug/L	ND	102	60-130			
Chloroform	40.6	0.5	ug/L	ND	101	60-130			
Dibromochloromethane	35.8	0.5	ug/L	ND	89.6	60-130			
Dichlorodifluoromethane	36.5	1.0	ug/L	ND	91.3	50-140			
1,2-Dichlorobenzene	39.1	0.5	ug/L	ND	97.8	60-130			
1,3-Dichlorobenzene	37.3	0.5	ug/L	ND	93.3	60-130			
1,4-Dichlorobenzene	38.1	0.5	ug/L	ND	95.2	60-130			
1,1-Dichloroethane	43.8	0.5	ug/L	ND	110	60-130			
1,2-Dichloroethane	46.6	0.5	ug/L	ND	116	60-130			
1,1-Dichloroethylene	42.3	0.5	ug/L	ND	106	60-130			
cis-1,2-Dichloroethylene	39.7	0.5	ug/L	ND	99.2	60-130			
trans-1,2-Dichloroethylene	38.3	0.5	ug/L	ND	95.8	60-130			
1,2-Dichloropropane	42.0	0.5	ug/L	ND	105	60-130			
cis-1,3-Dichloropropylene	36.4	0.5	ug/L	ND	91.1	60-130			
trans-1,3-Dichloropropylene	33.6	0.5	ug/L	ND	84.0	60-130			
Ethylbenzene	41.9	0.5	ug/L	ND	105	60-130			
Ethylene dibromide (dibromoethane, 1,2-)	44.8	0.2	ug/L	ND	112	60-130			
Hexane	43.2	1.0	ug/L	ND	108	60-130			
Methyl Ethyl Ketone (2-Butanone)	93.3	5.0	ug/L	ND	93.3	50-140			
Methyl Isobutyl Ketone	90.8	5.0	ug/L	ND	90.8	50-140			
Methyl tert-butyl ether	112	2.0	ug/L	ND	112	50-140			
Methylene Chloride	42.7	5.0	ug/L	ND	107	60-130			
Styrene	33.7	0.5	ug/L	ND	84.2	60-130			
1,1,1,2-Tetrachloroethane	30.1	0.5	ug/L	ND	75.3	60-130			
1,1,2,2-Tetrachloroethane	32.8	0.5	ug/L	ND	81.9	60-130			
Tetrachloroethylene	37.0	0.5	ug/L	ND	92.4	60-130			
Toluene	42.8	0.5	ug/L	ND	107	60-130			
1,1,1-Trichloroethane	32.1	0.5	ug/L	ND	80.2	60-130			
1,1,2-Trichloroethane	39.0	0.5	ug/L	ND	97.4	60-130			

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**Method Quality Control: Spike**

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Trichloroethylene	37.7	0.5	ug/L	ND	94.2	60-130			
Trichlorofluoromethane	44.3	1.0	ug/L	ND	111	60-130			
Vinyl chloride	30.9	0.5	ug/L	ND	77.2	50-140			
m,p-Xylenes	81.1	0.5	ug/L	ND	101	60-130			
o-Xylene	41.6	0.5	ug/L	ND	104	60-130			
Surrogate: 4-Bromofluorobenzene	78.0		%		97.5	50-140			
Surrogate: Dibromofluoromethane	84.2		%		105	50-140			
Surrogate: Toluene-d8	82.2		%		103	50-140			

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**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.

