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Phase II Environmental Site Assessment

6150 Thunder Road and 5368 Boundary Road
Ottawa, Ontario

Prepared For

Exit 96 Developments (2019) Inc.

September 28, 2020

Report: PE4791-1

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EXECUTIVE SUMMARY

Assessment

A Phase II ESA was conducted for the properties addressed 6150 Thunder Road and 5368 Boundary Road, in the City of Ottawa, Ontario. The purpose of the Phase II ESA was to address the potentially contaminating activity (PCA) that was identified during the Phase I ESA Update and considered to result in an area of potential environmental concern (APEC) on the Phase II Property and update the current sit conditions.

The initial subsurface investigation was carried out in conjunction with a Geotechnical Investigation in September 2019, and consisted of drilling three (3) boreholes, all of which were constructed with groundwater monitoring wells. The more recent subsurface investigation conducted in June 2020, consisted of drilling seven (7) boreholes.

Soil samples were obtained from the boreholes and screened using visual observations and organic vapour measurements. A total of four (4) soil samples were submitted for benzene, toluene, ethylbenzene and xylenes (BTEX) and petroleum hydrocarbons (PHCs, F_1-F_4) analyses as well as soil pH. No detectable BTEX or PHC concentrations were identified. The subsurface soil was determined to be 8.28. All soil results comply with the selected MECP Table 2 Industrial Standards for potable-water conditions.

Groundwater samples from monitoring wells installed in BH1, BH2 and BH3 were recovered and analysed for benzene, toluene, ethylbenzene and xylenes (BTEX) and petroleum hydrocarbons (PHCs, F_1-F_4). No detectable BTEX or PHC concentrations were identified. All groundwater results are in compliance with the MECP Table 2 Standards.

Conclusion

Based on the findings of the Phase II ESA, no further environmental investigation is required.

It is expected that groundwater monitoring wells will be abandoned in accordance with O.Reg.903, at the time of construction excavation. It is recommended that the integrity of the monitoring wells be maintained, prior to future construction.

1.0 INTRODUCTION

At the request of Exit 96 Developments (2019) Inc., Paterson Group (Paterson) conducted a Phase II Environmental Site Assessment of 6150 Thunder Road and 5368 Boundary Road, in the City of Ottawa, Ontario. The purpose of this Phase II ESA has been to address the area of potential environmental concern (APEC) identified on the Phase II Property during the Phase I ESA conducted by Paterson.

1.1 Site Description

Address:	6150 Thunder Road and 5368 Boundary Road, Ottawa, Ontario.
Legal Description:	Lot 1, Concession 9, Ottawa River in Gloucester Township, in the City of Ottawa, Ontario.
Property Identification Number(s):	04324-0354 and 04324-0157
Location:	The subject site is located 120m south of the intersection between Thunder Road and Boundary Road in Ottawa, Ontario.
Latitude and Longitude:	45° 20' 42" N, 75° 26' 42" W;
Zoning:	RU – Rural Countryside Zone
Configuration:	Irregular.
Site Area:	17.4 ha (approximate).

1.2 Property Ownership

The current registered property owner of 6150 Thunder Road and 5368 Boundary Road is Exit 96 Developments (2019) Inc. Paterson was retained to complete this Phase II ESA by Mr. Michel Pilon, acting on behalf of Exit 96 Developments (2019) Inc. Mr. Pilon can be contacted by telephone at 613-850-3132.

1.3 Current and Proposed Future Uses

The Phase II Property is vacant land. It is our understanding that the Phase II Property will be developed with a slab-on-grade warehouse style structure used for commercial/light-industrial purposes.

1.4 Applicable Site Condition Standard

The site condition standards for the property were obtained from Table 2 of the document entitled "Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act", prepared by the Ministry of the Environment, Conservation and Parks (MECP), April 2011. The MECP selected Table 2 Standards are based on the following considerations:

- ❒ Coarse-grained soil conditions
- ❒ Full depth generic site conditions
- ❒ Potable groundwater conditions
- ❒ Industrial land use

The commercial standards were selected based on the proposed future use of the subject site. 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 II Property is an industrial site, located in a light-industrial, commercial and residential area. The site is relatively flat and at grade with the adjacent properties. Regional topography slopes slightly down towards the south, in the direction of a tributary of Bear Brooke Creek, approximately 60 m from the subject site. Site drainage consists primarily of infiltration and some runoff on gravelled areas to adjacent culverts.

2.2 Past Investigations

Paterson completed a Phase I ESA in November 2018 for the subject site. Based on the Phase I ESA, no historical Potentially Contaminating Activities (PCAs) were identified on-site, however, an off-site PCA was identified, a retail fuel outlet (RFO) containing four (4) active underground storage tanks (USTs), which represented an Area of Potential Environmental Concern (APEC) on the Phase I and II Property. A Phase II ESA was recommended to address the APEC identified on-site.

It should be noted that the original Phase I ESA was conducted more than 18 months and as such, was subject to an update as per O.Reg 153/04, Section 28 (2).

In September 2020, Paterson completed a Phase I ESA Update. Based on the Phase I ESA Update, a Phase II ESA was recommended to address the following off-site PCA which resulted in an APEC on the Phase I Property:

- Retail fuel outlet (RFO) addressed 5336 Boundary Road, located at the intersection between Boundary Road and Thunder Road.

This Phase II ESA was conducted to address the aforementioned APEC.

3.0 SCOPE OF INVESTIGATION

3.1 Overview of Site Investigation

An initial subsurface investigation was conducted on December 19, 2018. The 2018 field program consisted of drilling three (3) boreholes, all of which were instrumented with groundwater monitoring wells. Boreholes were drilled to depths of 4.45 m below the ground surface (mbgs).

The most recent subsurface investigation was conducted on June 30, 2020, which consisted of drilling five (5) additional boreholes. The boreholes were drilled to a maximum depth of 7.47 mbgs.

3.2 Media Investigated

During the initial subsurface investigation, soil samples and groundwater samples were obtained and submitted for laboratory analysis, while the more recent investigation, only soil samples were submitted. The rationale for sampling and analyzing these media is based on the Contaminants of Potential Concern (CPCs) identified in the Phase I ESA Update.

The CPCs for soil and groundwater include benzene, toluene, ethylbenzene and xylenes (BTEX) and petroleum hydrocarbons (PHCs, fractions F_1-F_4).

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 shale of the Carlsbad Formation. Overburden of the subject property reportedly consists mostly of nearshore marine sediments of deltaic and estuarian deposits. The south part of the subject property consists of offshore marine deposits of clay and silt, with a drift thickness ranging from approximately 15 to 50 m below grade.

Contaminants of Potential Concern

As per the APEC identified in Table 1 of this Phase I ESA Update, the contaminants of potential concern (CPCs) in soil and/or groundwater include:

- Benzene, Toluene, Ethylbenzene and Xylenes (BTEX).
- Petroleum Hydrocarbons (PHCs, F_1-F_4).
- pH.

Existing Buildings and Structures

The Phase I Property is vacant land. There are no buildings or structures present on-site.

Water Bodies and Areas of Natural Significance

No other water bodies or areas of natural significance are present on the Phase I Property or lands within the Phase I Study Area.

Drinking Water Wells

The Phase I Property is situated in a rural area which relies upon potable water wells.

Neighbouring Land Use

Neighbouring land use in the Phase I Study Area consists of commercial (including a retail fuel outlet), and residential properties. The retail fuel outlet at 5336 Boundary Road is a PCA that represents an APEC on the Phase I Property.

Potentially Contaminating Activities and Areas of Potential Environmental Concern

The PCA that represents an APEC on the Phase I Property as well as Contaminants of Potential Concerns (CPCs) is presented in Table 1.

TABLE 1: Areas of Potential Environmental Concern

Area of Potential Environmental Concern (APEC)	Location of APEC with respect to Phase I Property	Potentially Contaminating Activity (PCA)	Location of PCA (on-site or off-site)	Contaminants of Potential Concern (CPC)	Media Potentially Impacted
Retail Fuel Outlet (RFO)	Eastern portion of the Phase I ESA property.	Item 28 - Gasoline and Associated Products Storage in Fixed UST	Off-site (immediately east of the site)	PHCs, BTEX,	Soil and groundwater

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 is a PCA that resulted in an APEC on the Phase I Property.

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

3.4 Deviations from Sampling and Analysis Plan

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

3.5 Impediments

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

4.0 INVESTIGATION METHOD

4.1 Subsurface Investigation

The initial subsurface investigation was conducted on December 19, 2018. The field program consisted of drilling three (3) boreholes on the Phase II Property. All boreholes were drilled to a maximum depth of 4.45 m below the existing

grade. All three (3) boreholes were completed as groundwater monitoring wells to access the groundwater table.

The most recent subsurface investigation was conducted on June 30, 2020, which consisted of drilling seven (7) additional boreholes. The boreholes were drilled to a maximum depth of 7.47 mbgs.

The boreholes drilled during the 2018 subsurface investigation were placed to address the aforementioned APEC on the Phase II Property. The boreholes were drilled with a track mounted power auger drill rig. The track mounted drill rig was provided by George Downing Estate Drilling of Hawkesbury, Ontario. Borehole locations are shown on Drawing PE4791-3 – Test Hole Location and Groundwater Contour Plan, appended to this report.

4.2 Soil Sampling

A total of thirty-five (35) soil samples were obtained from the boreholes by means of sampling from shallow auger flights and split spoon sampling. The depths at which auger samples and split spoon samples were obtained from the boreholes are shown as "**AU**" and "**SS**" on the Soil Profile and Test Data Sheets, appended to this report.

With the exception of BH3-20 and BH6-20 (consisting of silty sand, followed by silty clay), the site soils consist of topsoil, underlain by silty sand material, overlaying silty clay. The silty sand layer extended to an approximate depth of 0.97 to 3.81 m below the ground surface (mbgs). The boreholes were terminated in the silty clay layer at a maximum depth of 7.47 mbgs.

4.3 Field Screening Measurements

An RKI Eagle gastech with methane elimination and calibrated to hexane was used to measure the combustible vapour concentrations in the headspace of the soil samples recovered from the boreholes. The results of the vapour survey are discussed in Subsection 4.4 and are available on the Soil Profile & Test Data sheets in Appendix 1.

The technical protocol was obtained from Appendix C of the MECP document entitled "Interim Guidelines for the Remediation of Petroleum Contamination at Operating Retail and Private Fuel Outlets in Ontario", dated March 1992.

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 ambient temperature prior to conducting the vapour survey. Allowing the samples to stabilize to ambient 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 gastech calibrated to hexane was used for this purpose. 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.

4.4 Groundwater Monitoring Well Installation

Three (3) groundwater monitoring wells were installed on the Phase II Property as part of the Phase II investigation. The monitoring wells consisted of 50 mm diameter Schedule 40 threaded PVC risers and screens. Monitoring well construction details are listed below in Table 2 and are also presented on the Soil Profile and Test Data Sheets provided in Appendix 1.

TABLE 2: Monitoring Well Construction Details

Well ID	Ground Surface Elevation	Total Depth (m BGS)	Screened Interval (m BGS)	Sand Pack (m BGS)	Bentonite Seal (m BGS)	Casing Type
BH1	77.22	4.42	1.42-4.42	0.91-4.42	0.30-0.91	Flushmount
BH2	76.76	4.42	1.42-4.42	0.91-4.42	0.30-0.91	Flushmount
BH3	76.90	4.42	1.42-4.42	0.76-4.42	0.30-0.91	Flushmount

4.5 Field Measurement of Water Quality Parameters

Groundwater sampling was conducted at BH1, BH2 and BH3 on January 14, 2019. No water quality parameters were measured in the field at that time.

4.6 Groundwater Sampling

Groundwater sampling protocols were followed using the MECP document entitled “Guidance on Sampling and Analytical Methods for Use at Contaminated Sites in Ontario”, dated May 1996. Groundwater samples were obtained from each monitoring well, using dedicated sampling equipment. Standing water was purged from each well prior to sampling. Samples were stored in coolers to reduce analyte volatilization during transportation. Details of our standard

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

4.7 Analytical Testing

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

TABLE 3: Soil Samples Submitted

Sample ID	Sample Depth / Stratigraphic Unit	Parameters Analyzed			Rationale
		PHCs (F_1-F_4)	BTEX	pH	
December 19, 2018					
BH1-SS5	3.05-3.66m, Silty Clay	X	X		Assess soil for potential impacts on the eastern portion of the subject property due to the retail fuel outlet.
BH2-SS4	2.32-2.93m, Silty Clay	X	X		Assess soil for potential impacts on the eastern portion of the subject property due to the retail fuel outlet.
BH3-SS4	2.32-2.93m, Silty Clay	X	X		Assess soil for potential impacts on the south eastern portion of the subject property due to the retail fuel outlet.
June 30, 2020					
BH6-20	1.50-2.10 Silty Clay			X	Assess the soil quality.

TABLE 4: Groundwater Samples Submitted

Sample ID	Screened Interval/ Stratigraphic Unit	Parameters Analyzed		Rationale
		PHCs (F_1-F_4)	BTEX	
January 14, 2019				
BH1-GW1	1.42-4.42 m Silty Clay	X	X	Assess potential impacts on the eastern portion of the subject property due to the retail fuel outlet.
BH2-GW1	1.42-4.42 m Silty Clay	X	X	Assess potential impacts on the eastern portion of the subject property due to the retail fuel outlet.
BH3-GW1	1.42-4.42 m Silty Clay	X	X	Assess potential impacts on the south eastern portion of the subject property due to the retail fuel outlet.

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

4.8 Residue Management

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

4.9 Elevation Surveying

An elevation survey of all borehole locations was completed by Annis, O'Sullivan, Vollebekk Ltd., prior to the initial investigation, while the more recent boreholes (BH1-20 through BH5-20) were surveyed at geodetic elevations by Paterson.

4.10 Quality Assurance and Quality Control Measures

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

5.0 REVIEW AND EVALUATION

5.1 Geology

Site soils consist of a topsoil over silty sand material, followed by silty clay. The site stratigraphy is shown on Drawing PE4791-5 – Cross-Section A-A'.

Groundwater was encountered within the silty sand at depths ranging from approximately 0.42 to 0.93 m below the existing grade.

5.2 Groundwater Elevations, Flow Direction, and Hydraulic Gradient

Groundwater levels were measured during the groundwater sampling event on January 14, 2019 using an electronic water level meter. Groundwater levels are summarized below in Table 5.

TABLE 5: Groundwater Level Measurements

Borehole Location	Ground Surface Elevation (m)	Water Level Depth (m below grade)	Water Level Elevation (m ASL)	Date of Measurement
BH1	77.22	0.93	76.29	January 14, 2019
BH2	76.76	0.46	76.30	January 14, 2019
BH3	76.90	0.42	76.48	January 14, 2019

Based on the groundwater elevations measured during the January 2019 sampling event, groundwater contour mapping was completed. Groundwater contours are shown on Drawing PE4791-3 – Test Hole Location and Groundwater Contour Plan. Based on the contour mapping, groundwater flow beneath the Phase II Property appears to flow towards the west. A horizontal hydraulic gradient of approximately 0.001 m/m was calculated.

5.3 Fine-Coarse Soil Texture

No grain size analysis was completed for the subject site. Coarse grained standards were chosen as a conservative approach.

5.4 Soil: Field Screening

Field screening of the soil samples collected during drilling resulted in vapour readings ranging from 0 ppm to 55 ppm. No obvious visual or olfactory indications of potential environmental concerns were identified in the soil 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

Four (4) soil samples were submitted for analysis of PHCs (F1-F4) and BTEXs as well as soil pH. The results of the analytical testing are presented below in Table 6. The laboratory certificate of analysis is provided in Appendix 1.

The analytical result of the subsurface soil pH at BH6-20-SS3 was determined to be 8.28, which is within the acceptable MECP Table 2 Standards.

TABLE 6: Analytical Test Results – Soil – BTEXs and PHCs (F1-F4)					
Parameter	MDL (µg/g)	Soil Samples (µg/g)			MECP Table 2 Industrial Standards (µg/g)
		December 19, 2018			
		BH1-SS5	BH2-SS4	BH3-SS4	
Benzene	0.02	nd	nd	nd	0.32
Ethylbenzene	0.05	nd	nd	nd	1.1
Toluene	0.05	nd	nd	nd	6.4
Xylenes (Total)	0.05	nd	nd	nd	26
PHC F1	7	nd	nd	nd	55
PHC F2	4	nd	nd	nd	230
PHC F3	8	nd	nd	nd	1,000
PHC F4	6	nd	nd	nd	3,300

Notes:
- MDL – Method Detection Limit
- nd – not detected above the MDL
- **Bold and Underlined** – Value exceeds selected MECP Standards
- NA – Parameter not tested

No detectable PHC or BTEX concentrations were identified in the soil samples analyzed. All parameter concentrations comply with the selected MECP Table 2 Industrial Standards.

5.6 Groundwater Quality

Groundwater samples from monitoring wells installed in BH1, BH2 and BH3 were submitted for laboratory analysis of PHC and BTEX parameters. The groundwater samples were obtained from the screened intervals noted on Table 2. The results of the analytical testing are presented below in Table 8. The laboratory certificates of analysis are provided in Appendix 1.

TABLE 8: Analytical Test Results – Groundwater BTEX and PHCs (F1-F4)					
Parameter	MDL (µg/L)	Groundwater Samples (µg/L)			MECP Table 2 Standards (µg/L)
		January 14, 2019			
		BH1-GW1	BH2-GW1	BH3-GW1	
Benzene	0.5	nd	nd	nd	5
Ethylbenzene	0.5	nd	nd	nd	2.4
Toluene	0.5	nd	nd	nd	24
Xylenes (Total)	0.5	nd	nd	nd	300
PHC F1	25	nd	nd	nd	750
PHC F2	100	nd	nd	nd	150
PHC F3	100	nd	nd	nd	500
PHC F4	100	nd	nd	nd	500

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

No detectable PHC or BTEX concentrations were identified in the groundwater samples analyzed. All parameter concentrations comply with the selected MECP Table 2 Standards.

5.7 Quality Assurance and Quality Control Results

All samples submitted as part of the sampling events were handled in accordance with the Analytical Protocol with respect to preservation method, storage requirement, and container type. Based on the results of the vapour survey and the non-detect soil results, the samples are considered to be representative of the soil quality.

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

Overall, the quality of the field data collected during this Phase II ESA is considered to be sufficient to meet the overall objectives of this assessment.

5.8 Phase II Conceptual Site Model

The following section has been prepared in accordance with the requirements of O.Reg. 269/11 amended by the Environmental Protection Act. Conclusions and recommendations are discussed in a subsequent section.

Site Description

Potentially Contaminating Activity and Areas of Potential Environmental Concern

As indicated in the Phase I-ESA report and Section 2.2 of this report, the following PCA is considered to result in an APEC on the Phase I and Phase II Property:

- APEC 1: Retail fuel outlet (RFO) addressed 5336 Boundary Road, located at the intersection between Boundary Road and Thunder Road (PCA 28).

Contaminants of Potential Concern

As per the APEC identified in Table 1 of this report, the contaminants of potential concern (CPCs) in soil and/or groundwater include:

- Benzene, Toluene, Ethylbenzene and Xylenes (BTEX).
- Petroleum Hydrocarbons (PHCs, F_1-F_4).

Subsurface Structures and Utilities

Underground service locates were completed prior to the subsurface investigation. Underground utilities on the Phase II Property include a private water well and sewage systems.

Physical Setting

Site Stratigraphy

The site stratigraphy, from ground surface to the deepest aquifer or aquitard investigated, is illustrated on Drawing PE4791-5 – Cross-section A-A'. The stratigraphy consists of:

- Topsoil, approximately 0.3 m below existing grade.
- Loose, brown silty sand, extending to depths ranging from approximately 0.97 to 1.52 m below grade.
- Brown to grey silty clay was identified beneath the silty sand, extending to a depth of 4.42 m below grade.

Hydrogeological Characteristics

Groundwater at the Phase II Property was encountered in the silty sand. This unit is interpreted to function as a local aquifer at the subject site.

Water levels were measured at the subject site on January 14, 2019, at depths ranging from 0.42 to 0.93 m below grade. Based on the groundwater elevations measured during this monitoring event, groundwater contour mapping was completed and the horizontal hydraulic gradient for the subject site was calculated. Groundwater flow at the subject site was in a westerly direction, with a hydraulic gradient of approximately 0.001 m/m.

Approximate Depth to Bedrock

Bedrock was not encountered during the subsurface investigations. A dynamic cone penetration test (DCPT) commenced at approximately 7.332 mbgs at BH2-20. Practical DCPT refusal at 21.16 mbgs was reached, in which bedrock was inferred.

Approximate Depth to Water Table

Depth to water table at the subject site varies between approximately 0.42 to 0.93 m below the existing grade.

Sections 41 and 43.1 of the Regulation

Section 41 of the Regulation (Site Condition Standards, Environmentally Sensitive Areas) does not apply to the subject site as the Phase II Property is not within 30m of an environmentally sensitive area, and the pH of the subsurface is between 5 and 11.

Section 43.1 of the Regulation does not apply to the subject site in that the subject site is not a Shallow Soil Property.

Fill Placement

No fill material was identified on the Phase II Property.

Proposed Buildings and Other Structures

It is our understanding that Phase II Property will be purchased by the client. A proposed development plan was not provided to Paterson.

Existing Buildings and Structures

The Phase II Property is vacant land. There are no buildings or structures present on-site.

Areas of Natural Significance and Water Bodies

No other water bodies or areas of natural significance are present on the Phase I Property or lands within the Phase I Study Area.

Environmental Condition

Areas Where Contaminants are Present

No contaminants were identified in the soil or the groundwater analyzed during the Phase II ESA.

Types of Contaminants

No contaminants were identified in the soil or the groundwater analyzed during the Phase II ESA.

Contaminated Media

No contaminants were identified in the soil or the groundwater analyzed during the Phase II ESA.

What Is Known About Areas Where Contaminants Are Present

No contaminants are present on the Phase II Property.

Distribution and Migration of Contaminants

As previously noted, no impacted soil or groundwater was identified on the subject site. Therefore, concerns regarding the distribution or migration of contaminants do not apply to the Phase II Property or Study Area.

Discharge of Contaminants

No impacted soil or groundwater was identified on the subject site, therefore, concerns regarding the discharge of contaminants do not apply to the Phase II Property or Study Area.

Climatic and Meteorological Conditions

In general, climatic and meteorological conditions have the potential to affect contaminant distribution. Two (2) ways by which climatic and meteorological conditions may affect contaminant distribution include the downward leaching of contaminants by means of the infiltration of precipitation, and the migration of contaminants via groundwater levels and/or flow, which may fluctuate seasonally. However, based on the analytical results, there are no concerns with regards to leaching and/or migration, as there are no contaminants of concern on the subject site.

Potential for Vapour Intrusion

No impacted soil or groundwater was identified on the subject site, therefore, concern regarding potential of vapour intrusion does not apply to the Phase II Property.

6.0 CONCLUSIONS

Assessment

A Phase II ESA was conducted for the properties addressed 6150 Thunder Road and 5368 Boundary Road, in the City of Ottawa, Ontario. The purpose of the Phase II ESA was to address the potentially contaminating activity (PCA) that was identified during the Phase I ESA Update and considered to result in an area of potential environmental concern (APEC) on the Phase II Property and update the current site conditions.

The initial subsurface investigation was carried out in September 2019, and consisted of drilling three (3) boreholes, all of which were constructed with groundwater monitoring wells. The more recent subsurface investigation was conducted in June 2020 and consisted of drilling seven (7) boreholes.

Soil samples were obtained from the boreholes and screened using visual observations and organic vapour measurements. A total of four (4) soil samples were submitted for benzene, toluene, ethylbenzene and xylenes (BTEX) and petroleum hydrocarbons (PHCs, F_1-F_4) analyses as well as soil pH. No detectable BTEX or PHC concentrations were identified. The subsurface soil was determined to be 8.28. All soil results comply with the selected MECP Table 2 Industrial Standards for potable-water conditions.

Groundwater samples from monitoring wells installed in BH1, BH2 and BH3 were recovered and analysed for benzene, toluene, ethylbenzene and xylenes (BTEX) and petroleum hydrocarbons (PHCs, F_1-F_4). No detectable BTEX or PHC concentrations were identified. All groundwater results are in compliance with the MECP Table 2 Standards.

Conclusion

Based on the findings of the Phase II ESA, no further environmental investigation is required.

It is expected that groundwater monitoring wells will be abandoned in accordance with O.Reg.903, at the time of construction excavation. It is recommended that the integrity of the monitoring wells be maintained, prior to future construction.

7.0 STATEMENT OF LIMITATIONS

This Phase II - Environmental Site Assessment report has been prepared in general accordance with O.Reg. 153/04 as amended and meets the requirements of CSA Z769-00. The conclusions presented herein are based on information gathered from a limited sampling and testing program. The test results represent conditions at specific test locations at the time of the field program.

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

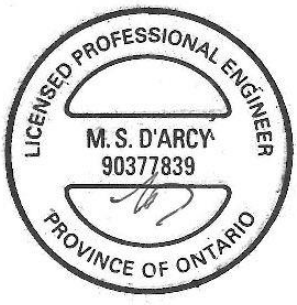
Should any conditions be encountered at the subject site and/or historical information that differ from our findings, we request that we be notified immediately in order to allow for a reassessment.

This report was prepared for the sole use of Exit 96 Developments (2019) Inc. Notification from Exit 96 Developments (2019) Inc. and Paterson Group will be required to release this report to any other party.

Paterson Group Inc.

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

Mark S. D'Arcy, P.Eng., QP$_{ESA}$



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- Exit 96 Developments (2019) Inc.
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FIGURES

FIGURE 1 – KEY PLAN

DRAWING PE4791-3 – TEST HOLE LOCATION AND GROUNDWATER CONTOUR PLAN

DRAWING PE4791-4 – ANALYTICAL TESTING PLAN – SOIL AND GROUNDWATER RESULTS

DRAWING PE4791-5 – CROSS-SECTION A-A' – STRATIGRAPHY

APPENDIX 1

SAMPLING AND ANALYSIS PLAN

SOIL PROFILE AND TEST DATA SHEETS

SYMBOLS AND TERMS

LABORATORY CERTIFICATES OF ANALYSIS

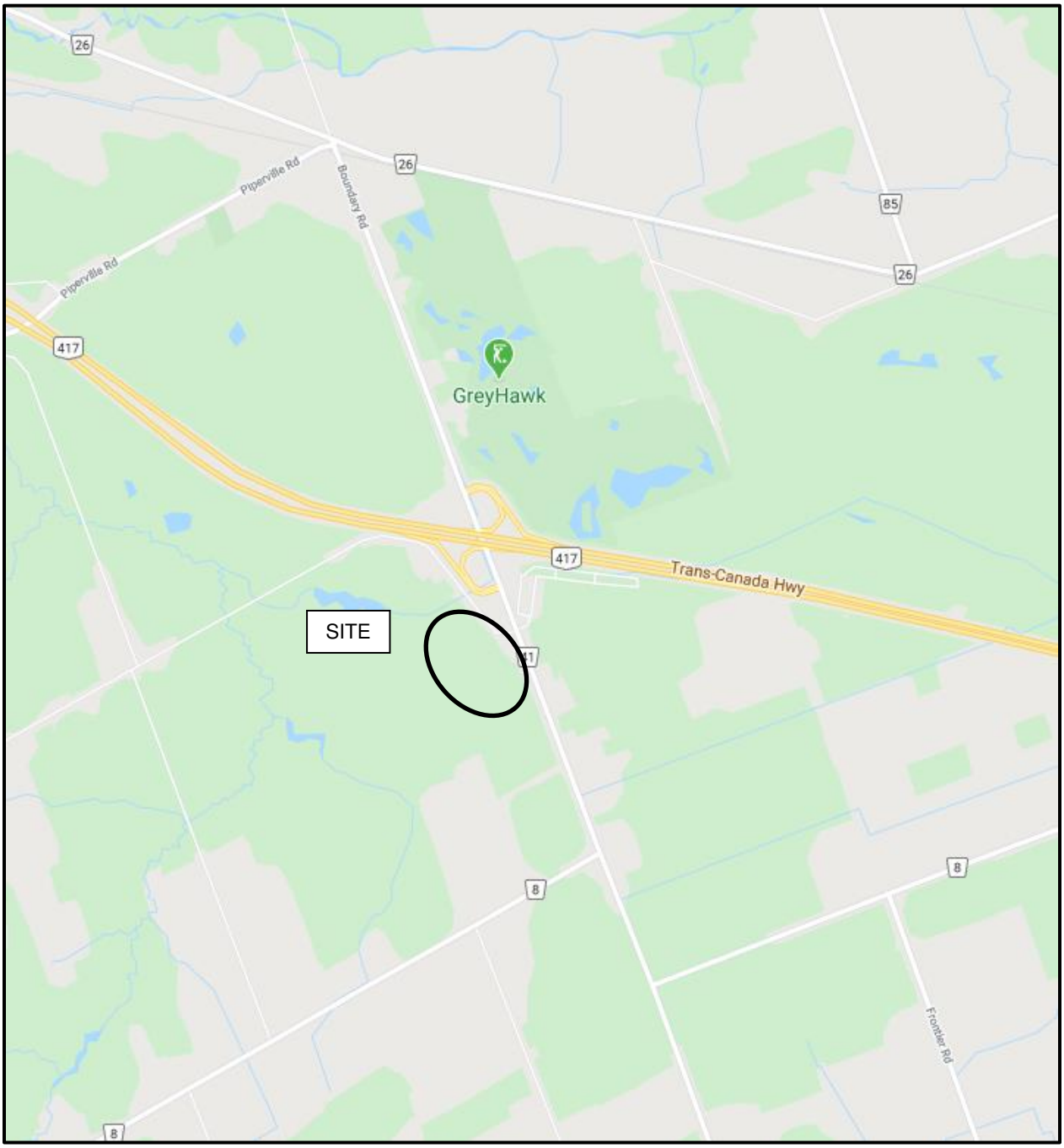
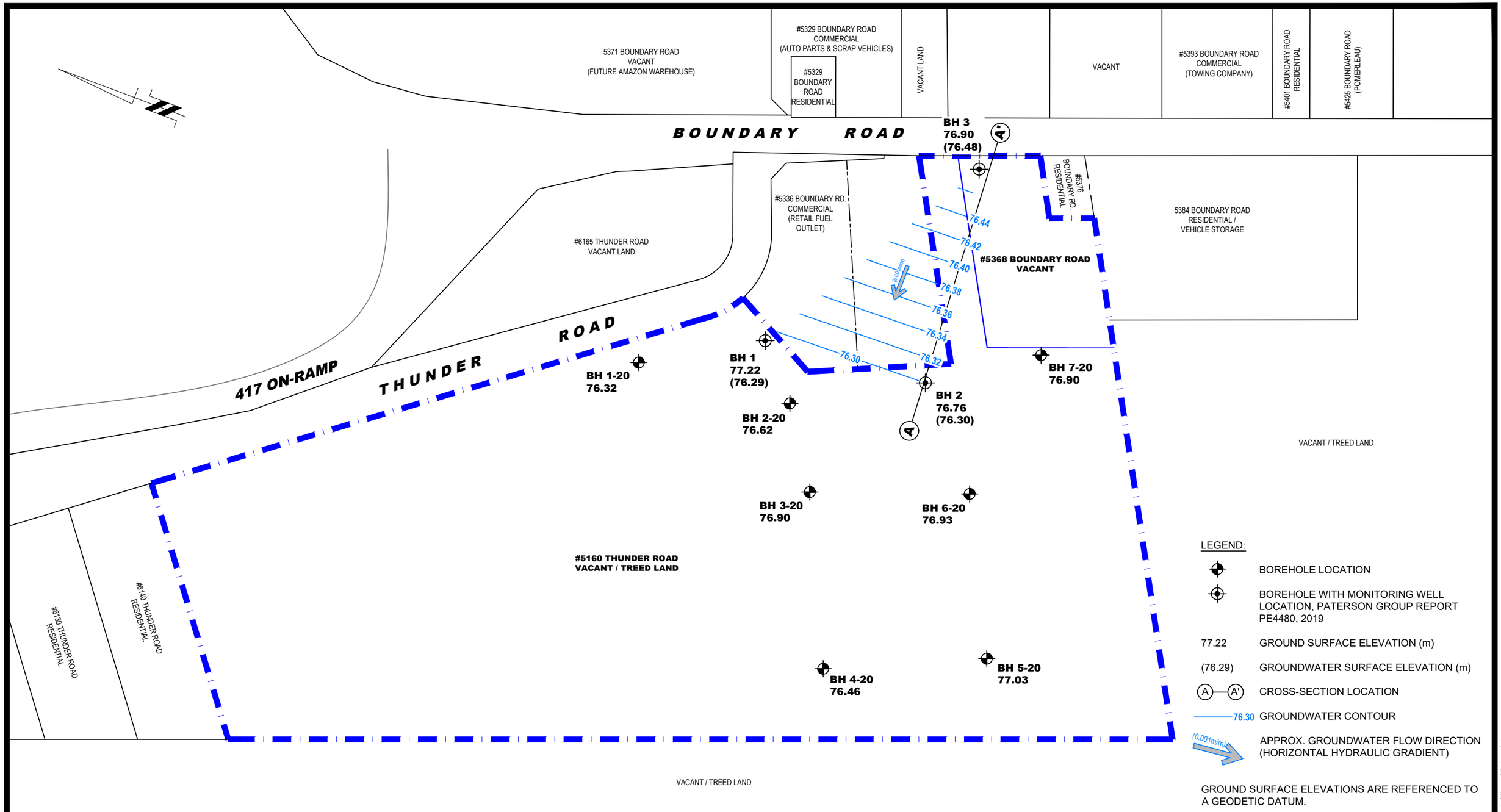


FIGURE 1

KEY PLAN



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NO.	REVISIONS	DATE	INITIAL

EXIT 96 DEVELOPMENTS INC.

PHASE II - ENVIRONMENTAL SITE ASSESSMENT
6150 THUNDER ROAD AND 5368 BOUNDARY ROAD

OTTAWA, ONTARIO

Title:

TEST HOLE LOCATION PLAN

Scale: 1:2500	Date: 09/2020
Drawn by: MPG	Report No.: PE4791-1
Checked by: MW	**PE4791-3**
Approved by: MSD	Revision No.:

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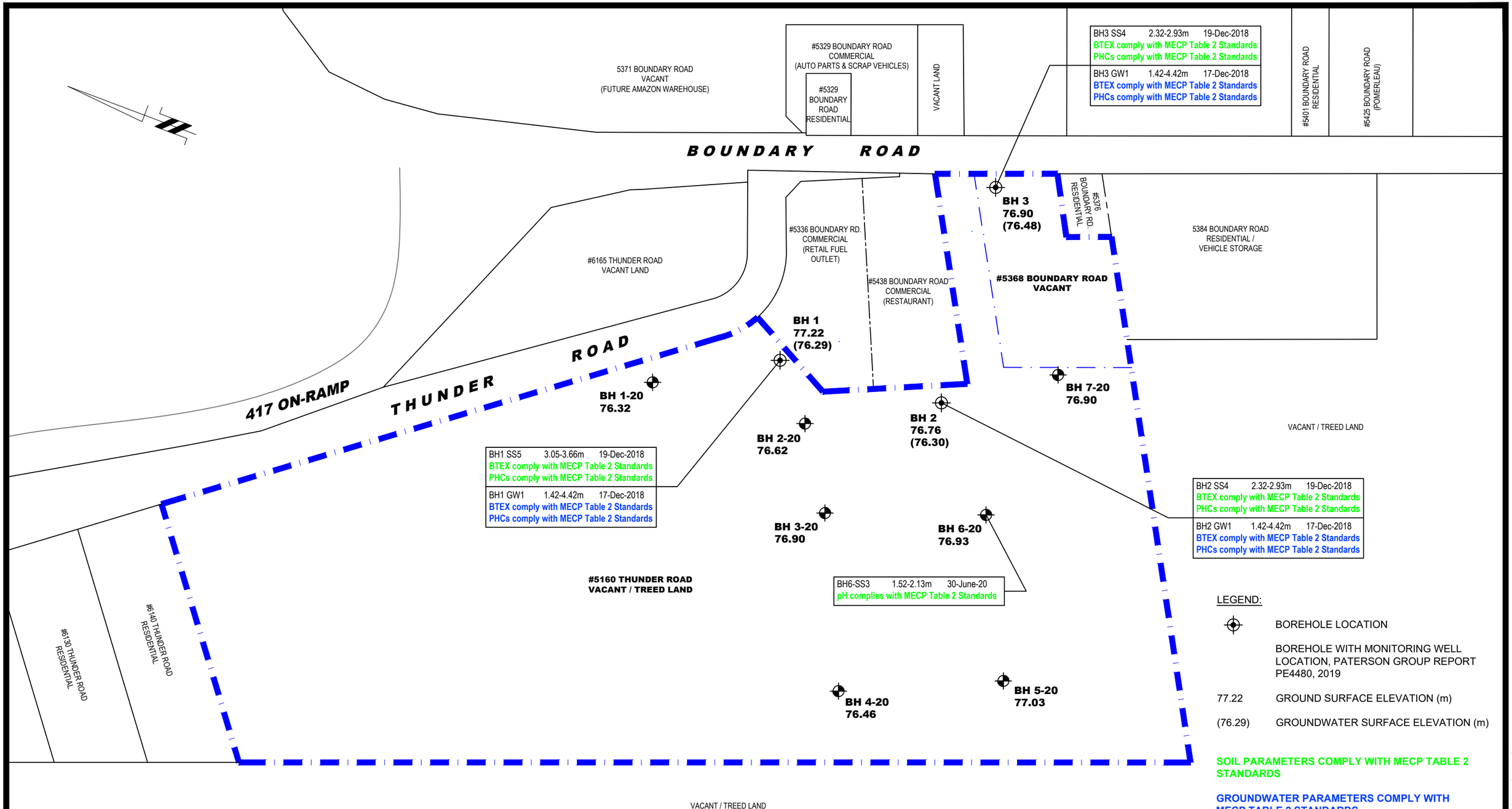

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NO.	REVISIONS	DATE	INITIAL

EXIT 96 DEVELOPMENTS INC.

PHASE II - ENVIRONMENTAL SITE ASSESSMENT
6150 THUNDER ROAD AND 5368 BOUNDARY ROAD

OTTAWA, ONTARIO

Title:

ANALTYICAL TESTING PLAN

Scale: 1:2500	Date: 09/2020
Drawn by: MPG	Report No.: PE4791-1
Checked by: MW	PE4791-4
Approved by: MSD	Revision No.:

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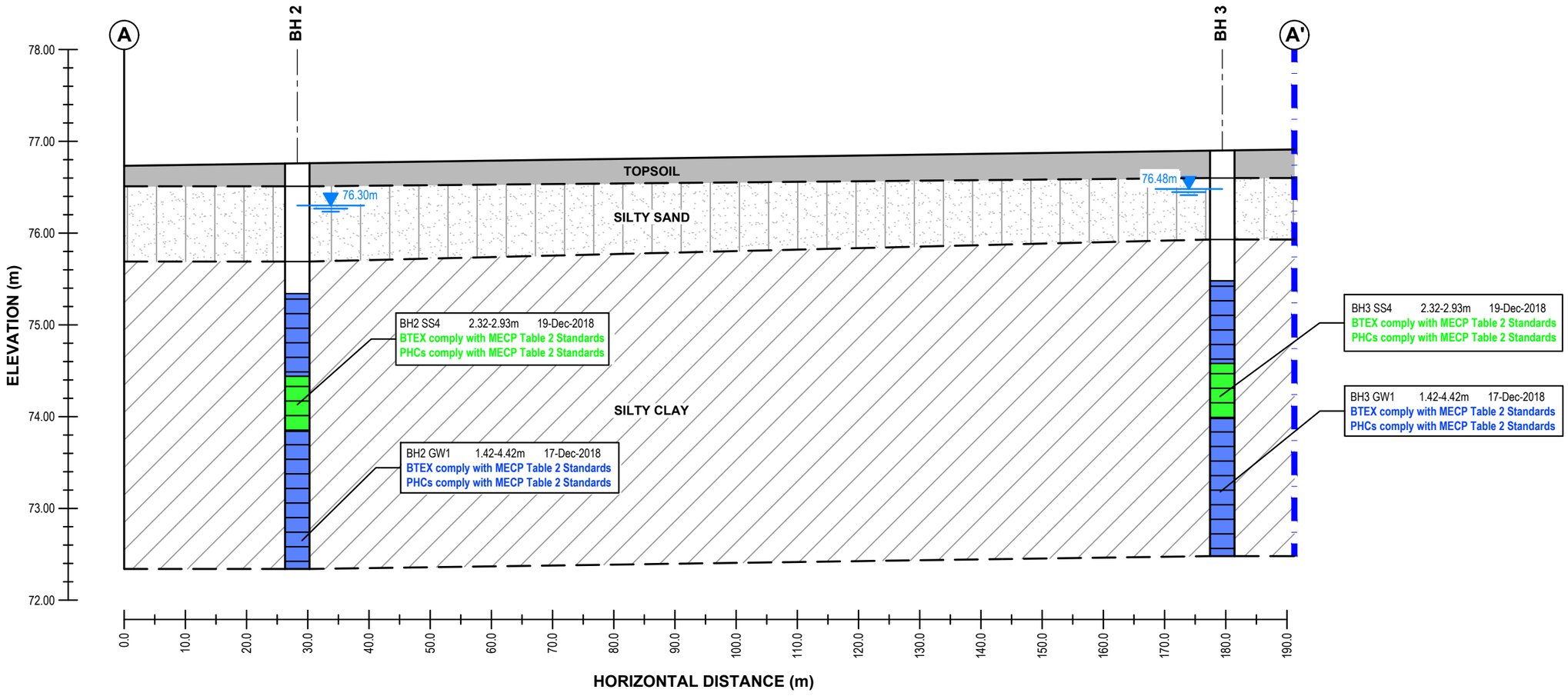

SOIL PARAMETERS COMPLY WITH MECP TABLE 2 STANDARDS

GROUNDWATER PARAMETERS COMPLY WITH MECP TABLE 2 STANDARDS

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NO.	REVISIONS	DATE	INITIAL

EXIT 96 DEVELOPMENTS INC.

PHASE II - ENVIRONMENTAL SITE ASSESSMENT
6150 THUNDER ROAD AND 5368 BOUNDARY ROAD

OTTAWA, ONTARIO

Title:

CROSS-SECTION A-A'

Scale: AS SHOWN	Date: 09/2020
Drawn by: MPG	Report No.: PE4791-1
Checked by: MW	PE4791-5
Approved by: MSD	Revision No.:

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Geotechnical Engineering

Environmental Engineering

Hydrogeology

Geological Engineering

Materials Testing

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Sampling & Analysis Plan

Phase II Environmental Site Assessment
6150 Thunder Road and 5368 Boundary Road
Ottawa, Ontario

Prepared For

Exit 96 Developments (2019) Inc.

December 2018

Report: PE4791-SAP

Table of Contents

1.0 SAMPLING PROGRAM

Paterson Group Inc. (Paterson) was commissioned by Michel Pilon to conduct a Phase II Environmental Site Assessment (ESA) at 6150 Thunder Road and 5368 Boundary Road, in the City of Ottawa, Ontario. Based on our November 2018 Phase I ESA and more resent Phase I ESA Update completed for the subject property, a subsurface investigation program, consisting of borehole drilling, was developed. A geotechnical investigation was conducted concurrently with the environmental subsurface investigation.

Borehole	Location & Rationale	Proposed Depth & Rationale
BH1	Placed on the eastern boundary with the retail fuel outlet (RFO).	Borehole to be sampled to approximately 4.5m. Install monitoring well to intercept groundwater table. Core bedrock if necessary for monitoring well installation.
BH2	Placed borehole 65 m southwest of the BH1 to delineate potential impacts caused by the RFO.	Borehole to be sampled to approximately 4.5m. Install monitoring well to intercept groundwater table. Core bedrock if necessary for monitoring well installation.
BH3	Placed borehole 100 m south of the RFO to delineate potential impacts caused by the RFO.	Borehole to be sampled to approximately 4.5m. Install monitoring well to intercept groundwater table. Core bedrock if necessary for monitoring well installation.
BH1-20 through BH7-20	Placed on the southern portion of site for geotechnical purposes	Borehole to be drilled to approximately 6 mbgs and/or until practical refusal is achieved.

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

Following borehole drilling, monitoring wells will be installed in selected boreholes (as above) for the measurement of water levels and the collection of groundwater samples. Borehole locations are shown on the Test Hole Location Plan appended to the main report.

2.0 ANALYTICAL TESTING PROGRAM

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

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

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

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

3.0 STANDARD OPERATING PROCEDURES

3.1 Environmental Drilling Procedure

Purpose

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

Equipment

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

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

Determining Borehole Locations

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

After drilling is completed a plan with the borehole locations must be provided. Distances and orientations of boreholes with respect to site features (buildings, roadways, etc.) must be provided. Ground surface elevations provided by Annis, O'Sullivan, Vollebekk Ltd.

Drilling Procedure

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

- ❒ Continuous split spoon samples (every 0.6 m or 2') or semi-continuous (every 0.76 m or 2'6") are required.
- ❒ Make sure samples are well sealed in plastic bags with no holes prior to screening and are kept cool but unfrozen.
- ❒ If sampling for VOCs, BTEX, or PHCs F1, a soil core from each soil sample which may be analyzed must be taken and placed in the laboratory-provided methanol vial.
- ❒ Note all and any odours or discolouration of samples.
- ❒ Split spoon samplers must be washed between samples.
- ❒ If obvious contamination is encountered, continue sampling until vertical extent of contamination is delineated.
- ❒ As a general rule, environmental boreholes should be deep enough to intercept the groundwater table (unless this is impossible/impractical - call project manager to discuss).
- ❒ If at all possible, soil samples should be submitted to a preliminary screening procedure on site, either using a RKI Eagle, PID, etc. depending on type of suspected contamination.

Spoon Washing Procedure

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

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

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

Screening Procedure

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

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

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

3.2 Monitoring Well Installation Procedure

Equipment

- ❒ 5' x 2" [1.52 m x 50 mm] threaded sections of Schedule 40 PVC slotted well screen (5' x 1 ¼" [1.52 m x 32 mm] if installing in cored hole in bedrock)
- ❒ 5' x 2" [1.52 m x 50 mm] threaded sections of Schedule 40 PVC riser pipe (5' x 1 ¼" [1.52 m x 32 mm] if installing in cored hole in bedrock)
- ❒ Threaded end-cap
- ❒ Slip-cap or J-plug
- ❒ Asphalt cold patch or concrete
- ❒ Silica Sand
- ❒ Bentonite chips (Holeplug)
- ❒ Steel flushmount casing

Procedure

- ❒ Drill borehole to required depth, using drilling and sampling procedures described above.
- ❒ If borehole is deeper than required monitoring well, backfill with bentonite chips to required depth. This should only be done on wells where contamination is not suspected, in order to prevent downward migration of contamination.
- ❒ Only one monitoring well should be installed per borehole.
- ❒ Monitoring wells should not be screened across more than one stratigraphic unit to prevent potential migration of contaminants between units.
- ❒ Where LNAPLs are the suspected contaminants of concern, monitoring wells should be screened straddling the water table in order to capture any free product floating on top of the water table.
- ❒ Thread the end cap onto a section of screen. Thread second section of screen if required. Thread risers onto screen. Lower into borehole to required depth. Ensure slip-cap or J-plug is inserted to prevent backfill materials entering well.
- ❒ As drillers remove augers, backfill borehole annulus with silica sand until the level of sand is approximately 0.3 m above the top of the screen.
- ❒ Backfill with holeplug until at least 0.3 m of holeplug is present above the top of the silica sand.
- ❒ Backfill remainder of borehole with holeplug or with auger cuttings (if contamination is not suspected).
- ❒ Install flushmount casing. Seal space between flushmount and borehole annulus with concrete, cold patch, or holeplug to match surrounding ground surface.

3.3 Monitoring Well Sampling Procedure

Equipment

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

Sampling Procedure

- ❒ Locate well and use socket wrench or Allan key to open metal flush mount protector cap. Remove plastic well cap.
- ❒ Measure water level, with respect to existing ground surface, using water level meter or interface probe. If using interface probe on suspected NAPL site, measure the thickness of free product.
- ❒ Measure total depth of well.
- ❒ Clean water level tape or interface probe using methanol and water. Change gloves between wells.
- ❒ Calculate volume of standing water within well and record.
- ❒ Insert polyethylene tubing into well and attach to peristaltic pump. Turn on peristaltic pump and purge into graduated bucket. Purge at least three well volumes of water from the well. Measure and record field chemistry. Continue to purge, measuring field chemistry after every well volume purged, until appearance or field chemistry stabilizes.
- ❒ Note appearance of purge water, including colour, opacity (clear, cloudy, silty), sheen, presence of LNAPL, and odour. Note any other unusual features (particulate matter, effervescence (bubbling) of dissolved gas, etc.).
- ❒ Fill required sample bottles. If sampling for metals, attach 75-micron filter to discharge tube and filter metals sample. If sampling for VOCs, use low flow rate to ensure continuous stream of non-turbulent flow into sample bottles. Ensure no headspace is present in VOC vials.
- ❒ Replace well cap and flushmount casing cap.

4.0 QUALITY ASSURANCE/QUALITY CONTROL (QA/QC)

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

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

5.0 DATA QUALITY OBJECTIVES

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

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

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

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

For the purpose of calculating the RPD, it is desirable to select field duplicates from samples for which parameters are present in concentrations above laboratory detection limits, i.e. samples which are expected to be contaminated. If parameters are below laboratory detection limits for selected samples or duplicates, the RPD may be calculated using a concentration equal to one half (0.5 x) the laboratory detection limit.

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

These considerations are discussed in the body of the report.

6.0 PHYSICAL IMPEDIMENTS TO SAMPLING & ANALYSIS PLAN

Physical impediments to the Sampling and Analysis plan may include:

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

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

patersongroup Consulting Engineers

154 Colonnade Road South, Ottawa, Ontario K2E 7J5

SOIL PROFILE AND TEST DATA

Phase II - Environmental Site Assessment
5368 Boundary Road and 6150 Thunder Road
Ottawa, Ontario

DATUM Ground surface elevations provided by Annis, O'Sullivan, Vollebekk Ltd.

FILE NO. PE4480

REMARKS

HOLE NO. BH 1

BORINGS BY CME 55 Power Auger **DATE** December 19, 2019

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)
GROUND SURFACE						0	77.22
TOPSOIL		AU	1				
0.30							
Loose, brown **SILTY SAND**		SS	2	42	6	1	76.22
1.52							
		SS	3	83	W	2	75.22
Brown **SILTY CLAY**							
		SS	4	83	W		
- grey by 2.7m depth						3	74.22
		SS	5	71	9		
						4	73.22
		SS	6	96	W		
4.42							
End of Borehole							
(GWL @ 0.93m - Jan. 14, 2019)							

Photo Ionization Detector
● Volatile Organic Rdg. (ppm)

○ **Lower Explosive Limit %**

20 40 60 80

100 200 300 400 500

RKI Eagle Rdg. (ppm)

▲ Full Gas Resp. △ Methane Elim.

Monitoring Well Construction

patersongroup Consulting Engineers

154 Colonnade Road South, Ottawa, Ontario K2E 7J5

SOIL PROFILE AND TEST DATA

Phase II - Environmental Site Assessment
5368 Boundary Road and 6150 Thunder Road
Ottawa, Ontario

DATUM Ground surface elevations provided by Annis, O'Sullivan, Vollebekk Ltd.

FILE NO. PE4480

REMARKS

HOLE NO. BH 2

BORINGS BY CME 55 Power Auger **DATE** December 19, 2019

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)
GROUND SURFACE						0	76.76
TOPSOIL							
0.25		AU	1				
Very loose, brown **SILTY SAND**						1	75.76
1.07		SS	2	38	2		
Brown **SILTY CLAY**		SS	3	88	W	2	74.76
- grey by 2.2m depth		SS	4	83	4		
		SS	5	100	W	3	73.76
		SS	6	100	W	4	72.76
4.42							
End of Borehole							
(GWL @ 0.46m - Jan. 14, 2019)							

Photo Ionization Detector

● Volatile Organic Rdg. (ppm)

○ **Lower Explosive Limit %**

20 40 60 80

100 200 300 400 500

RKI Eagle Rdg. (ppm)

▲ Full Gas Resp. △ Methane Elim.

Monitoring Well Construction

patersongroup Consulting Engineers

154 Colonnade Road South, Ottawa, Ontario K2E 7J5

SOIL PROFILE AND TEST DATA

Phase II - Environmental Site Assessment
5368 Boundary Road and 6150 Thunder Road
Ottawa, Ontario

DATUM Ground surface elevations provided by Annis, O'Sullivan, Vollebekk Ltd.

FILE NO. PE4480

REMARKS

HOLE NO. BH 3

BORINGS BY CME 55 Power Auger **DATE** December 19, 2019

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)
GROUND SURFACE						0	76.90
TOPSOIL							
0.30		AU	1				
Very loose, brown **SILTY SAND**							
0.97		SS	2	88	3	1	75.90
		SS	3	12	W	2	74.90
Brown **SILTY CLAY**							
		SS	4	100	W		
- grey by 3.0m depth						3	73.90
		SS	5	92	W		
						4	72.90
		SS	6	100	W		
4.42							
End of Borehole							
(GWL @ 0.42m - Jan. 14, 2019)							

Photo Ionization Detector

● Volatile Organic Rdg. (ppm)

○ **Lower Explosive Limit %**

20 40 60 80

100 200 300 400 500

RKI Eagle Rdg. (ppm)

▲ Full Gas Resp. △ Methane Elim.

Monitoring Well Construction

patersongroup Consulting Engineers

154 Colonnade Road South, Ottawa, Ontario K2E 7J5

SOIL PROFILE AND TEST DATA

Phase II - Environmental Site Assessment
6150 Thunder Road and 5368 Boundary Road
Ottawa, Ontario

DATUM Geodetic

FILE NO. PE4791

REMARKS

HOLE NO. BH 1-20

BORINGS BY Track-Mount Power Auger **DATE** June 30, 2020

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)	Photo Ionization Detector: ● Volatile Organic Rdg. (ppm) / ○ Lower Explosive Limit %	Monitoring Well Construction
GROUND SURFACE						0	76.32		
TOPSOIL 0.25									
Brown **SILTY SAND** 0.38		AU	1						
		SS	2	83	3	1	75.32		
						2	74.32		
Firm, brown **SILTY CLAY**									
- soft to firm and grey by 3.0m depth						3	73.32		
						4	72.32		
						5	71.32		
						6	70.32		
						7	69.32		
7.47 End of Borehole									

Photo Ionization Detector: ○ Lower Explosive Limit % — 20 40 60 80

100 200 300 400 500

RKI Eagle Rdg. (ppm)

▲ Full Gas Resp. △ Methane Elim.

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154 Colonnade Road South, Ottawa, Ontario K2E 7J5

SOIL PROFILE AND TEST DATA

Phase II - Environmental Site Assessment
6150 Thunder Road and 5368 Boundary Road
Ottawa, Ontario

DATUM Geodetic

FILE NO. PE4791

REMARKS

HOLE NO. BH 2-20

BORINGS BY Track-Mount Power Auger **DATE** July 1, 2020

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)	Photo Ionization Detector ● Volatile Organic Rdg. (ppm) / ○ Lower Explosive Limit %	Monitoring Well Construction
GROUND SURFACE						0	76.62		
Very loose, brown **SILTY SAND,** some organics		AU	1						
0.56									
Brown **SILTY SAND** with sand seams		SS	2	79	3	1	75.62		
1.52									
						2	74.62		
						3	73.62		
Firm to soft, grey **SILTY CLAY**						4	72.62		
						5	71.62		
						6	70.62		
						7	69.62		
7.32									
Dynamic Cone Penetration Test commenced at 7.32m depth. Cone pushed to 19.5m depth.									
Practical DCPT refusal at 21.16m depth									

Photo Ionization Detector: ○ Lower Explosive Limit % — 20 40 60 80

RKI Eagle Rdg. (ppm) — 100 200 300 400 500

▲ Full Gas Resp. △ Methane Elim.

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154 Colonnade Road South, Ottawa, Ontario K2E 7J5

SOIL PROFILE AND TEST DATA

Phase II - Environmental Site Assessment
6150 Thunder Road and 5368 Boundary Road
Ottawa, Ontario

DATUM Geodetic

FILE NO. PE4791

REMARKS

HOLE NO. BH 3-20

BORINGS BY Track-Mount Power Auger **DATE** June 30, 2020

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)	Photo Ionization Detector: Volatile Organic Rdg. (ppm) / Lower Explosive Limit %	Monitoring Well Construction
GROUND SURFACE						0	76.90		
Loose, brown **SILTY SAND,** some organics, trace clay		AU	1						
		SS	2	58	8	1	75.90		
1.27									
Firm, brown **SILTY CLAY**						2	74.90		
- grey by 3.0m depth						3	73.90		
						4	72.90		
		SS	3	100	1	5	71.90		
						6	70.90		
						7	69.90		
7.47									
End of Borehole									

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

20 40 60 80

100 200 300 400 500

RKI Eagle Rdg. (ppm)

▲ Full Gas Resp. △ Methane Elim.

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154 Colonnade Road South, Ottawa, Ontario K2E 7J5

SOIL PROFILE AND TEST DATA

Phase II - Environmental Site Assessment
6150 Thunder Road and 5368 Boundary Road
Ottawa, Ontario

DATUM Geodetic

FILE NO. PE4791

REMARKS

HOLE NO. BH 4-20

BORINGS BY Track-Mount Power Auger **DATE** June 30, 2020

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)	Photo Ionization Detector: ● Volatile Organic Rdg. (ppm) / ○ Lower Explosive Limit %	Monitoring Well Construction
GROUND SURFACE						0	76.46	20 40 60 80	
TOPSOIL 0.08									
Very loose, brown **SILTY SAND,** trace organics 0.60		AU	1						
		SS	2	46	2	1	75.46		
						2	74.46		
Firm, brown **SILTY CLAY**									
- soft and grey by 3.0m depth						3	73.46		
						4	72.46		
						5	71.46		
						6	70.46		
						7	69.46		
7.47									
End of Borehole								100 200 300 400 500 **RKI Eagle Rdg. (ppm)** ▲ Full Gas Resp. △ Methane Elim.	

patersongroup Consulting Engineers

154 Colonnade Road South, Ottawa, Ontario K2E 7J5

SOIL PROFILE AND TEST DATA

Phase II - Environmental Site Assessment
6150 Thunder Road and 5368 Boundary Road
Ottawa, Ontario

DATUM Geodetic

FILE NO. PE4791

REMARKS

HOLE NO. BH 5-20

BORINGS BY Track-Mount Power Auger **DATE** June 30, 2020

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)
GROUND SURFACE						0	77.03
TOPSOIL 0.10		AU	1				
Loose, brown **SILTY SAND,** trace organics		SS	2	42	4	1	76.03
1.30							
Firm, brown **SILTY CLAY** 1.52						2	75.03
						3	74.03
						4	73.03
Soft to firm, grey **SILTY CLAY,** trace sand seams						5	72.03
						6	71.03
						7	70.03
7.32							
Dynamic Cone Penetration Test commenced at 7.32m depth. Cone pushed to 15.2m depth.							
Practical DCPT refusal at 16.28m depth							

Photo Ionization Detector

● Volatile Organic Rdg. (ppm)

○ **Lower Explosive Limit %**

20 40 60 80

100 200 300 400 500

RKI Eagle Rdg. (ppm)

▲ Full Gas Resp. △ Methane Elim.

Monitoring Well Construction

patersongroup Consulting Engineers

154 Colonnade Road South, Ottawa, Ontario K2E 7J5

SOIL PROFILE AND TEST DATA

Phase II - Environmental Site Assessment
6150 Thunder Road and 5368 Boundary Road
Ottawa, Ontario

DATUM Geodetic

FILE NO. PE4791

REMARKS

HOLE NO. BH 6-20

BORINGS BY Track-Mount Power Auger **DATE** June 30, 2020

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)	Photo Ionization Detector: Volatile Organic Rdg. (ppm) / Lower Explosive Limit %	Monitoring Well Construction
GROUND SURFACE						0	76.93		
Compact, brown **SILTY SAND**		AU	1						
		SS	2	33	10	1	75.93		
1.37									
		SS	3	100	1	2	74.93		
						3	73.93		
Firm to soft, grey **SILTY CLAY**						4	72.93		
						5	71.93		
						6	70.93		
						7	69.93		
7.47									
End of Borehole									

Photo Ionization Detector
● Volatile Organic Rdg. (ppm)
○ Lower Explosive Limit %
20 40 60 80
100 200 300 400 500
RKI Eagle Rdg. (ppm)
▲ Full Gas Resp. △ Methane Elim.

patersongroup Consulting Engineers

154 Colonnade Road South, Ottawa, Ontario K2E 7J5

SOIL PROFILE AND TEST DATA

Phase II - Environmental Site Assessment
6150 Thunder Road and 5368 Boundary Road
Ottawa, Ontario

DATUM Geodetic

FILE NO. PE4791

REMARKS

HOLE NO. BH 7-20

BORINGS BY Track-Mount Power Auger **DATE** June 30, 2020

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)
GROUND SURFACE						0	76.90
TOPSOIL 0.15		AU	1				
FILL: Brown silty sand							
0.81		SS	2	100	2	1	75.90
Very loose, brown **SILTY SAND** with clay		SS	3	100	W	2	74.90
- grey by 2.3m depth						3	73.90
3.81						4	72.90
Soft, grey **SILTY CLAY**						5	71.90
5.94							
End of Borehole							

Photo Ionization Detector

● Volatile Organic Rdg. (ppm)

○ **Lower Explosive Limit %**

20 40 60 80

100 200 300 400 500

RKI Eagle Rdg. (ppm)

▲ Full Gas Resp. △ Methane Elim.

Monitoring Well Construction

SYMBOLS AND TERMS

SOIL DESCRIPTION

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

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

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

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

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

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

SYMBOLS AND TERMS (continued)

SOIL DESCRIPTION (continued)

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

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

ROCK DESCRIPTION

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

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

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

SAMPLE TYPES

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

SYMBOLS AND TERMS (continued)

PLASTICITY LIMITS AND GRAIN SIZE DISTRIBUTION

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

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

CONSOLIDATION TEST

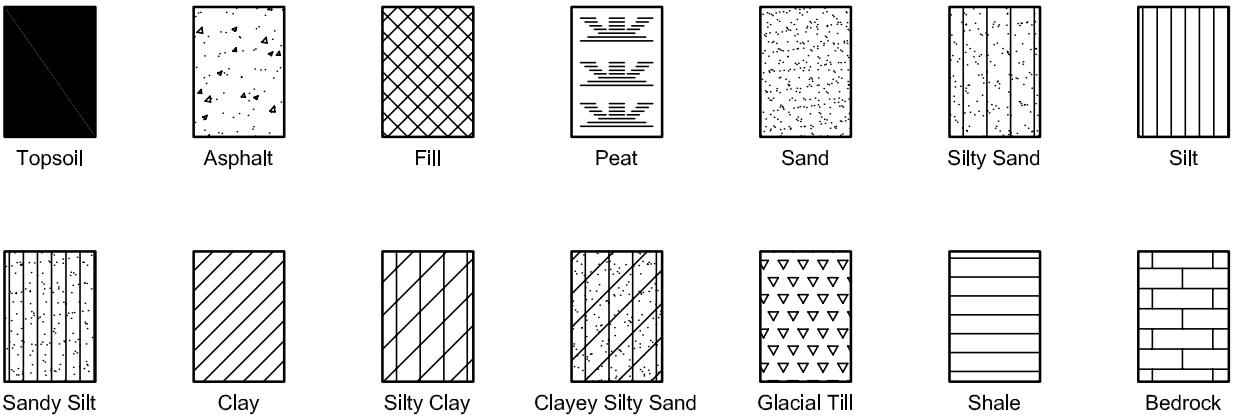
p'_o	-	Present effective overburden pressure at sample depth
p'_c	-	Preconsolidation pressure of (maximum past pressure on) sample
Ccr	-	Recompression index (in effect at pressures below p'_c)
Cc	-	Compression index (in effect at pressures above p'_c)
OC Ratio		Overconsolidaton ratio = p'_c / p'_o
Void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

PERMEABILITY TEST

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

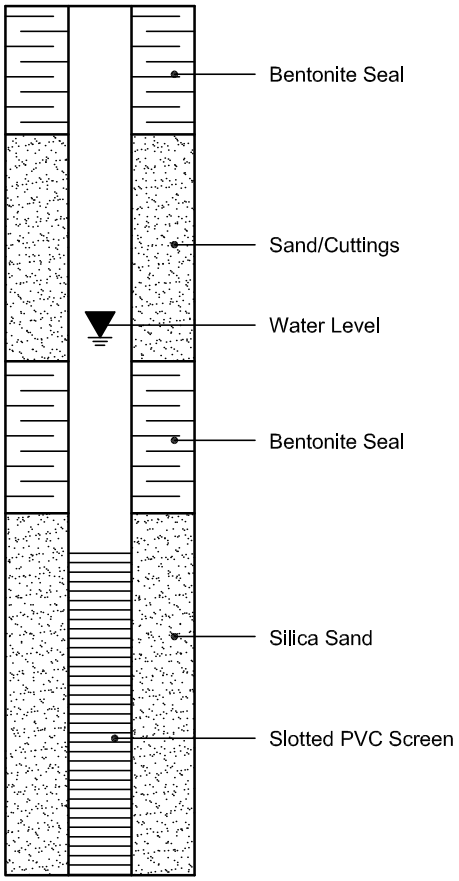
SYMBOLS AND TERMS (continued)

STRATA PLOT

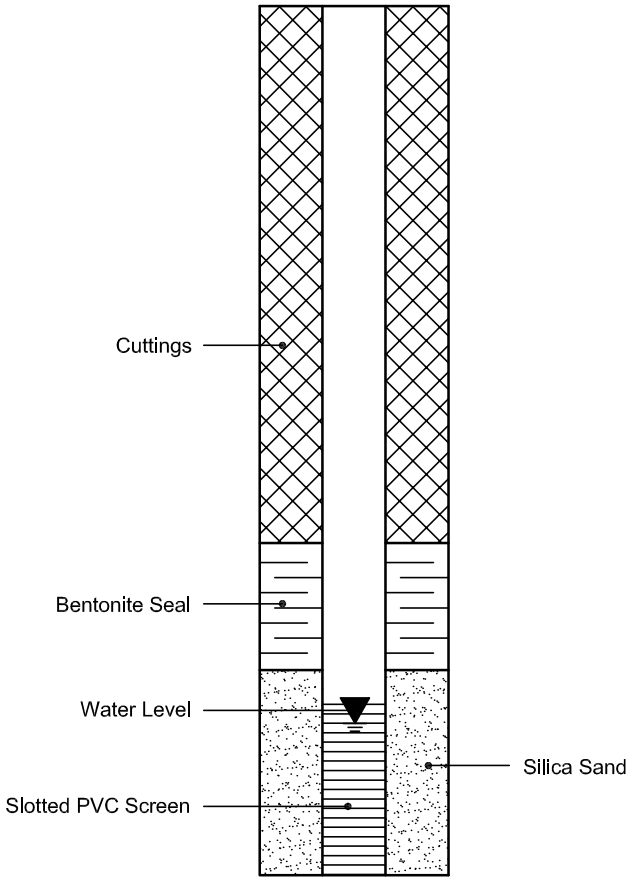


MONITORING WELL AND PIEZOMETER CONSTRUCTION

MONITORING WELL CONSTRUCTION



PIEZOMETER CONSTRUCTION



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Certificate of Analysis

Paterson Group Consulting Engineers

154 Colonnade Road South
Nepean, ON K2E 7J5
Attn: Mandy Witteman

Client PO: 25667
Project: PE4480
Custody: 118595

Report Date: 31-Dec-2018
Order Date: 21-Dec-2018

Order #: 1851574

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

Paracel ID	Client ID
1851574-01	BH1-SS5
1851574-02	BH2-SS4
1851574-03	BH3-SS4

Approved By:

Dale Robertson, BSc
Laboratory Director

Certificate of Analysis
Client: Paterson Group Consulting Engineers
Client PO: 25667

Report Date: 31-Dec-2018
Order Date: 21-Dec-2018
Project Description: PE4480

Analysis Summary Table

Analysis	Method Reference/Description	Extraction Date	Analysis Date
BTEX by P&T GC-MS	EPA 8260 - P&T GC-MS	27-Dec-18	27-Dec-18
PHC F1	CWS Tier 1 - P&T GC-FID	27-Dec-18	27-Dec-18
PHCs F2 to F4	CWS Tier 1 - GC-FID, extraction	24-Dec-18	27-Dec-18
Solids, %	Gravimetric, calculation	28-Dec-18	28-Dec-18

Certificate of Analysis

Client: Paterson Group Consulting Engineers

Client PO: 25667

Report Date: 31-Dec-2018

Order Date: 21-Dec-2018

Project Description: PE4480

	Client ID:	BH1-SS5	BH2-SS4	BH3-SS4	-
	Sample Date:	12/19/2018 09:00	12/19/2018 09:00	12/19/2018 09:00	-
	Sample ID:	1851574-01	1851574-02	1851574-03	-
	MDL/Units	Soil	Soil	Soil	-
Physical Characteristics					
% Solids	0.1 % by Wt.	66.5	50.4	56.7	-
Volatiles					
Benzene	0.02 ug/g dry	<0.02	<0.02	<0.02	-
Ethylbenzene	0.05 ug/g dry	<0.05	<0.05	<0.05	-
Toluene	0.05 ug/g dry	<0.05	<0.05	<0.05	-
m,p-Xylenes	0.05 ug/g dry	<0.05	<0.05	<0.05	-
o-Xylene	0.05 ug/g dry	<0.05	<0.05	<0.05	-
Xylenes, total	0.05 ug/g dry	<0.05	<0.05	<0.05	-
Toluene-d8	Surrogate	82.2%	79.5%	80.7%	-
Hydrocarbons					
F1 PHCs (C6-C10)	7 ug/g dry	<7	<7	<7	-
F2 PHCs (C10-C16)	4 ug/g dry	<4	<4	<4	-
F3 PHCs (C16-C34)	8 ug/g dry	<8	<8	<8	-
F4 PHCs (C34-C50)	6 ug/g dry	<6	<6	<6	-

Method Quality Control: Blank

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Hydrocarbons									
F1 PHCs (C6-C10)	ND	7	ug/g						
F2 PHCs (C10-C16)	ND	4	ug/g						
F3 PHCs (C16-C34)	ND	8	ug/g						
F4 PHCs (C34-C50)	ND	6	ug/g						
Volatiles									
Benzene	ND	0.02	ug/g						
Ethylbenzene	ND	0.05	ug/g						
Toluene	ND	0.05	ug/g						
m,p-Xylenes	ND	0.05	ug/g						
o-Xylene	ND	0.05	ug/g						
Xylenes, total	ND	0.05	ug/g						
Surrogate: Toluene-d8	*2.72*		*ug/g*		*85.0*	*50-140*			

Method Quality Control: Duplicate

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Hydrocarbons									
F1 PHCs (C6-C10)	ND	7	ug/g dry	ND				40	
F2 PHCs (C10-C16)	10	4	ug/g dry	38			116.0	30	QR-04
F3 PHCs (C16-C34)	1800	8	ug/g dry	4120			78.2	30	QR-04
F4 PHCs (C34-C50)	339	6	ug/g dry	803			81.1	30	QR-04
Physical Characteristics									
% Solids	78.8	0.1	% by Wt.	79.3			0.6	25	
Volatiles									
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	*3.27*		*ug/g dry*		*96.4*	*50-140*			

Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Hydrocarbons									
F1 PHCs (C6-C10)	204	7	ug/g		102	80-120			
F2 PHCs (C10-C16)	164	4	ug/g	38	105	60-140			
F3 PHCs (C16-C34)	2240	8	ug/g	4120	-636	60-140			QM-06
F4 PHCs (C34-C50)	600	6	ug/g	803	-109	60-140			QM-06
Volatiles									
Benzene	2.97	0.02	ug/g		74.3	60-130			
Ethylbenzene	3.99	0.05	ug/g		99.7	60-130			
Toluene	3.83	0.05	ug/g		95.7	60-130			
m,p-Xylenes	7.54	0.05	ug/g		94.2	60-130			
o-Xylene	3.90	0.05	ug/g		97.4	60-130			
Surrogate: Toluene-d8	*2.60*		*ug/g*		*81.4*	*50-140*			

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.

Paracel ID: 1851574

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Chain of Custody
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№ 118595

Page 1 of 1

Client Name: PATERSON GROUP	Project Reference: PE4400	**Turnaround Time:**	
Contact Name: MANDY WITTEMAN	Quote #	☐ 1 Day	☐ 3 Day
Address: 154 Colonnade Rd S.	PO # 25667	☐ 2 Day	☒ Regular
Telephone: 613-226-7381	Email Address: mwitteman@patersongroup.ca	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

Paracel Order Number: 1851574

	Sample ID/Location Name	Matrix	Air Volume	# of Containers	Sample Taken Date	Sample Taken Time	PHCs F1-F4+BTEX	VOCs	PAHs	Metals by ICP	Hg	CrVI	B (HWS)
1	BH1-SS5	S		2	Dec 19/18		X						
2	BH2-SS4	S		2	↓		X						
3	BH3-SS4	S		2			X						
4													
5													
6													
7													
8													
9													
10													

Comments:

Method of Delivery: Paracel

Relinquished By (Sign):	Received by Driver/Depot: A. Jeause	Received at Lab: SUNRISE POINT	Verified By:
Relinquished By (Print): MIKE B	Date/Time: 20/12/18 4:00	Date/Time: Dec 20, 2018 09:29	Date/Time: Dec 21/18 9:02
Date/Time: Dec 20/18	Temperature: °C FH	Temperature: 14.2 °C	pH Verified [ ] By:

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Certificate of Analysis

Paterson Group Consulting Engineers

154 Colonnade Road South
Nepean, ON K2E 7J5
Attn: Joey Villeneuve

Client PO: 30331
Project: PG5161
Custody: 128399

Report Date: 14-Jul-2020
Order Date: 8-Jul-2020

Order #: 2028331

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

Paracel ID	Client ID
2028331-01	BH6-SS3

Approved By:

Dale Robertson, BSc
Laboratory Director

Certificate of Analysis

Report Date: 14-Jul-2020

Client: Paterson Group Consulting Engineers

Order Date: 8-Jul-2020

Client PO: 30331

Project Description: PG5161

Analysis Summary Table

Analysis	Method Reference/Description	Extraction Date	Analysis Date
Anions	EPA 300.1 - IC, water extraction	13-Jul-20	13-Jul-20
pH, soil	EPA 150.1 - pH probe @ 25 °C, CaCl buffered ext.	11-Jul-20	11-Jul-20
Resistivity	EPA 120.1 - probe, water extraction	14-Jul-20	14-Jul-20
Solids, %	Gravimetric, calculation	11-Jul-20	11-Jul-20

Certificate of Analysis

Report Date: 14-Jul-2020

Client: Paterson Group Consulting Engineers

Order Date: 8-Jul-2020

Client PO: 30331

Project Description: PG5161

	Client ID:	BH6-SS3	-	-	-
	Sample Date:	02-Jul-20 11:00	-	-	-
	Sample ID:	2028331-01	-	-	-
	MDL/Units	Soil	-	-	-
Physical Characteristics					
% Solids	0.1 % by Wt.	65.5	-	-	-
General Inorganics					
pH	0.05 pH Units	8.28	-	-	-
Resistivity	0.10 Ohm.m	30.3	-	-	-
Anions					
Chloride	5 ug/g dry	17	-	-	-
Sulphate	5 ug/g dry	58	-	-	-

Certificate of Analysis

Report Date: 14-Jul-2020

Client: Paterson Group Consulting Engineers

Order Date: 8-Jul-2020

Client PO: 30331

Project Description: PG5161

Method Quality Control: Blank

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Anions									
Chloride	ND	5	ug/g						
Sulphate	ND	5	ug/g						
General Inorganics									
Resistivity	ND	0.10	Ohm.m						

Certificate of Analysis

Report Date: 14-Jul-2020

Client: Paterson Group Consulting Engineers

Order Date: 8-Jul-2020

Client PO: 30331

Project Description: PG5161

Method Quality Control: Duplicate

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Anions									
Chloride	347	5	ug/g dry	311			10.8	20	
Sulphate	71.2	5	ug/g dry	66.3			7.2	20	
General Inorganics									
pH	7.66	0.05	pH Units	7.67			0.1	2.3	
Resistivity	54.7	0.10	Ohm.m	55.3			1.1	20	
Physical Characteristics									
% Solids	81.1	0.1	% by Wt.	82.3			1.5	25	

Certificate of Analysis

Client: Paterson Group Consulting Engineers

Client PO: 30331

Report Date: 14-Jul-2020

Order Date: 8-Jul-2020

Project Description: PG5161

Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Anions									
Chloride	413	5	ug/g	311	101	82-118			
Sulphate	170	5	ug/g	66.3	103	80-120			

Qualifier Notes:

None

Sample Data Revisions

None

Work Order Revisions / Comments:

None

Other Report Notes:

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

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.

PARACEL LABORATORIES LTD.

Paracel ID: 2028331

Paracel Order Number (Lab Use Only)	Chain Of Custody (Lab Use Only)
2028331	Nº 128399

Client Name: Paterson Group	Project Ref: PG5161	Page __ of __
Contact Name: Joey V.	Quote #:	Turnaround Time
Address: 154 Colonnade Rd.	PO #: 30331	☐ 1 day ☐ 3 day
	E-mail: Jvillenave@patersongroup.ca	☐ 2 day ☒ Regular
Telephone: 613-226-7381		Date Required:

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

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

	Sample ID/Location Name	Matrix	Air Volume	# of Containers	Sample Taken: Date	Sample Taken: Time	PHCs F1-F4+BTEX	VOCs	PAHs	Metals by ICP	Hg	CrVI	B (HWS)	Chloride	PH	Sulphate	Resistivity		
1	BH6-SS3	S			July 2 2020	11:00								X	X	X	X		
2																			
3																			
4																			
5																			
6																			
7																			
8																			
9																			
10																			

Comments:

Method of Delivery: Paracel

Relinquished By (Sign):	Received By Driver/Depot: T. Louie	Received at Lab: BFam	Verified By: BFam
Relinquished By (Print):	Date/Time: 08/07/20 3:30	Date/Time: Jul-4 08/20 17:00	Date/Time: Jul-4 08/20 17:18
Date/Time:	Temperature: °C	Temperature: 8.0 °C	pH Verified: ☐ By:

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Certificate of Analysis

Paterson Group Consulting Engineers

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

Client PO: 25770
Project: PE4480
Custody: 118597

Report Date: 21-Jan-2019
Order Date: 15-Jan-2019

Order #: 1903263

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

Paracel ID	Client ID
1903263-01	BH1 - GW1
1903263-02	BH2 - GW1
1903263-03	BH3 - GW1

Approved By:

Mark Foto

Mark Foto, M.Sc.
Lab Supervisor

Certificate of Analysis
Client: Paterson Group Consulting Engineers
Client PO: 25770

Report Date: 21-Jan-2019
Order Date: 15-Jan-2019
Project Description: PE4480

Analysis Summary Table

Analysis	Method Reference/Description	Extraction Date	Analysis Date
BTEX by P&T GC-MS	EPA 624 - P&T GC-MS	17-Jan-19	17-Jan-19
PHC F1	CWS Tier 1 - P&T GC-FID	17-Jan-19	17-Jan-19
PHCs F2 to F4	CWS Tier 1 - GC-FID, extraction	18-Jan-19	19-Jan-19

Certificate of Analysis

Client: Paterson Group Consulting Engineers

Client PO: 25770

Report Date: 21-Jan-2019

Order Date: 15-Jan-2019

Project Description: PE4480

	Client ID:	BH1 - GW1	BH2 - GW1	BH3 - GW1	-
	Sample Date:	01/14/2019 09:00	01/14/2019 09:00	01/14/2019 09:00	-
	Sample ID:	1903263-01	1903263-02	1903263-03	-
	MDL/Units	Water	Water	Water	-
Volatiles					
Benzene	0.5 ug/L	<0.5	<0.5	<0.5	-
Ethylbenzene	0.5 ug/L	<0.5	<0.5	<0.5	-
Toluene	0.5 ug/L	<0.5	<0.5	<0.5	-
m,p-Xylenes	0.5 ug/L	<0.5	<0.5	<0.5	-
o-Xylene	0.5 ug/L	<0.5	<0.5	<0.5	-
Xylenes, total	0.5 ug/L	<0.5	<0.5	<0.5	-
Toluene-d8	Surrogate	105%	107%	107%	-
Hydrocarbons					
F1 PHCs (C6-C10)	25 ug/L	<25	<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: 25770

Report Date: 21-Jan-2019
Order Date: 15-Jan-2019
Project Description: PE4480

Method Quality Control: Blank

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Hydrocarbons									
F1 PHCs (C6-C10)	ND	25	ug/L						
F2 PHCs (C10-C16)	ND	100	ug/L						
F3 PHCs (C16-C34)	ND	100	ug/L						
F4 PHCs (C34-C50)	ND	100	ug/L						
Volatiles									
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	*87.1*		*ug/L*		*109*	*50-140*			

Certificate of Analysis
Client: Paterson Group Consulting Engineers
Client PO: 25770

Report Date: 21-Jan-2019
Order Date: 15-Jan-2019
Project Description: PE4480

Method Quality Control: Duplicate

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Hydrocarbons									
F1 PHCs (C6-C10)	ND	25	ug/L	ND				30	
Volatiles									
Benzene	22.2	0.5	ug/L	18.1			20.4	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	*78.2*		*ug/L*		*97.8*	*50-140*			

Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Hydrocarbons									
F1 PHCs (C6-C10)	1630	25	ug/L		81.3	68-117			
F2 PHCs (C10-C16)	1800	100	ug/L		112	60-140			
F3 PHCs (C16-C34)	4570	100	ug/L		117	60-140			
F4 PHCs (C34-C50)	2880	100	ug/L		116	60-140			
Volatiles									
Benzene	39.0	0.5	ug/L		97.6	60-130			
Ethylbenzene	41.8	0.5	ug/L		105	60-130			
Toluene	35.4	0.5	ug/L		88.4	60-130			
m,p-Xylenes	83.2	0.5	ug/L		104	60-130			
o-Xylene	41.9	0.5	ug/L		105	60-130			
Surrogate: Toluene-d8	*76.5*		*ug/L*		*95.6*	*50-140*			

Qualifier Notes:

None

Sample Data Revisions

None

Work Order Revisions / Comments:

None

Other Report Notes:

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

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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Paracel ID: 1903263

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Chain of Custody
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№ 118597

Page ___ of ___

Client Name: Paterson Group	Project Reference: PE4480	**Turnaround Time:**	
Contact Name: Mark D'Arcy	Quote #	☐ 1 Day	☐ 3 Day
Address: 154 Colonnade Rd.	PO # 25770	☐ 2 Day	☒ Regular
Telephone: 613-226-7381	Email Address: mdarcy@patersongroup.ca mwitteman@patersongroup.ca	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

Paracel Order Number: 1903263

	Sample ID/Location Name	Matrix	Air Volume	# of Containers	Sample Taken Date	Sample Taken Time	PHCs F1-F4+BTEX	VOCs	PAHs	Metals by ICP	Hg	CrVI	B (HWS)							
1	BH1-GW1	GW		3	Jan 14/19		X													✓
2	BH2-GW1	GW		3	↓		X													✓
3	BH3-GW1	GW		3	↓		X													✓
4																				
5																				
6																				
7																				
8																				
9																				
10																				

Comments:

Method of Delivery:

Relinquished By (Sign): MLB	Received by Driver/Depot: T. Feaine	Received at Lab: [signature]
Relinquished By (Print): Mike B.	Date/Time: 15/01/19 4:20 PM	Date/Time: Jan 15/19 5:30pm
Date/Time:	Temperature: °C	Temperature: 15 °C

Verified By: [signature]
Date/Time: Jan 16, 19 9:58
pH Verified [ ] By: NA