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August 13, 2018
File: PE4223-LET.02

Mr. Claude Brunet
330 McLeod Street
Ottawa, Ontario
K2P 2C5

Subject: **Supplemental Phase II - Environmental Site Assessment and Soil Remediation Program**
330 McLeod Street
Ottawa, Ontario

Dear Sir,

Further to your request, Paterson Group (Paterson) conducted a Supplemental Phase II - Environmental Site Assessment (ESA) and a Soil Remediation Program for the property located at 330 McLeod Street in Ottawa, Ontario.

This report supplements a previous environmental report prepared for the subject property, as detailed below.

1.0 Site Information

The subject site is located on the south side of McLeod Street, approximately 100 m east of Bank Street, in the City of Ottawa, Ontario. The subject site is currently occupied by a four (4) storey retirement residence (McLeod Retirement Home). The subject building occupies the majority of the site while an asphalt laneway is situated to the east of the subject building. The rear of the subject site is asphalt covered and used for vehicular parking. The neighbouring properties are residential and commercial offices. Based on aerial photographs, the subject property has been occupied by the current residential structure since at least 1965.

2.0 Previous Reports

The following report was reviewed prior to conducting this assessment:

- "Environmental Clean-Up, 330 McLeod Street, Ottawa, Ontario", prepared by Fondex Ontario Limited, dated October 1998.

The above noted report included the removal of approximately 57 metric tonnes of total petroleum hydrocarbon (TPH) impacted soil from the area of the former on-site furnace oil underground storage tank (UST) nest. The former furnace oil UST had been situated at the rear of the existing building.

Upon the conclusion of the impacted soil removal program, three (3) soil samples were analysed for TPH. The analytical test results complied with the Ontario Ministry of Environment guidelines which were applicable at the time. It should be noted that at the time of the above noted soil removal program, the MOE did not have standards for TPH in groundwater, as a result, no groundwater was analysed at that time.

The MOE issued new standards in February of 1997, in March of 2004 and again in April of 2011. As a result of the new breakdown of the petroleum hydrocarbon parameters, a direct comparison of the previous data cannot be made to the current 2011 standards. In 2014, the MOE added Climate Change to it's portfolio and was renamed the Ontario Ministry of Environment and Climate Change (MOECC).

- "Draft Phase I - Environmental Site Assessment, 330 McLeod Street, Ottawa, Ontario", prepared by Paterson Group, dated January 2018.

Paterson Group conducted a Phase I-Environmental Site Assessment (ESA) of 330 McLeod Street in the City of Ottawa, Ontario. The purpose of this Phase I-ESA was to research the past and current use of the subject site and neighbouring properties and to identify any environmental concerns with the potential to have impacted the subject property. Based on the findings of the Phase I-ESA, Phase II–ESA was recommended for the subject property.

Based on the age of the building (early 1960s) potential ACMs were identified throughout the structure and lead-based paints were determined to possibly be present on original painted surfaces throughout the structure. At the time of the assessment, painted surfaces were observed to be in good to fair condition. Potential ACMs observed at the time of the assessment included drywall joint compound, vinyl floor tiles, plaster, pipe insulation and elbow parging cement. At the time of the assessment, the majority of potential ACMs were observed to be in good to fair condition, however, exposed parging cement was observed on pipe joints in the boiler room. One section of damaged drywall was also observed in a basement hallway. A designated substance survey of the subject structure was recommended.

It was recommended, based on a review of the previous reports that additional soil and groundwater quality information be obtained from the subject property, specifically, in the area of the former underground furnace oil storage tank nest. As a result, boreholes with

groundwater monitoring wells, were recommended in the southern portion of the site. The results of the Phase II-ESA are detailed below.

- "Phase II - Environmental Site Assessment, 330 McLoed, Ottawa, Ontario", prepared by Paterson Group, dated February 2018.

Soil

Ten (10) boreholes (BH1 to BH10) were placed on the subject property on February 8 and March 5, 2018. One (1) of the boreholes was placed in the former underground furnace oil storage tank nest at the rear of the existing retirement residence. The remaining boreholes were placed to the south of the existing building (within the rear parking area) in order to provide general site coverage or to delineate suspected PHC impacted soil. Two (2) of the boreholes were equipped with groundwater monitoring wells. A suspected petroleum hydrocarbon odour was noted in some of the soil samples obtained from BH1, BH2, BH3, BH6, BH7, BH8 and BH9 located in the southwest corner of the property. No unusual visual or olfactory observations were made regarding the soil samples obtained from the remaining boreholes.

Eight (8) soil samples were submitted to Paracel Laboratories for PHCs and BTEX analysis based on the combustible vapour readings and our visual observations. Petroleum hydrocarbon contaminated soil and/or groundwater was identified in five (5) of the boreholes placed in the southwest quadrant of the subject site during the course of two (2) on-site subsurface investigations. Samples analyzed from BH1, BH2, BH3, BH6 and BH7 were in excess of the MOECC Table 3 standards. No detectable BTEX and PHC concentrations were identified in the soil samples analyzed from BH4, BH8 or BH9. Based on our findings, it was determined that the impacted soil and groundwater did not pose a risk to the current use of the land or to the occupants of the subject building, however, the presence of this impacted soil and groundwater did pose a liability to the property.

Groundwater

A groundwater sample was collected from the monitoring well installed in BH1 on February 12, 2018. The water sample was submitted for BTEX and PHCs analysis. No unusual visual or olfactory observations were noted regarding the groundwater obtained from BH1.

No detectable BTEX or PHC (F1 and F4) concentrations were identified in groundwater Sample BH1-GW1. The detected PHC (F3) concentration met the MOECC Table 3 standards while the detected PHC (F2) concentration was in excess of the MOECC Table 3 standards.

Further, it was recommended that if the site is to undergo future re-development or a change in ownership, the contaminated soil and groundwater in the southwest quadrant of the subject site be remediated, where the contaminated soil and groundwater would be hauled to a registered waste disposal facility under the guidance of a member of this firm. Based on the results of the Phase II-ESA, a Supplemental Phase II-ESA was recommended in order to investigate possible impacts below the subject structure, the findings of which are presented below.

3.0 Subsurface Investigation

Three (3) boreholes (BH11 to BH13) were placed on the interior of the subject building on July 24, 2018. The boreholes were extended to depths ranging from 3.45 to 5.8m below the basement concrete slab. Two of the boreholes (BH11 and BH12) were instrumented with a groundwater monitoring well. The boreholes were conducted using portable drilling equipment under the full-time supervision of Paterson personnel. All three boreholes were placed in the southern portion of the building, proximal to the location of the former underground storage tank. The boreholes were located in areas free of underground services. The locations of the boreholes are illustrated on the enclosed Test Hole Location Plan. The depths at which the split spoon samples were obtained from the test holes are shown as **"SS"** on the Soil Profile and Test Data sheets, attached to this report.

Subsurface Profile

The soil profile encountered in the boreholes consisted of a layer of concrete followed by a granular fill, overlaying a layer of silty sand fill which was followed by native silty clay. The specific details of the soil profile at the test hole locations are presented on the attached Soil Profile and Test Data sheets.

Monitoring Well Installation

Groundwater monitoring wells were installed in BH11 and BH12, the locations of which can be seen on the attached Test Hole Location Plan. Typical monitoring well construction details are described below:

- Slotted 32 mm diameter PVC screen at base of borehole.
- 32 mm diameter PVC riser pipe from the top of the screen to ground surface.
- No.3 silica sand back-fill within annular space around screen.
- Bentonite above sand pack to just below ground surface.
- Clean backfill from top of bentonite plug to the ground surface.

Refer to the Soil Profile and Test Data sheets attached for the actual well construction in BH11 and BH12.

Elevation Surveying

Borehole locations were not surveyed but measured down from the parking lot grade located on the southern portion of the site. An assumed elevation of 100.00 m was assigned to the parking lot grade.

Soil Sampling Protocol

A total of twenty-two (22) soil samples were recovered from the test holes by means of stainless steel split spoon sampling. Upon recovery, all samples were immediately sealed in appropriate containers to facilitate a preliminary screening procedure. Visual and/or olfactory signs of petroleum hydrocarbon impact were noted in some of the samples obtained from all three (3) of the boreholes.

All samples recovered as part of this investigation will be stored in the laboratory for a period of one (1) month after issuance of this report. All samples will then be discarded unless this firm is otherwise directed.

Soil Sample Headspace Analysis

An RKI Eagle (gastech) calibrated to hexane was used to measure the combustible vapour concentrations in the headspace of all soil samples recovered from the boreholes. The technical protocol was obtained from Appendix C of the MOECC document titled "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 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. 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 parts per million (ppm) scale is used to measure concentrations of hydrocarbon vapours that are too low to register on the Lower Explosive Limit (LEL) scale. The explosive point, 100% LEL, represents the leanest mixture which will burn (or explode) if ignited.

The combustible vapour readings were found to range from 0-430 ppm or 0-80% LEL in the soil samples obtained. The majority of the results are not considered to represent significant petroleum hydrocarbon contamination, however, the higher readings in all three (3) of the boreholes are considered to potentially indicate petroleum hydrocarbon contamination. Refer to the Soil Profile and Test Data sheets attached for soil sample headspace results.

Groundwater

A return visit to the site was conducted on August 1, 2018 in order to obtain stabilized groundwater levels and to sample the groundwater from the monitoring wells installed in BH11 and BH12. The groundwater levels were found to range from 1.36 to 1.37 m below the existing basement slab in the above noted boreholes. It should be noted that groundwater levels are expected to fluctuate throughout the year with seasonal variations. Based on visual and olfactory observations, petroleum hydrocarbon impact was not suspected in groundwater samples obtained from BH11 and BH12. Based on groundwater levels collected from neighbouring properties, the groundwater flow direction appears to be in an approximate north-easterly direction.

4.0 Analytical Test Results

Soil and Groundwater Standards

The soil and groundwater standards for the subject site were obtained from Table 3 of the document entitled “Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the *Environmental Protection Act*”, dated April 15, 2011. The MOECC Standards are based on the following considerations:

- Fine grained soil conditions.
- Surface soil and groundwater conditions.
- Non-potable groundwater situation.
- Residential land use.

Table 1 – Analytical Test Results – Soil
PHC (F_1 – F_4) and BTEX

Parameter	MDL (µg/L)	Soil Samples (µg/L) July 24, 2018			MOECC Table 3 Residential Standards (µg/L)
		BH11-SS3	BH12-SS3A	BH13-SS2	
Benzene	0.02	nd	nd	nd	0.17
Ethylbenzene	0.05	nd	nd	0.10	15
Toluene	0.05	0.16	nd	nd	6
Xylenes (Total)	0.05	0.07	0.08	nd	25
PHC F_1	7	**195**	nd	**249**	65
PHC F_2	4	**399**	**617**	**907**	150
PHC F_3	8	289	521	773	1300
PHC F_4	6	nd	nd	nd	5600

Notes:
- MDL – Method Detection Limit
- nd – not detected above the MDL
- **bold** – exceeds selected MOECC standard

The detected PHC (F_1 and F_2) concentrations identified in soil sample BH11-SS3 and BH13-SS2 and the detected PHC (F2) concentration in samples BH12-SS3A and BH13-SS2 were in excess of the MOECC Table 3 standards. The remaining detected PHC and BTEX concentrations comply with the MOECC Table 3 standards.

Groundwater

Groundwater samples were collected from the monitoring wells installed in BH11 and BH12 on August 1, 2018. The water samples were submitted for PHCs and BTEX analysis. The results of the analytical testing, and the selected MOECC standards, are presented in Table 2. A copy of the laboratory certificate of analysis is attached to this report.

Table 2 – Analytical Test Results – Groundwater
PHC (F_1 – F_4) and BTEX

Parameter	MDL (µg/L)	Groundwater Samples (µg/L) August 1, 2018		MOECC Table 3 Residential Standards (µg/L)
		BH11-GW1	BH12-GW1	
Benzene	0.02	nd	nd	430
Ethylbenzene	0.05	4.0	nd	2,300
Toluene	0.05	nd	nd	18,000
Xylenes (Total)	0.05	nd	nd	4,200
PHC F_1	25	186	nd	750

Table 2 – Analytical Test Results – Groundwater
PHC (F_1 – F_4) and BTEX

Parameter	MDL (µg/L)	Groundwater Samples (µg/L) August 1, 2018		MOECC Table 3 Residential Standards (µg/L)
		BH11-GW1	BH12-GW1	
PHC F_2	100	**501**	nd	150
PHC F_3	100	200	nd	500
PHC F_4	100	nd	nd	500

Notes:
- MDL – Method Detection Limit
- nd – not detected above the MDL
- **bold** – exceeds selected MOECC standard

The detected concentrations of PHC F_2 exceeds the selected MOECC Table 3 standards for the site in BH11-GW1, while the remaining PHCs (F_1, F_3 and F_4) meet the standards. The detected BTEX concentrations identified in groundwater samples BH11-GW1 meet the selected MOEEC Table 3 standards and no concentrations of BTEX or PHCs were detected in BH12-GW1. The groundwater in the vicinity of BH11 is not considered to be in compliance with the selected MOECC Table 3 standards.

5.0 Soil Remediation

Background

As mentioned above, based on the findings of the Phase II-ESA conducted in February and March of 2018, analytical results identified petroleum hydrocarbon (F_1-F_3 range) concentrations in excess of the MOECC Table 3 standards for the site in boreholes BH1, BH2, BH3, BH6 and BH7. These boreholes were drilled in the vicinity of a former underground storage tank (UST) containing furnace oil. Paterson was subsequently commissioned to supervise Excavation Bilodeau in the excavation and removal of the contaminated soil on the property in July and August of 2018, the details of which are contained below.

Remediation Excavation

Paterson monitored the site remediation program between July and August 2018, supervising the removal of petroleum hydrocarbon impacted soil. The impacted soil was considered solid non-hazardous material. The source of the petroleum release was determined to be from a former UST containing furnace oil, buried near the southwest corner of the subject structure. Based on the presence of an approximate 12 m^2 concrete slab found in the area of the excavation, the exact location of the tank was determined.

Excavation Bilodeau, with the help of hauling contractors, removed 226.42 metric tonnes of contaminated soil from the subject site and disposed of it properly at Waste Connections Navan Road Landfill site. Paterson personnel monitored the removal and disposal of the impacted soil.

During remediation activities, rainwater from the surrounding soil entered the excavation and was observed to have a light PHC sheen. Drain-All Ltd., a licenced purging contractor, was commissioned and removed 9,852 L of water, and disposed of it off-site.

Following the remedial excavation, Paterson carried out a soil sampling program for the base and the sidewalls of the excavation. Sixteen (16) sidewall samples were collected between 2 and 3 meters below the surface and twelve (12) base were acquired. Thirteen (13) samples were submitted to Paracel Laboratories for PHCs and BTEX analysis. All final analyzed samples met the selected MOECC Table 3 standards.

It should be noted that not all of the potentially impacted material was removed from the subject site. In order to maintain a safe lateral support zone for the subject structure and the neighbouring property, a sloped area was left along the north and west walls of the excavation, as indicated by Area A and Area B on Drawing PE4223-3, respectively. Additionally, an area approximately 4m long and 1m wide was not remediated near the centre of the excavation, based on the presence of an underground telecommunications utility which was found to be encased in concrete. Furthermore, a small volume of impacted soil measuring 1.5m wide by 1.5m was left below the catch basin (marked as CB on the Site Remediation Plan, Drawing PE4223-3).

In total, it is estimated that 120 metric tonnes of contaminated material remain on the southern portion of the subject site along the north and western walls of the excavation and beneath the catch-basin and concrete encased telecommunications utility. In addition, a minimum of 125 metric tonnes of contaminated material remains underneath the southern portion of the subject structure.

Soil Sampling Program

Subsurface Profile

In general, the soil profile encountered in the western portion of the excavation consisted of asphalt, underlain by a granular fill material, followed by a sandy fill material, over a native dry brown-grey clay. It should be noted that a concrete slab was encountered in the north-western portion of the excavation, just above the native clay layer. On the eastern portion of the property, the soil profile encountered in the excavation consisted of asphalt, underlain by a granular fill material, followed by a sandy fill material, over a native

coarse sand with pebbles, followed by a native dry brown-grey clay. Groundwater was not encountered during excavation activities.

Soil Sampling Protocol

Following the removal of contaminated soil by the contractor, a total of twenty-eight (28) soil samples were recovered from the excavation in accordance with the MOECC O.Reg 153/04 - Schedule E: Table 3 for a floor area between 50 and 100 m^2. Samples included three (3) samples from the north wall, two (2) from the western wall, six (6) from the southern wall and seven (7) from the eastern wall. Twelve (12) samples were collected from the base of the excavation.

Upon recovery, all samples were immediately sealed in appropriate containers to facilitate a preliminary screening procedure. No unusual visual or olfactory observations were made regarding the soil samples obtained from the excavation with the exception of W2, N2 and N3, which were suspected to be contaminated with PHCs.

Soil Sample Headspace Analysis

An RKI Eagle (gastech) calibrated to hexane was used to measure the combustible vapour concentrations in the headspace of all soil samples recovered from the boreholes. The technical protocol was obtained from Appendix C of the MOECC document titled "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 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. 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 parts per million (ppm) scale is used to measure concentrations of hydrocarbon vapours that are too low to register on the Lower Explosive Limit (LEL) scale.

The combustible vapour readings were found to range from 0 to 35 ppm in the soil samples obtained. No samples indicated values that were considered to be above background levels. It should be noted that the vapour results cannot be used to identify

the presence of heavier petroleum hydrocarbons (PHCs) or weathered PHCs. The results of the vapour survey are presented on the Site Remediation Plan.

Analytical Test Results

Soil Standards

The soil standards for the subject site are presented above in Section 4.0

Soil

Based on our visual observations, in conjunction with the vapour readings, thirteen (13) soil samples were submitted to Paracel Laboratories for petroleum hydrocarbons (PHCs Fractions 1 to 4) and BTEX. The results of the analytical testing and the selected soil standards are presented in Table 3.

A copy of the laboratory certificate of analysis is attached to this report.

Table 3
Analytical Test Results – Soil – Base Samples
BTEX and PHCs (Fractions 1 to 4)

Parameter	MDL (µg/g)	Soil Samples (µg/g)					Table 3 Standards Residential Land Use (µg/g)
		B1	B2	B3	B9	B12	
Benzene	0.02	nd	nd	nd	nd	nd	0.21
Ethylbenzene	0.05	nd	nd	nd	nd	nd	2
Toluene	0.05	nd	nd	nd	nd	nd	2.3
Xylenes (Total)	0.05	nd	nd	nd	nd	nd	3.1
F_1 PHCs (C_6-C_{10})	7	nd	nd	nd	nd	nd	55
F_2 PHCs (C_{10}-C_{16})	4	39	nd	nd	nd	nd	98
F_3 PHCs (C_{16}-C_{34})	8	38	nd	29	nd	nd	300
F_4 PHCs (C_{34}-C_{50})	6	nd	nd	7	nd	nd	2,800

Notes:
- MDL – Method Detection Limit
- Nd – Not Detected (< MDL)
- **Bold and underlined** results exceed the MOECC Table 3 residential standards

All base soil samples analyzed comply with the selected MOECC standards.

Table 4
Analytical Test Results – Soil – Side Wall Samples
BTEX and PHCs (Fractions 1 to 4)

Parameter	MDL (µg/g)	Soil Samples (µg/g)								Table 3 Standards Residential Land Use (µg/g)
		N1	W1	S1	S3	S6	E1	E3	E6	
Benzene	0.02	nd	nd	nd	nd	nd	nd	nd	nd	0.21
Ethylbenzene	0.05	nd	nd	nd	nd	nd	nd	nd	nd	2
Toluene	0.05	nd	nd	nd	nd	nd	nd	nd	nd	2.3
Xylenes (Total)	0.05	nd	nd	nd	nd	nd	nd	nd	nd	3.1
F_1 PHCs (C_6-C_{10})	7	nd	nd	nd	55	nd	**183**	nd	nd	55
F_2 PHCs (C_{10}-C_{16})	4	48	47	nd	37	nd	**589**	13	nd	98
F_3 PHCs (C_{16}-C_{34})	8	208	251	nd	59	nd	**527**	79	nd	300
F_4 PHCs (C_{34}-C_{50})	6	nd	nd	nd	nd	nd	nd	nd	nd	2,800

Notes:
- MDL – Method Detection Limit
- Nd – Not Detected (< MDL)
- **Bold and underlined** results exceed the MOECC Table 3 residential standards

The F_1, F_2 and F_3 fraction petroleum parameter in sample E1 exceed the selected MOECC standard. The remaining soil samples analyzed complied with the selected MOECC standards

Following the detection of additional the contaminated soil, Paterson personnel monitored the removal of the contaminated portion of the eastern wall in the vicinity of E1. Sample E3 was recovered further to the east. Based on the E3 analytical results, all potentially impacted material was removed from this portion of the site. The remaining side wall soil samples analyzed complied with the selected MOECC standards.

6.0 Assessment and Recommendations

Assessment

A Supplemental Phase II - Environmental Site Assessment was carried out for the subject site based on the findings of the initial Phase II-ESA conducted on the subject property by Paterson in February and March of 2018. The purpose of the Supplemental Phase II-ESA was to delineate the previously identified PHC and BTEX impacted soil and

groundwater on the subject site. More specifically, the subsurface environment beneath the southern portion of the on-site building was to be assessed.

Three (3) boreholes were placed on the interior of the subject building on July 24, 2018. Borehole BH11 was placed within the southwestern corner of the building (within the boiler room), borehole BH12 was placed along the central portion of the southern wall (stairwell) and borehole BH13 was placed in the laundry room located in the south-central portion of the building. The boreholes were located in areas free of underground services. Two of the boreholes (BH11 and BH12) were instrumented with a groundwater monitoring well.

Soil

Visual and/or olfactory signs of petroleum hydrocarbon impact were noted in some of the samples obtained from all three (3) of the boreholes. Three (3) soil samples were submitted to Paracel Laboratories for PHCs and BTEX analysis. The detected PHC (F_1 and F_2) concentrations identified in soil samples BH11-SS3, BH12-SS2A and BH13-SS2 were in excess of the MOECC Table 3 residential standards. The remaining detected PHC and BTEX concentrations comply with the MOECC Table 3 standards. The PHC impacted soil was encountered at a depth of approximately 0.8 and 1.8m below the basement concrete slab (2.5 to 3 m below ground surface).

Groundwater

Groundwater samples (BH11-GW1 and BH12-GW1) were collected from the monitoring wells installed in BH11 and BH12 on August 1, 2018. The water samples were submitted for PHCs and BTEX analysis. No concentrations of PHCs (F_1-F_4) or BTEX were identified in the BH12-GW1. The detectable PHC (F_1, F_3 and F_4) and BTEX in BH11-GW1 meet the selected MOECC standards, while the F_2 PHC fraction exceeds the selected MOECC Table 3 standards.

Remediation

Following the March 2018 Phase II-ESA, a Site Remediation Program was carried out at 330 McLeod Street in the City of Ottawa, Ontario. The purpose of the program was to remove the petroleum hydrocarbon contaminated soil in excess of MOECC Table 3 residential standards, in order to reduce the site liability. In total, 226.42 metric tonnes of soil were removed from the site by Excavation Bilodeau and disposed of at the BFI Canada Inc. Navan landfill. A volume of 9,852L of rain water that entered the excavation during the remediation was removed by Drain-All Ltd.

Following the removal of impacted soil, twenty-eight (28) soil samples were recovered from the walls and base of the excavation and thirteen (13) samples were submitted to Paracel Laboratories for PHCs and BTEX analysis. Sample (E1), was in excess of the MOECC Table 3 standards. Paterson personnel subsequently monitored the removal of the contaminated portion of the eastern wall, in the vicinity of E1. Sample E3 was recovered further to the east. Based on the E3 analytical results, all potentially impacted material was removed in this portion of the site.

No PHC or BTEX concentrations were identified in the remaining soil samples in excess of the MOECC standards.

It should be noted that PHC contaminated material remains in two sloped areas, along the north wall (Area A – Drawing PE4223-3) and the western wall (Area B – Drawing PE4223-3) of the excavation, beneath the catch-basin and beneath an underground concrete encased telecommunications utility. As such, an estimated of 120 metric tonnes of material is estimated to remain on the southern portion of the site. In addition, the lateral extent of the contaminants beneath the subject structure are unknown, however, a minimum of 125 metric tonnes of contaminated material remains.

Conclusion

Based on the field observations and the analytical test results, it is our opinion that the majority of the contaminated material was removed from the parking area on the southern portion of the subject site as a result of the remedial excavation program. Based on the March 2018 and August 2018 Phase II-ESA reports, the soil beneath the subject structure has been impacted by petroleum hydrocarbon release, however, the lateral extent is unknow. Additionally, the groundwater on the southwest portion of the subject site is considered to have been impacted by the petroleum hydrocarbon release.

Recommendations

Monitoring Wells

If the monitoring wells installed in BH11 and BH12 are not going to be used in the future, they should be abandoned according to Ontario Regulation 903. The monitoring wells will be registered with the MOECC under this regulation. Further information can be provided upon request in this regard.

Soil and Groundwater

Petroleum hydrocarbon (PHC) contaminated soil was identified in all three (3) of the boreholes placed in the southern portion of the subject structure, while PHC contaminated

groundwater was detected in BH11 (southwest corner of the building). Based on our findings, it is our opinion that the impacted soil and groundwater does not pose a risk to the current use of the land or to the occupants of the subject building. However, the presence of this impacted soil and groundwater does pose a liability to the property.

It is recommended that when the site is to undergo future re-development, the contaminated soil beneath the subject structure and along the western and northern remediation excavation walls and the encountered groundwater be removed. The most practical methodology would be to transfer the contaminated soil and groundwater to a registered waste disposal facility under the guidance of a member of this firm. It should also be noted that if soil, which has to be removed for construction purposes and which contains contaminant concentrations that meet the subject property standards but exceed the MOECC Table 1 (background) standards, it will have to be disposed of at an approved waste disposal facility at a premium.

7.0 Statement of Limitations

This Supplemental Phase II - Environmental Site Assessment and Soil Remediation Report has been prepared in general accordance with the agreed scope-of-work and the requirements of CSA Z768-01. The client should be aware of 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 described by 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 Mr. Claude Brunet. Permission and notification from the above noted party and this firm will be required to release this report to any other party.

We trust that this submission satisfies your current requirements. Should you have any questions please contact the undersigned.

Paterson Group Inc.

Marek J. Moroz, P.Geo.

Mark S. D'Arcy, P.Eng.

Report Distribution:

- ❑ Mr. Claude Brunet (1 copy)
- ❑ Paterson Group (1 copy)

Appendix:

- ❑ Soil Profile and Test Data Sheets
- ❑ Symbols and Terms
- ❑ Analytical Test Results
- ❑ Test Hole Location Plan
- ❑ Site Remediation Plan

patersongroup Consulting Engineers

154 Colonnade Road South, Ottawa, Ontario K2E 7J5

SOIL PROFILE AND TEST DATA

Phase II - Environmental Site Assessment
330 McLeod Street
Ottawa, Ontario

DATUM BM - Measured 1.2m lower than the ground surface in the vicinity of BH 7.

FILE NO. PE4223

REMARKS

HOLE NO. BH11

BORINGS BY Portable Drill **DATE** July 24, 2018

SOIL DESCRIPTION		STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)
GROUND SURFACE							0	59.10
Concrete slab	0.12							
FILL: Crushed stone	0.26							
FILL: Sand with gravel	0.46		SS	1	46		1	58.10
			SS	2	67			
			SS	3	100		2	57.10
			SS	4	54			
Dark grey to grey **SILTY CLAY**			SS	5	100		3	56.10
			SS	6	100			
			SS	7	100		4	55.10
			SS	8	100			
			SS	9	100		5	54.10
	5.80							
End of Borehole								
(GWL @ 1.37m - Aug. 1, 2018)								

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
330 McLeod Street
Ottawa, Ontario

DATUM BM - Measured 1.2m lower than the ground surface in the vicinity of BH 7.

FILE NO. PE4223

REMARKS

HOLE NO. BH12

BORINGS BY Portable Drill **DATE** July 24, 2018

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)
GROUND SURFACE						0	59.10
Concrete slab 0.08							
FILL: Crushed stone 0.16		SS	1	50			
FILL: Sand with gravel, cobbles							
0.97		SS	2	30		1	58.10
		SS	3	100			
		SS	4	100		2	57.10
Dark grey to grey **SILTY CLAY**		SS	5	100			
		SS	6	100		3	56.10
		SS	7	100			
		SS	8	100		4	55.10
4.91							
End of Borehole							
(GWL @ 1.36m - Aug. 1, 2018)							

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
330 McLeod Street
Ottawa, Ontario

DATUM BM - Measured 1.2m lower than the ground surface in the vicinity of BH 7.

FILE NO. PE4223

REMARKS

HOLE NO. BH13

BORINGS BY Portable Drill **DATE** July 24, 2018

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										
Concrete slab	0.16									
FILL: Crushed stone	0.26									
FILL: Sand			SS	1	50		0	59.10		
	0.89		SS	2	100		1	58.10		
Dark grey to grey **SILTY CLAY**			SS	3	54		2	57.10		
			SS	4	100					
			SS	5	100		3	56.10		
End of Borehole	3.45									

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

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

▲ Full Gas Resp. △ Methane Elim.

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 strength of cohesionless soils is the relative density, 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.

Relative Density	'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 vane tests, penetrometer tests, unconfined compression tests, or occasionally by Standard Penetration Tests.

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 is the ratio between the undisturbed undrained shear strength and the remoulded undrained shear strength of the soil.

Terminology used for describing soil strata based upon texture, or the proportion of individual particle sizes present is provided on the Textural Soil Classification Chart at the end of this information package.

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 NXL size core. However, it can be used on smaller core sizes, such as BX, 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
PS	-	Piston sample
AU	-	Auger sample or bulk sample
WS	-	Wash sample
RC	-	Rock core sample (Core bit size AXT, BXL, etc.). Rock core samples are obtained with the use of standard diamond drilling bits.

SYMBOLS AND TERMS (continued)

GRAIN SIZE DISTRIBUTION

MC%	-	Natural moisture 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 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 x 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

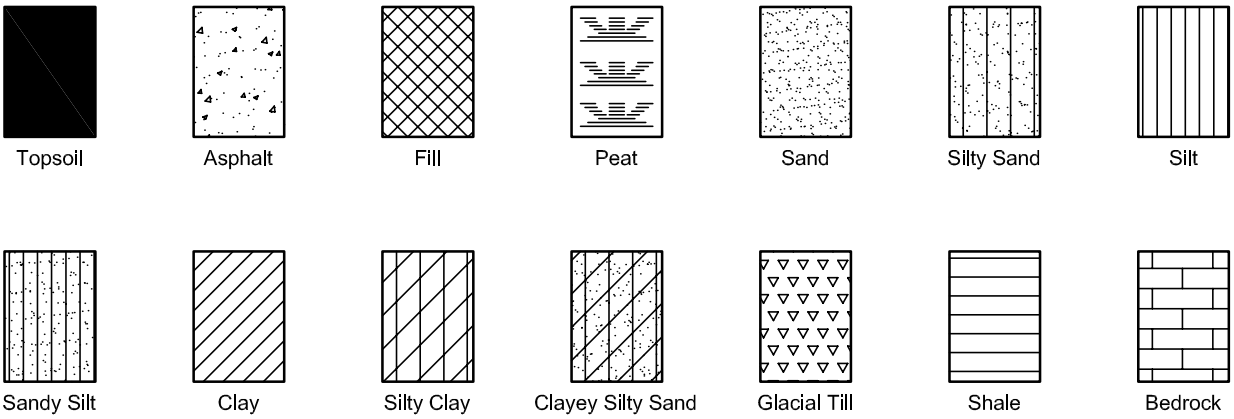
p'_o	-	Present effective overburden pressure at sample depth
p'_c	-	Preconsolidation pressure of (maximum past pressure on) sample
Ccr	-	Recompression index (in effect at pressures below p'_c)
Cc	-	Compression index (in effect at pressures above p'_c)
OC Ratio		Overconsolidaton ratio = p'_c / p'_o
Void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

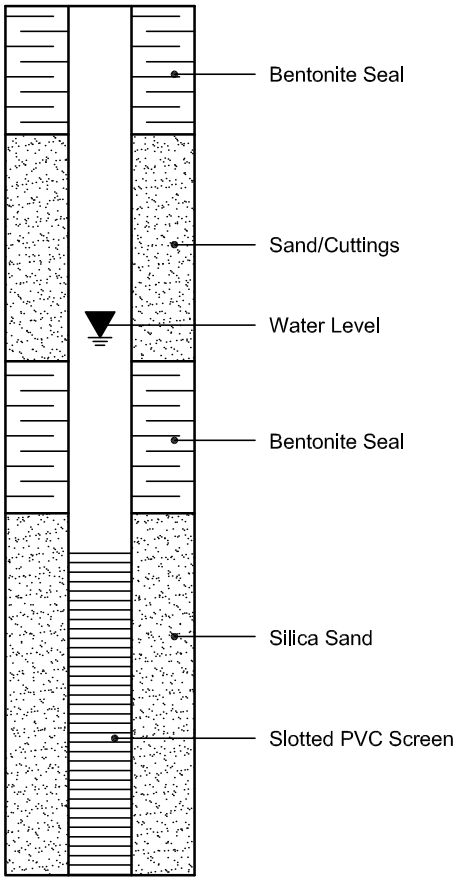
SYMBOLS AND TERMS (continued)

STRATA PLOT

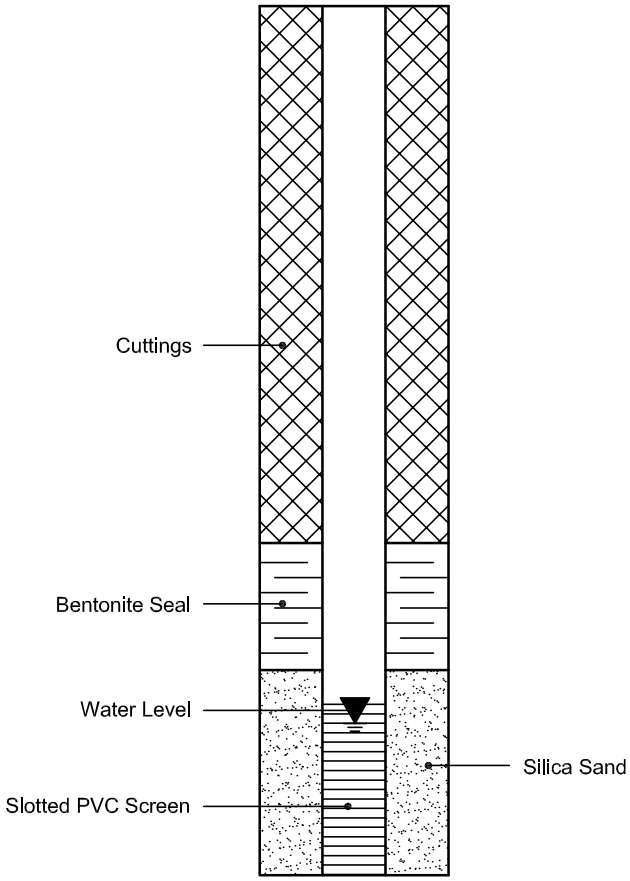


MONITORING WELL AND PIEZOMETER CONSTRUCTION

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: Eric Leveque

Client PO: 23923
Project: PE4223
Custody: 116729

Report Date: 25-Jul-2018
Order Date: 20-Jul-2018

Order #: 1829593

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

Paracel ID	Client ID
1829593-01	N1
1829593-02	W1

Approved By:

Mark Foto

Mark Foto, M.Sc.
Lab Supervisor

Certificate of Analysis
Client: Paterson Group Consulting Engineers
Client PO: 23923

Report Date: 25-Jul-2018
Order Date: 20-Jul-2018
Project Description: PE4223

Analysis Summary Table

Analysis	Method Reference/Description	Extraction Date	Analysis Date
BTEX by P&T GC-MS	EPA 8260 - P&T GC-MS	22-Jul-18	25-Jul-18
PHC F1	CWS Tier 1 - P&T GC-FID	22-Jul-18	25-Jul-18
PHCs F2 to F4	CWS Tier 1 - GC-FID, extraction	21-Jul-18	23-Jul-18
Solids, %	Gravimetric, calculation	23-Jul-18	23-Jul-18

Certificate of Analysis
Client: Paterson Group Consulting Engineers
Client PO: 23923

Report Date: 25-Jul-2018
Order Date: 20-Jul-2018
Project Description: PE4223

	Client ID:	N1	W1	-	-
	Sample Date:	07/20/2018 09:00	07/20/2018 09:00	-	-
	Sample ID:	1829593-01	1829593-02	-	-
	MDL/Units	Soil	Soil	-	-
Physical Characteristics					
% Solids	0.1 % by Wt.	73.1	71.1	-	-
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	116%	122%	-	-
Hydrocarbons					
F1 PHCs (C6-C10)	7 ug/g dry	<7	<7	-	-
F2 PHCs (C10-C16)	4 ug/g dry	48	47	-	-
F3 PHCs (C16-C34)	8 ug/g dry	208	251	-	-
F4 PHCs (C34-C50)	6 ug/g dry	<6	<6	-	-

Certificate of Analysis
Client: Paterson Group Consulting Engineers
Client PO: 23923

Report Date: 25-Jul-2018
Order Date: 20-Jul-2018
Project Description: PE4223

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	*2.88*		*ug/g*		*90.0*	*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)	13	4	ug/g dry	12			10.4	30	
F3 PHCs (C16-C34)	60	8	ug/g dry	45			29.2	30	
F4 PHCs (C34-C50)	19	6	ug/g dry	15			23.2	30	
Physical Characteristics									
% Solids	98.6	0.1	% by Wt.	98.4			0.2	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	*4.08*		*ug/g dry*		*92.7*	*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)	190	7	ug/g		95.0	80-120			
F2 PHCs (C10-C16)	118	4	ug/g	12	105	60-140			
F3 PHCs (C16-C34)	335	8	ug/g	45	116	60-140			
F4 PHCs (C34-C50)	183	6	ug/g	15	107	60-140			
Volatiles									
Benzene	3.32	0.02	ug/g		82.9	60-130			
Ethylbenzene	4.94	0.05	ug/g		124	60-130			
Toluene	4.93	0.05	ug/g		123	60-130			
m,p-Xylenes	9.45	0.05	ug/g		118	60-130			
o-Xylene	5.08	0.05	ug/g		127	60-130			
Surrogate: Toluene-d8	*3.00*		*ug/g*		*93.9*	*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.

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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Paracel ID: 1829593

e: paracel@paracellabs.com

Chain of Custody (Lab Use Only)

№ 116729

Page ___ of ___

Client Name: PATERSON GROUP	Project Reference: PE4223
Contact Name: ERIC LEVEQUE & MARK D'ARCY	Quote #
Address: 154 COLONNADE RD SOUTH ottawa	PO # 23923
Telephone: 226-7381	Email Address: eleveque@patersongroup.ca mdarcy@patersongroup.ca

Turnaround Time: ☒ 1 Day (crossed out) ☐ 3 Day ☐ 2 Day ☒ Regular

Date Required:

Criteria: ☒ O. Reg. 153/04 (As Amended) Table 3 ☐ 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)

Paracel Order Number: 1829593

Required Analyses

	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	N1	S		2	July 20 2018		✓										120ml + 1 vial			
2	W1	S		2	"	"	✓										↓			
3																				
4																				
5																				
6																				
7																				
8																				
9																				
10																				

Comments: Regular TAT as per Eric

Method of Delivery: Paracel

Relinquished By (Sign): [signature]	Received by Driver/Depot: T. ROUSE	Received at Lab: SUNEEPORN DOKMAI	Verified By: [signature]
Relinquished By (Print): ADRIAN	Date/Time: 20/07/18 3:00 PM	Date/Time: JUL 20, 2018 05:18	Date/Time: 07/20/18 5:20
Date/Time: JULY 20 2018	Temperature: °C	Temperature: 12.4 °C	pH Verified [ ] By:

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Certificate of Analysis

Paterson Group Consulting Engineers

154 Colonnade Road South
Nepean, ON K2E7J5
Attn: Marek Moroz

Client PO: 24743
Project: PE4223
Custody: 44397

Report Date: 24-Jul-2018
Order Date: 23-Jul-2018

Order #: 1830134

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

Paracel ID	Client ID
1830134-01	B1
1830134-02	B2

Approved By:

Mark Foto, M.Sc.
Lab Supervisor

Certificate of Analysis
Client: Paterson Group Consulting Engineers
Client PO: 24743

Report Date: 24-Jul-2018
Order Date: 23-Jul-2018
Project Description: PE4223

Analysis Summary Table

Analysis	Method Reference/Description	Extraction Date	Analysis Date
BTEX by P&T GC-MS	EPA 8260 - P&T GC-MS	23-Jul-18	24-Jul-18
PHC F1	CWS Tier 1 - P&T GC-FID	23-Jul-18	24-Jul-18
PHCs F2 to F4	CWS Tier 1 - GC-FID, extraction	24-Jul-18	24-Jul-18
Solids, %	Gravimetric, calculation	24-Jul-18	24-Jul-18

Certificate of Analysis

Client: Paterson Group Consulting Engineers

Client PO: 24743

Report Date: 24-Jul-2018

Order Date: 23-Jul-2018

Project Description: PE4223

	Client ID:	B1	B2	-	-
	Sample Date:	07/23/2018 12:00	07/23/2018 12:00	-	-
	Sample ID:	1830134-01	1830134-02	-	-
	MDL/Units	Soil	Soil	-	-
Physical Characteristics					
% Solids	0.1 % by Wt.	58.1	57.3	-	-
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	103%	102%	-	-
Hydrocarbons					
F1 PHCs (C6-C10)	7 ug/g dry	<7	<7	-	-
F2 PHCs (C10-C16)	4 ug/g dry	39	<4	-	-
F3 PHCs (C16-C34)	8 ug/g dry	38	<8	-	-
F4 PHCs (C34-C50)	6 ug/g dry	<6	<6	-	-

Certificate of Analysis
Client: Paterson Group Consulting Engineers
Client PO: 24743

Report Date: 24-Jul-2018
Order Date: 23-Jul-2018
Project Description: PE4223

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	*8.61*		*ug/g*		*108*	*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)	49	4	ug/g dry	39			22.0	30	
F3 PHCs (C16-C34)	59	8	ug/g dry	38			44.2	30	QR-01
F4 PHCs (C34-C50)	ND	6	ug/g dry	ND				30	
Physical Characteristics									
% Solids	74.5	0.1	% by Wt.	74.9			0.5	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	*9.58*		*ug/g dry*		*110*	*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)	195	7	ug/g		97.5	80-120			
F2 PHCs (C10-C16)	152	4	ug/g	39	82.0	60-140			
F3 PHCs (C16-C34)	342	8	ug/g	38	90.2	60-140			
F4 PHCs (C34-C50)	205	6	ug/g	ND	95.9	60-140			
Volatiles									
Benzene	4.25	0.02	ug/g		106	60-130			
Ethylbenzene	3.86	0.05	ug/g		96.4	60-130			
Toluene	3.74	0.05	ug/g		93.4	60-130			
m,p-Xylenes	7.78	0.05	ug/g		97.2	60-130			
o-Xylene	3.93	0.05	ug/g		98.4	60-130			
Surrogate: Toluene-d8	*7.95*		*ug/g*		*99.4*	*50-140*			

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.

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 LABORATORIES LTD.

Paracel ID: 1830134

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Chain of Custody
(Lab Use Only)
№ 44397

Page 1 of 1

Client Name: Paterson Group	Project Reference: PE4223
Contact Name: Marek Maroz / E Leveque	Quote #
Address: 154 Colonnade Rd S, Ottawa	PO # 24743
Telephone: 613 226 7381	Email Address:

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

Criteria: ☒ O. Reg. 153/04 (As Amended) Table 3 ☐ 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)

Paracel Order Number: 1830134

Required Analyses

	Sample ID/Location Name	Matrix	Air Volume	# of Containers	Sample Taken Date	Sample Taken Time	BTEX + PHCs F1-F4										
1	B1	S		2	July 23	12p	X					120 mL + 1 vial					
2	B2	S		2	↓	12p	X					↓					
3																	
4																	
5																	
6																	
7																	
8																	
9																	
10																	

Comments:

Method of Delivery: Paracel

Relinquished By (Sign): [signature]	Received by Driver/Depot: [signature] Rouse	Received at Lab: Sumreporn Dommai	Verified By: [signature]
Relinquished By (Print): Marek Maroz	Date/Time: 23/07/18 4:00	Date/Time: JUL 23, 2018 05:29	Date/Time: July 23/18 5:44
Date/Time: 2018-07-23 4	Temperature: °C	Temperature: 18.5 °C	pH Verified [ ] By:

Chain of Custody (Blank) - Rev 0.4 Feb 2016

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Certificate of Analysis

Paterson Group Consulting Engineers

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

Client PO: 24802
Project: PE4223
Custody: 44335

Report Date: 26-Jul-2018
Order Date: 25-Jul-2018

Order #: 1830378

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

Paracel ID	Client ID
1830378-01	E1
1830378-02	S1

Approved By:

Mark Foto

Mark Foto, M.Sc.
Lab Supervisor

Certificate of Analysis
Client: Paterson Group Consulting Engineers
Client PO: 24802

Report Date: 26-Jul-2018
Order Date: 25-Jul-2018
Project Description: PE4223

Analysis Summary Table

Analysis	Method Reference/Description	Extraction Date	Analysis Date
BTEX by P&T GC-MS	EPA 8260 - P&T GC-MS	26-Jul-18	26-Jul-18
PHC F1	CWS Tier 1 - P&T GC-FID	26-Jul-18	26-Jul-18
PHCs F2 to F4	CWS Tier 1 - GC-FID, extraction	26-Jul-18	26-Jul-18
Solids, %	Gravimetric, calculation	26-Jul-18	26-Jul-18

Certificate of Analysis

Client: Paterson Group Consulting Engineers

Client PO: 24802

Report Date: 26-Jul-2018

Order Date: 25-Jul-2018

Project Description: PE4223

	Client ID:	E1	S1	-	-
	Sample Date:	07/23/2018 09:00	07/23/2018 09:00	-	-
	Sample ID:	1830378-01	1830378-02	-	-
	MDL/Units	Soil	Soil	-	-
Physical Characteristics					
% Solids	0.1 % by Wt.	67.0	56.8	-	-
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	66.2%	87.3%	-	-
Hydrocarbons					
F1 PHCs (C6-C10)	7 ug/g dry	183	<7	-	-
F2 PHCs (C10-C16)	4 ug/g dry	589	<4	-	-
F3 PHCs (C16-C34)	8 ug/g dry	527	<8	-	-
F4 PHCs (C34-C50)	6 ug/g dry	<6	<6	-	-

Certificate of Analysis
Client: Paterson Group Consulting Engineers
Client PO: 24802

Report Date: 26-Jul-2018
Order Date: 25-Jul-2018
Project Description: PE4223

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	*2.95*		*ug/g*		*92.2*	*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)	401	4	ug/g dry	589			38.0	30	QR-04
F3 PHCs (C16-C34)	393	8	ug/g dry	527			29.1	30	
F4 PHCs (C34-C50)	ND	6	ug/g dry	ND				30	
Physical Characteristics									
% Solids	83.0	0.1	% by Wt.	81.3			2.1	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	*3.04*		*ug/g dry*		*83.5*	*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)	195	7	ug/g		97.6	80-120			
F2 PHCs (C10-C16)	675	4	ug/g	589	72.4	60-140			
F3 PHCs (C16-C34)	812	8	ug/g	527	97.1	60-140			
F4 PHCs (C34-C50)	230	6	ug/g	ND	124	60-140			
Volatiles									
Benzene	3.68	0.02	ug/g		92.0	60-130			
Ethylbenzene	4.86	0.05	ug/g		122	60-130			
Toluene	4.67	0.05	ug/g		117	60-130			
m,p-Xylenes	10.2	0.05	ug/g		128	60-130			
o-Xylene	4.90	0.05	ug/g		123	60-130			
Surrogate: Toluene-d8	*2.34*		*ug/g*		*73.0*	*50-140*			

Qualifier Notes:

QC Qualifiers :

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.

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Paracel ID: 1830378

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acel@paracellabs.com

Chain of Custody
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№ 44335

Page 1 of 1

Client Name: Paterson Group	Project Reference: PE4223		**Turnaround Time:**
Contact Name: E Leveque M. Moroz	Quote #		☒ 1 Day ☐ 3 Day
Address: 154 Colonnade Rd S, Ottawa, ON	PO # 24802		☐ 2 Day ☐ Regular
Telephone: 613 226 7381	Email Address:		Date Required:

Criteria: ☒ O. Reg. 153/04 (As Amended) Table 3 ☐ 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)

Paracel Order Number: 1830378

Required Analyses

	Sample ID/Location Name	Matrix	Air Volume	# of Containers	Sample Taken Date	Sample Taken Time	BTEX + PHCs										
1	E1	S		2	July 23		X					120ml + 1vial.					
2	S1	S		2	↓		X					↓					
3																	
4																	
5																	
6																	
7																	
8																	
9																	
10																	

Comments:

Method of Delivery: Paracel

Relinquished By (Sign): [signature]	Received by Driver/Depot: M. Skouie	Received at Lab: Uvnneporn Dokmai	Verified By: [signature]
Relinquished By (Print): Marek Moroz	Date/Time: 25/07/18 310	Date/Time: Jul 25, 2018 05:42	Date/Time: July 25/18 6:02
Date/Time: 2018-07-25	Temperature: °C PH.	Temperature: 17.9 °C	pH Verified [ ] By:

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Certificate of Analysis

Paterson Group Consulting Engineers

154 Colonnade Road South
Nepean, ON K2E7J5
Attn: Marek Moroz

Client PO:
Project: PE4223
Custody: 43304

Report Date: 30-Jul-2018
Order Date: 27-Jul-2018

Order #: 1830638

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

Paracel ID	Client ID
1830638-01	B9
1830638-02	S3
1830638-03	E3

Approved By:

Dale Robertson, BSc
Laboratory Director

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

Report Date: 30-Jul-2018
Order Date: 27-Jul-2018
Project Description: PE4223

Analysis Summary Table

Analysis	Method Reference/Description	Extraction Date	Analysis Date
BTEX by P&T GC-MS	EPA 8260 - P&T GC-MS	30-Jul-18	30-Jul-18
PHC F1	CWS Tier 1 - P&T GC-FID	30-Jul-18	30-Jul-18
PHCs F2 to F4	CWS Tier 1 - GC-FID, extraction	27-Jul-18	30-Jul-18
Solids, %	Gravimetric, calculation	30-Jul-18	30-Jul-18

Certificate of Analysis

Client: Paterson Group Consulting Engineers

Client PO:

Report Date: 30-Jul-2018

Order Date: 27-Jul-2018

Project Description: PE4223

	Client ID:	B9	S3	E3	-
	Sample Date:	07/27/2018 13:00	07/27/2018 10:00	07/27/2018 11:00	-
	Sample ID:	1830638-01	1830638-02	1830638-03	-
	MDL/Units	Soil	Soil	Soil	-
Physical Characteristics					
% Solids	0.1 % by Wt.	56.8	59.8	71.0	-
Volatiles					
Benzene	0.02 ug/g dry	<0.02	<0.02	<0.02	-
Ethylbenzene	0.05 ug/g dry	<0.05	<0.05	<0.05	-
Toluene	0.05 ug/g dry	<0.05	<0.05	<0.05	-
m,p-Xylenes	0.05 ug/g dry	<0.05	<0.05	<0.05	-
o-Xylene	0.05 ug/g dry	<0.05	<0.05	<0.05	-
Xylenes, total	0.05 ug/g dry	<0.05	<0.05	<0.05	-
Toluene-d8	Surrogate	69.7%	69.3%	74.0%	-
Hydrocarbons					
F1 PHCs (C6-C10)	7 ug/g dry	<7	55	<7	-
F2 PHCs (C10-C16)	4 ug/g dry	<4	37	13	-
F3 PHCs (C16-C34)	8 ug/g dry	<8	59	79	-
F4 PHCs (C34-C50)	6 ug/g dry	<6	<6	<6	-

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

Report Date: 30-Jul-2018
Order Date: 27-Jul-2018
Project Description: PE4223

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	*2.92*		*ug/g*		*91.1*	*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)	58	4	ug/g dry	64			9.0	30	
F3 PHCs (C16-C34)	54	8	ug/g dry	53			2.2	30	
F4 PHCs (C34-C50)	ND	6	ug/g dry	ND				30	
Physical Characteristics									
% Solids	86.1	0.1	% by Wt.	86.4			0.3	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	*3.36*		*ug/g dry*		*75.0*	*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)	198	7	ug/g		99.2	80-120			
F2 PHCs (C10-C16)	154	4	ug/g	64	106	60-140			
F3 PHCs (C16-C34)	283	8	ug/g	53	110	60-140			
F4 PHCs (C34-C50)	110	6	ug/g	ND	82.9	60-140			
Volatiles									
Benzene	4.78	0.02	ug/g		120	60-130			
Ethylbenzene	4.95	0.05	ug/g		124	60-130			
Toluene	4.61	0.05	ug/g		115	60-130			
m,p-Xylenes	9.23	0.05	ug/g		115	60-130			
o-Xylene	4.64	0.05	ug/g		116	60-130			
Surrogate: Toluene-d8	*2.38*		*ug/g*		*74.5*	*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.

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 LABORATORIES LTD.

Paracel ID: 1830638

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cel@paracellabs.com

Chain of Custody (Lab Use Only)
№ 43304

Page 1 of 1

Client Name: Paterson Group	Project Reference: PE4223	**Turnaround Time:**	
Contact Name: M. Moroz E. Leveque	Quote #	☒ 1 Day	☐ 3 Day
Address: 154 Colonnade Rd S, Ottawa, ON	PO #	☐ 2 Day	☐ Regular
Telephone: 613 226 7381	Email Address:	Date Required:	

Criteria: ☒ O. Reg. 153/04 (As Amended) Table 3 ☐ 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)

Paracel Order Number: 1830638 - Rush. 1830640 - Regular

	Sample ID/Location Name	Matrix	Air Volume	# of Containers	Sample Taken Date	Sample Taken Time	BTEX TPHCs	Required Analyses
1	B3	S		2	July 27	10a	X	← Regular TAT
2	B9	S		↓		1p	↓	} ← Rush 24h
3	S3	S		↓		10a	↓	}
4	E3	S		↓		11a	↓	}
5								
6								
7								
8								
9								
10								

-120mL + 1 vial ↓

Comments: Will email PO

Method of Delivery: Walk-in

Relinquished By (Sign): [signature]	Received by Driver/Depot:	Received at Lab: [signature]	Verified By: [signature]
Relinquished By (Print): Mark Moroz	Date/Time:	Date/Time: July 27/18 2:50p	Date/Time: 27/7/18 3:10
Date/Time: 2018-07-27. 3p	Temperature: °C	Temperature: 8.1 °C	pH Verified [ ] By:

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Certificate of Analysis

Paterson Group Consulting Engineers

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

Client PO:
Project: PE4223
Custody: 43101

Report Date: 31-Jul-2018
Order Date: 30-Jul-2018

Order #: 1831092

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

Paracel ID	Client ID
1831092-01	B12
1831092-02	E6
1831092-03	S6

Approved By:

Dale Robertson, BSc
Laboratory Director

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

Report Date: 31-Jul-2018
Order Date: 30-Jul-2018
Project Description: PE4223

Analysis Summary Table

Analysis	Method Reference/Description	Extraction Date	Analysis Date
BTEX by P&T GC-MS	EPA 8260 - P&T GC-MS	31-Jul-18	31-Jul-18
PHC F1	CWS Tier 1 - P&T GC-FID	31-Jul-18	31-Jul-18
PHCs F2 to F4	CWS Tier 1 - GC-FID, extraction	30-Jul-18	31-Jul-18
Solids, %	Gravimetric, calculation	31-Jul-18	31-Jul-18

Certificate of Analysis

Client: Paterson Group Consulting Engineers

Client PO:

Report Date: 31-Jul-2018

Order Date: 30-Jul-2018

Project Description: PE4223

	Client ID:	B12	E6	S6	-
	Sample Date:	07/30/2018 13:00	07/30/2018 13:00	07/30/2018 13:00	-
	Sample ID:	1831092-01	1831092-02	1831092-03	-
	MDL/Units	Soil	Soil	Soil	-
Physical Characteristics					
% Solids	0.1 % by Wt.	67.0	69.1	68.5	-
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	63.9%	69.2%	63.2%	-
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	-

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

Report Date: 31-Jul-2018
Order Date: 30-Jul-2018
Project Description: PE4223

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	*2.92*		*ug/g*		*91.1*	*50-140*			

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

Report Date: 31-Jul-2018
Order Date: 30-Jul-2018
Project Description: PE4223

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)	7	4	ug/g dry	8			20.9	30	
F3 PHCs (C16-C34)	60	8	ug/g dry	142			81.3	30	QR-01
F4 PHCs (C34-C50)	32	6	ug/g dry	39			20.9	30	
Physical Characteristics									
% Solids	90.4	0.1	% by Wt.	92.0			1.8	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	*3.36*		*ug/g dry*		*75.0*	*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)	198	7	ug/g		99.2	80-120			
F2 PHCs (C10-C16)	119	4	ug/g	8	131	60-140			
F3 PHCs (C16-C34)	279	8	ug/g	142	66.3	60-140			
F4 PHCs (C34-C50)	150	6	ug/g	39	85.5	60-140			
Volatiles									
Benzene	4.78	0.02	ug/g		120	60-130			
Ethylbenzene	4.95	0.05	ug/g		124	60-130			
Toluene	4.61	0.05	ug/g		115	60-130			
m,p-Xylenes	9.23	0.05	ug/g		115	60-130			
o-Xylene	4.64	0.05	ug/g		116	60-130			
Surrogate: Toluene-d8	*2.38*		*ug/g*		*74.5*	*50-140*			

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.

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 LABORATORIES LTD.

Paracel ID: 1831092

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Chain of Custody
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№ 43101

Page 1 of 1

Client Name: PATERSON	Project Reference: PE4223
Contact Name: Evengue M. Moroz	Quote #
Address: 154 Colonnade Rd S, Ottawa, ON	PO #
Telephone: 613 226 7381	Email Address:

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

Criteria: ☒ O. Reg. 153/04 (As Amended) Table 3 ☐ 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)

Paracel Order Number: 1831092.

	Sample ID/Location Name	Matrix	Air Volume	# of Containers	Sample Taken: Date	Sample Taken: Time	Required Analyses: BTEX + PHCs F1-F4										
1	B12	S		2	July 30	1pm	X			250mL + vial							✓
2	E6	S		1	↓	↓	X			120mL + vial							✓
3	S6	S		↓	↓	↓	X			250mL + vial							✓
4																	
5																	
6																	
7																	
8																	
9																	
10																	

Comments: will email P.O.

Method of Delivery: walk-in

Relinquished By (Sign): Marek Moroz	Received by Driver/Depot:	Received at Lab: Scott	Verified By: Melissa
Relinquished By (Print): Marek Moroz	Date/Time:	Date/Time: July 30/18 4:21p	Date/Time: July 30/18 4:28
Date/Time: 2018-07-30	Temperature: °C	Temperature: 24.7 °C	pH Verified [ ] By:

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Certificate of Analysis

Paterson Group Consulting Engineers

154 Colonnade Road South
Nepean, ON K2E7J5
Attn: Marek Moroz

Client PO:
Project: PE4223
Custody: 43304

Report Date: 2-Aug-2018
Order Date: 27-Jul-2018

Order #: 1830640

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

Paracel ID	Client ID
1830640-01	B3

Approved By: Mark Foto

Mark Foto, M.Sc.
Lab Supervisor

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

Report Date: 02-Aug-2018
Order Date: 27-Jul-2018
Project Description: PE4223

Analysis Summary Table

Analysis	Method Reference/Description	Extraction Date	Analysis Date
BTEX by P&T GC-MS	EPA 8260 - P&T GC-MS	31-Jul-18	1-Aug-18
PHC F1	CWS Tier 1 - P&T GC-FID	31-Jul-18	1-Aug-18
PHCs F2 to F4	CWS Tier 1 - GC-FID, extraction	30-Jul-18	31-Jul-18
Solids, %	Gravimetric, calculation	31-Jul-18	31-Jul-18

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

Report Date: 02-Aug-2018
Order Date: 27-Jul-2018
Project Description: PE4223

	Client ID:	B3	-	-	-
	Sample Date:	07/27/2018 10:00	-	-	-
	Sample ID:	1830640-01	-	-	-
	MDL/Units	Soil	-	-	-
Physical Characteristics					
% Solids	0.1 % by Wt.	57.7	-	-	-
Volatiles					
Benzene	0.02 ug/g dry	<0.02	-	-	-
Ethylbenzene	0.05 ug/g dry	<0.05	-	-	-
Toluene	0.05 ug/g dry	<0.05	-	-	-
m,p-Xylenes	0.05 ug/g dry	<0.05	-	-	-
o-Xylene	0.05 ug/g dry	<0.05	-	-	-
Xylenes, total	0.05 ug/g dry	<0.05	-	-	-
Toluene-d8	Surrogate	51.1%	-	-	-
Hydrocarbons					
F1 PHCs (C6-C10)	7 ug/g dry	<7	-	-	-
F2 PHCs (C10-C16)	4 ug/g dry	<4	-	-	-
F3 PHCs (C16-C34)	8 ug/g dry	29	-	-	-
F4 PHCs (C34-C50)	6 ug/g dry	7	-	-	-

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

Report Date: 02-Aug-2018
Order Date: 27-Jul-2018
Project Description: PE4223

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	*2.92*		*ug/g*		*91.1*	*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)	ND	4	ug/g dry	ND				30	
F3 PHCs (C16-C34)	110	8	ug/g dry	89			21.2	30	
F4 PHCs (C34-C50)	32	6	ug/g dry	26			20.4	30	
Physical Characteristics									
% Solids	90.4	0.1	% by Wt.	92.0			1.8	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	*3.36*		*ug/g dry*		*75.0*	*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)	198	7	ug/g		99.2	80-120			
F2 PHCs (C10-C16)	98	4	ug/g	ND	105	60-140			
F3 PHCs (C16-C34)	326	8	ug/g	89	103	60-140			
F4 PHCs (C34-C50)	205	6	ug/g	26	123	60-140			
Volatiles									
Benzene	4.78	0.02	ug/g		120	60-130			
Ethylbenzene	4.95	0.05	ug/g		124	60-130			
Toluene	4.61	0.05	ug/g		115	60-130			
m,p-Xylenes	9.23	0.05	ug/g		115	60-130			
o-Xylene	4.64	0.05	ug/g		116	60-130			
Surrogate: Toluene-d8	*2.38*		*ug/g*		*74.5*	*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.

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 LABORATORIES LTD.

Paracel ID: 1830640

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Chain of Custody
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№ 43304

Page 1 of 1

Client Name: Paterson Group	Project Reference: PE4223
Contact Name: M. Inroe E. Leveque	Quote #
Address: 154 Colonnade Rd S, Ottawa, ON	PO #
Telephone: 613 226 7381	Email Address:

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

Criteria: ☒ O. Reg. 153/04 (As Amended) Table 3 ☐ 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)

Paracel Order Number:
1830638 - Rush.
1830640 - Regular

	Sample ID/Location Name	Matrix	Air Volume	# of Containers	Sample Taken Date	Sample Taken Time	Required Analyses: BTEX/F1-F4/HCs	
1	BH3	S		2	July 27	10a	X	← Regular TAT
2	BH9	S				1p		
3	BH3	S				10a		← Rush 24h
4	BH3	S				11a		
5								
6								
7								
8								
9								
10								

-120 mL + 1x40mL TAT

Comments: Will email PO.

Method of Delivery: Walkin

Relinquished By (Sign):	Received by Driver/Depot:	Received at Lab:
Relinquished By (Print): Mark Morse	Date/Time:	Date/Time: July 27/18 2:50p
Date/Time: 2018-07-27 3p	Temperature: °C	Temperature: 24.1 °C

Verified By:
Date/Time: July 27/18 5:10p
pH Verified ☐ By:

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Certificate of Analysis

Paterson Group Consulting Engineers

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

Client PO: 24802
Project: PE4223
Custody: 44399

Report Date: 30-Jul-2018
Order Date: 25-Jul-2018

Order #: 1830390

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

Paracel ID	Client ID
1830390-01	BH11-SS3
1830390-02	BH12-SS3A
1830390-03	BH13-SS2

Approved By:

Dale Robertson, BSc
Laboratory Director

Certificate of Analysis
Client: Paterson Group Consulting Engineers
Client PO: 24802

Report Date: 30-Jul-2018
Order Date: 25-Jul-2018
Project Description: PE4223

Analysis Summary Table

Analysis	Method Reference/Description	Extraction Date	Analysis Date
BTEX by P&T GC-MS	EPA 8260 - P&T GC-MS	27-Jul-18	28-Jul-18
PHC F1	CWS Tier 1 - P&T GC-FID	27-Jul-18	28-Jul-18
PHCs F2 to F4	CWS Tier 1 - GC-FID, extraction	26-Jul-18	27-Jul-18
Solids, %	Gravimetric, calculation	26-Jul-18	26-Jul-18

Certificate of Analysis
Client: Paterson Group Consulting Engineers
Client PO: 24802

Report Date: 30-Jul-2018
Order Date: 25-Jul-2018
Project Description: PE4223

	Client ID:	BH11-SS3	BH12-SS3A	BH13-SS2	-
	Sample Date:	07/24/2018 13:00	07/24/2018 10:00	07/24/2018 10:00	-
	Sample ID:	1830390-01	1830390-02	1830390-03	-
	MDL/Units	Soil	Soil	Soil	-
Physical Characteristics					
% Solids	0.1 % by Wt.	77.7	66.6	71.4	-
Volatiles					
Benzene	0.02 ug/g dry	<0.02	<0.02	<0.02	-
Ethylbenzene	0.05 ug/g dry	<0.05	<0.05	0.10	-
Toluene	0.05 ug/g dry	0.16	<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	0.07	0.08	<0.05	-
Xylenes, total	0.05 ug/g dry	0.07	0.08	<0.05	-
Toluene-d8	Surrogate	80.0%	80.8%	78.6%	-
Hydrocarbons					
F1 PHCs (C6-C10)	7 ug/g dry	195	<7	249	-
F2 PHCs (C10-C16)	4 ug/g dry	399	617	907	-
F3 PHCs (C16-C34)	8 ug/g dry	289	521	773	-
F4 PHCs (C34-C50)	6 ug/g dry	<6	<6	<6	-

Certificate of Analysis
Client: Paterson Group Consulting Engineers
Client PO: 24802

Report Date: 30-Jul-2018
Order Date: 25-Jul-2018
Project Description: PE4223

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	*2.92*		*ug/g*		*91.1*	*50-140*			

Certificate of Analysis
Client: Paterson Group Consulting Engineers
Client PO: 24802

Report Date: 30-Jul-2018
Order Date: 25-Jul-2018
Project Description: PE4223

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)	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	
Physical Characteristics									
% Solids	83.0	0.1	% by Wt.	81.3			2.1	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	*3.36*		*ug/g dry*		*75.0*	*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)	198	7	ug/g		99.2	80-120			
F2 PHCs (C10-C16)	84	4	ug/g	ND	77.9	60-140			
F3 PHCs (C16-C34)	227	8	ug/g	ND	86.0	60-140			
F4 PHCs (C34-C50)	148	6	ug/g	ND	88.8	60-140			
Volatiles									
Benzene	4.78	0.02	ug/g		120	60-130			
Ethylbenzene	4.95	0.05	ug/g		124	60-130			
Toluene	4.61	0.05	ug/g		115	60-130			
m,p-Xylenes	9.23	0.05	ug/g		115	60-130			
o-Xylene	4.64	0.05	ug/g		116	60-130			
Surrogate: Toluene-d8	*2.38*		*ug/g*		*74.5*	*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.

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 LABORATORIES LTD.

Paracel ID: 1830390

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icel@paracellabs.com

Chain of Custody (Lab Use Only)
№ 44399
Page 1 of 1

Client Name: Paterson	Project Reference: PE4223
Contact Name: E. Leveque M. Moroz	Quote #
Address: 154 Colonnade Rd S, Ottawa	PO # 24802
Telephone: 613 226 7381	Email Address:

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

Criteria: ☒ O. Reg. 153/04 (As Amended) Table 3 ☐ 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)

Paracel Order Number: 1830390

Required Analyses

	Sample ID/Location Name	Matrix	Air Volume	# of Containers	Date	Time	BTEX PHCs										
1	BH11-SS2B	S		2	July 24	1p	X	← Hold			-120ml + 1 vial-						
2	BH11-SS3	S		2	↓	1p	X				↓						
3	BH12-SS3A	S		2	↓	10a	X				↓						
4	BH13-SS2	S		2	↓	6p	X				↓						
5																	
6																	
7																	
8																	
9																	
10																	

Comments: BH11-SS2B on Hold

Method of Delivery: Paracel

Relinquished By (Sign): [signature]	Received by Driver/Depot: [signature]	Received at Lab: SUNTEPORN DOMMA	Verified By: [signature]
Relinquished By (Print): Marek Moroz	Date/Time: 25/07/18 3:10	Date/Time: Jul 25 2018 05:44	Date/Time: Aug 25/18 7:35P
Date/Time: 2018-07-25	Temperature: °C	Temperature: 17.9 °C	pH Verified [ ] By:

Chain of Custody (Blank) - Rev 0.4 Feb 2016

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Certificate of Analysis

Paterson Group Consulting Engineers

154 Colonnade Road South
Nepean, ON K2E7J5
Attn: Marek Moroz

Client PO: 24854
Project: PE4223
Custody: 44348

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

Order #: 1831314

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

Paracel ID	Client ID
1831314-01	BH11-GW1
1831314-02	BH12-GW1

Approved By:

Dale Robertson, BSc
Laboratory Director

Certificate of Analysis
Client: Paterson Group Consulting Engineers
Client PO: 24854

Report Date: 07-Aug-2018
Order Date: 1-Aug-2018
Project Description: PE4223

Analysis Summary Table

Analysis	Method Reference/Description	Extraction Date	Analysis Date
BTEX by P&T GC-MS	EPA 624 - P&T GC-MS	2-Aug-18	2-Aug-18
PHC F1	CWS Tier 1 - P&T GC-FID	2-Aug-18	2-Aug-18
PHCs F2 to F4	CWS Tier 1 - GC-FID, extraction	2-Aug-18	3-Aug-18

Certificate of Analysis
Client: Paterson Group Consulting Engineers
Client PO: 24854

Report Date: 07-Aug-2018
Order Date: 1-Aug-2018
Project Description: PE4223

	Client ID:	BH11-GW1	BH12-GW1	-	-
	Sample Date:	08/01/2018 12:00	08/01/2018 12:00	-	-
	Sample ID:	1831314-01	1831314-02	-	-
	MDL/Units	Water	Water	-	-
Volatiles					
Benzene	0.5 ug/L	<0.5	<0.5	-	-
Ethylbenzene	0.5 ug/L	4.0	<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	99.7%	106%	-	-
Hydrocarbons					
F1 PHCs (C6-C10)	25 ug/L	186	<25	-	-
F2 PHCs (C10-C16)	100 ug/L	501	<100	-	-
F3 PHCs (C16-C34)	100 ug/L	200	<100	-	-
F4 PHCs (C34-C50)	100 ug/L	<100	<100	-	-

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	*85.2*		*ug/L*		*107*	*50-140*			

Method Quality Control: Duplicate

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Hydrocarbons									
F1 PHCs (C6-C10)	ND	25	ug/L	ND				30	
Volatiles									
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	*82.7*		*ug/L*		*103*	*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)	2020	25	ug/L		101	68-117			
F2 PHCs (C10-C16)	1660	100	ug/L		104	60-140			
F3 PHCs (C16-C34)	4300	100	ug/L		110	60-140			
F4 PHCs (C34-C50)	3040	100	ug/L		123	60-140			
Volatiles									
Benzene	36.9	0.5	ug/L		92.3	60-130			
Ethylbenzene	38.0	0.5	ug/L		95.0	60-130			
Toluene	37.2	0.5	ug/L		93.1	60-130			
m,p-Xylenes	79.0	0.5	ug/L		98.8	60-130			
o-Xylene	39.9	0.5	ug/L		99.6	60-130			
Surrogate: Toluene-d8	*76.9*		*ug/L*		*96.1*	*50-140*			

Qualifier Notes:

Login Qualifiers :

Container(s) - Bottle and COC sample ID don't match - Bottle reads BH12-GW1
Applies to samples: BH12-GW1

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.

PARACEL LABORATORIES LTD.

Paracel ID: 1831314

Head Office
319 St. Laurent Blvd.
a, Ontario K1G 4J8
00-749-1947
acel@paracellabs.com

Chain of Custody
(Lab Use Only)
№ 44348

Page 1 of 1

Client Name: Paterson Group	Project Reference: PE4373 4213
Contact Name: M. Moroz	Quote #
Address: 154 Colonnade Rd, S, Ottawa	PO # 24854
Telephone: 613 226 7381	Email Address:

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

Criteria: ☒ O. Reg. 153/04 (As Amended) Table 3 ☐ 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)

Paracel Order Number: 1831314

	Sample ID/Location Name	Matrix	Air Volume	# of Containers	Sample Taken: Date	Sample Taken: Time	Required Analyses: PHC F1+BTEX										
1	BH1 - GW1	GW		3	Aug 1	Noon	+										
2	BH2 - GW2	GW		3	↓	↓	+										
3																	
4																	
5																	
6																	
7																	
8																	
9																	
10																	

Comments: * Bottle reads BH12-GW1. Reported GW1 by mistake.

Method of Delivery: Paracel

Relinquished By (Sign):	Received by Driver/Depot: T. Feaver	Received at Lab:	Verified By:
Relinquished By (Print): Marcel Moroz	Date/Time: 01/08/18 3:40 pm	Date/Time: Aug 1/18 4:30 pm	Date/Time: Aug 1/18 5:35 pm
Date/Time: Aug 1	Temperature: °C	Temperature: 19.2°	pH Verified [ ] By:

#315 McLEOD STREET
HULSE, PLAYFAIR,
McGARRY FUNERAL
HOMES

#328 McLEOD STREET
RESIDENTIAL

#326 McLEOD STREET
RESIDENTIAL

#229 ARGYLE STREET
RESIDENTIAL

#321 McLEOD STREET
RESIDENTIAL

#233 ARGYLE STREET
RESIDENTIAL

FH - TBM

#323 McLEOD STREET
RESIDENTIAL

McLEOD STREET

ASPHALTIC CONCRETE DRIVEWAY

ASPHALTIC CONCRETE
PARKING AREA

LANDSCAPED

#330 McLEOD STREET
RESIDENTIAL

BH 9
70.19

BH 10
70.15

SLOPED AREA A

CB

BH 5
70.21

BH 2
70.26

BH 12
{59.1}
(57.7)

BH 13
{59.1}

BH 3
70.21

BH 4
70.18

BH 7
70.20

BH 1
70.19

BH 8
70.18

BH 11
{59.1}
(57.7)

BH 6
70.23

SLOPED AREA B

#237 ARGYLE STREET
COMMERCIAL

#333 McLEOD STREET
RESIDENTIAL

CONCRETE SLAB
(FORMER UNDERGROUND
STORAGE TANK LOCATION)

APPROXIMATE AREA OF
REMEDIATION EXCAVATION
(REFER TO SITE REMEDIATION PLAN)

#340 McLEOD STREET
CONDOMINIUM RESIDENTIAL
DEVELOPMENT

LEGEND:

⊕	BOREHOLE WITH MONITORING WELL LOCATION
⊕	BOREHOLE LOCATION
70.19	GROUND SURFACE ELEVATION (m)
{59.1}	APPROX. ELEVATION (MEASURED FROM GROUND SURFACE NEAR BH 7)
(57.7)	GROUNDWATER SURFACE ELEVATION (m) AUGUST 1, 2018

TBM - NORTHEAST BOLT OF BOTTOM OF FLANGE OF FIRE HYDRANT IN FRONT OF 323 McLEOD STREET. GEODETIC ELEVATION = 70.569m.

patersongroup
consulting engineers

154 Colonnade Road South
Ottawa, Ontario K2E 7J5
Tel: (613) 226-7381 Fax: (613) 226-6344

NO.	REVISIONS	DATE	INITIAL
0			

MR. CLAUDE BRUNET

SUPPLEMENTAL PHASE II - ENVIRONMENTAL SITE ASSESSMENT
330 McLEOD STREET

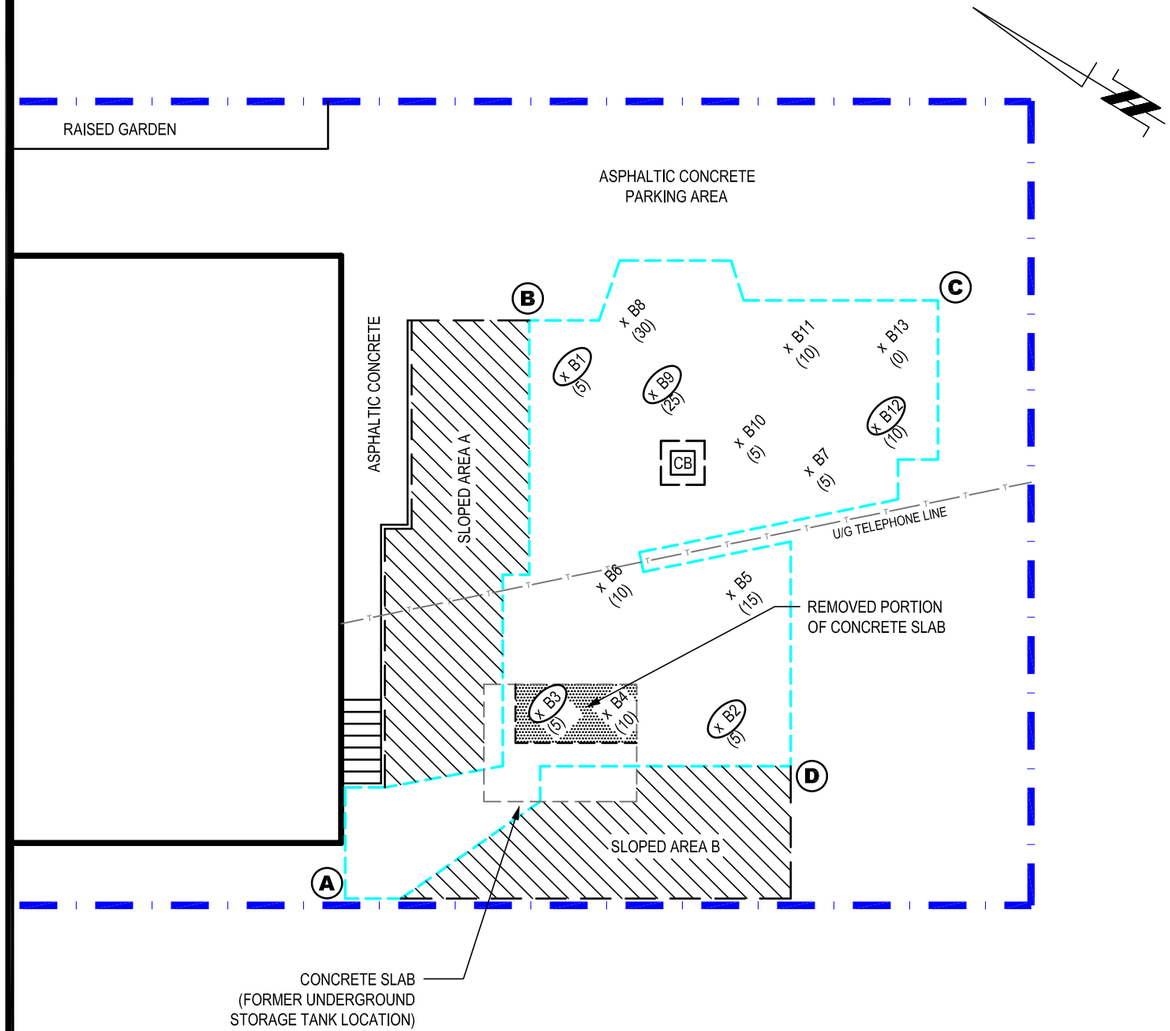
OTTAWA, ONTARIO

Title:

TEST HOLE LOCATION PLAN

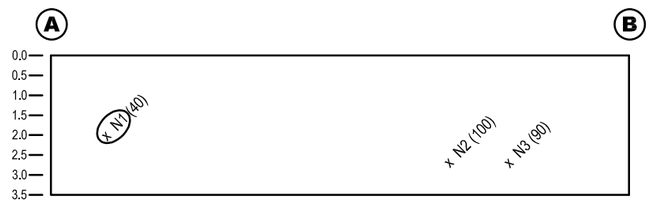
Scale: 1:200	Date: 08/2018
Drawn by: MPG	Report No.: PE4223-2
Checked by: MM	Dwg. No.: PE4223-2
Approved by: MSD	Revision No.: 0

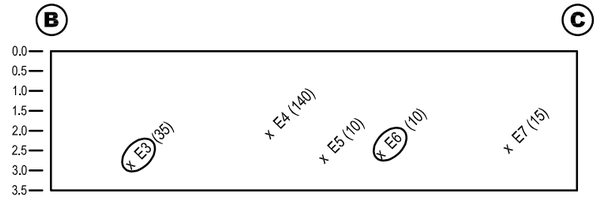
p:\autocad drawings\environmental\pe42xx\pe4223\pe4223-2 thlp.dwg

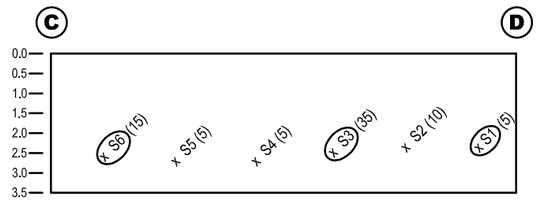


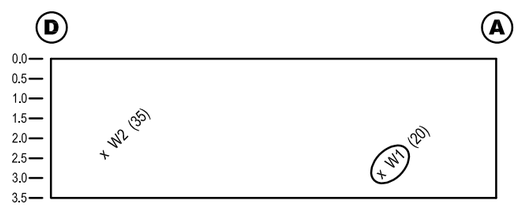
LEGEND:

x B10	APPROX. SOIL SAMPLE LOCATION
(x W1)	ANALYZED SOIL SAMPLE LOCATION
(30)	VAPOUR READING (ppm)









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Ottawa, Ontario K2E 7J5
Tel: (613) 226-7381 Fax: (613) 226-6344

NO.	REVISIONS	DATE	INITIAL
0			

MR. CLAUDE BRUNET

ENVIRONMENTAL SITE REMEDIATION
330 McLEOD STREET

OTTAWA, ONTARIO

Title:

SITE REMEDIATION PLAN

Scale: 1:150	Date: 08/2018
Drawn by: MPG	Report No.: PE4223-2
Checked by: MM	Dwg. No.: PE4223-3
Approved by: MSD	Revision No.: 0

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