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Updated Phase II-Environmental Site Assessment

Commercial Property
325 Dalhousie Street, 110 York Street
and 137-141 George Street
Ottawa, Ontario

Prepared For

Claridge Homes

November 29, 2013

Report: PE2709-1R

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November 29, 2013
File: PE2709-LET.01R

Claridge Homes
2001 - 210 Gladstone Avenue
Ottawa, Ontario
K2P 0Y6

Attention: **Mr. Neil Malhotra**

Subject: **Updated Phase II-Environmental Site Assessment**
110 York Street, 325 Dalhousie Street,
137 and 141 George Street - Ottawa

Dear Sir,

Further to your request and authorization, Paterson Group (Paterson) conducted additional groundwater sampling at the subject site, to address comments made by the City of Ottawa. This report consists of the 2012 Phase II - Environmental Site Assessment (ESA) prepared for the aforementioned properties, which has been updated with the additional test results.

1.0 Background Information

The subject site consists of four parcels of land located south of York Street, north of George Street, and west of Dalhousie Street, in the City of Ottawa, Ontario. The property addressed as 137 George Street is currently occupied by a paved asphalt parking lot. The property addressed as 141 George Street is currently occupied by the Honest Lawyer bar and restaurant, 110 York Street is occupied by a paved asphalt parking area and The Whiskey Bar and 325 Dalhousie Street is occupied by an 11-storey office building and a paved parking area. Adjacent properties to the west are occupied by low-rise multi-unit commercial buildings (343 and 353 Dalhousie Street).

2.0 Previous Engineering Reports

The following reports were reviewed as a component of this study:

- ‘Phase I and Limited Phase II-Environmental Site Assessment, Commercial Property, 141 George Street, Ottawa, Ontario’, prepared by Paterson, dated September 2011.

The above noted report identified the following environmental concerns with the potential to have impacted the subject site:

- A former service station, previously addressed 337 Dalhousie Street) was present on the subject property addressed 321 to 325 Dalhousie, immediately south of the existing office building;
- A former service station was present at 351 Dalhousie Street (currently addressed as 353 Dalhousie Street), immediately to the west of 137 George Street;
- A printing business was present at 125-127 George Street (currently the parking lot addressed as 137 George Street);
- A dry cleaning business was present at 343 Dalhousie Street, immediately to the west of 137 George Street.

As a component of the 2011 Phase I and Limited Phase II-ESA, Paterson supervised the drilling of a borehole and the installation of a monitoring well (BH1-11) in the southeast corner of 141 George Street (The Honest Lawyer). All soil and groundwater samples were in compliance with the 2011 MOE Table 3 standards for residential properties. The location of this borehole is shown on Drawing PE2709-1 - Test Hole Location Plan.

3.0 Subsurface Investigation

The subsurface investigation was conducted on July 17 and 18, 2012, and consisted of placing four (4) boreholes on the subject property (BH1 to BH4). The boreholes were placed to provide general coverage of the former service stations, dry cleaner, and print shop identified in previous reports. The borehole locations are illustrated on Drawing PE2709-1 - Test Hole Location Plan, appended to this report. The boreholes were advanced using a truck-mounted power auger drill rig.

The boreholes were completed to depths ranging from 4.2 to 21.1 m below the existing grade. A total of 29 soil samples were recovered from the boreholes by means of split spoon sampling. Upon recovery, all samples were immediately sealed in appropriate containers to facilitate the preliminary screening procedure. Additionally, 16 rock core samples were collected from BH1, BH2, and BH4, where monitoring wells were installed. BH4 was completed to a depth of 21.1 m for geotechnical purposes and to characterize groundwater conditions at depth, as opposed to BH1 and BH2, which were cored to depths of 7.6 to 8.8 m to characterize shallow groundwater conditions. The depths at which the split spoon and rock core samples were obtained from the boreholes are shown as "**SS**" and "**RC**" respectively on the Soil Profile and Test Data Sheets appended to this report.

Monitoring Well Installation

Groundwater monitoring wells were installed in BH1, BH2, and BH4. The locations of these monitoring wells are shown on the attached Test Hole Location Plan. Typical monitoring well construction details are described below. Reference to the Soil Profile and Test Data Sheets should be made for specific well construction details.

- ❏ 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 backfill within annular space around screen.
- ❏ 2 m and 13 m thick bentonite hole plug directly above PVC slotted screen.
- ❏ Clean backfill from top of bentonite plug to the ground surface.

It is noted that BH4 was cored using a HQ-diameter wireline coring system as opposed to the usual NQ diameter, to facilitate the installation of 51 mm, as opposed to a 32 mm, screen and risers. The monitoring well installed in BH4 was screened at a much greater depth than the monitoring wells installed in BH1 and BH2.

Sampling Protocol

Soil and groundwater sampling protocols were followed using the MOE document entitled "Guidance on Sampling and Analytical Methods for Use at Contaminated Sites in Ontario", dated May 1996.

Soil samples were recovered by hand from a stainless steel split spoon sampler, using protective gloves (changed after each sample). The samples were placed into plastic bags. If significant contamination was encountered, samples were immediately placed in glass jars and laboratory-provided methanol preservation vials. Sampling equipment was washed in soapy water after each split spoon sample to prevent cross-contamination of samples. Samples were stored in coolers to reduce analyte volatilization during transportation.

Groundwater samples were recovered from the monitoring wells installed in BH1, BH2, and BH4. The wells were purged prior to sampling by removing three times the volume of water contained within the wells where possible, or until the wells were dry. The groundwater samples were taken using a peristaltic pump set to low flow using dedicated polyethylene tubing. The samples were stored in laboratory-provided bottles and stored in a cooler to reduce analyte volatilization during transportation.

Analytical Testing

Paracel Laboratories (Paracel), of Ottawa, performed the laboratory analysis of the soil and groundwater samples submitted for analytical testing. Paracel is a member of the Standards Council of Canada/Canadian Association for Environmental Analytical Laboratories (SCC/CAEAL). Paracel is accredited and certified by SCC/CAEAL for specific tests registered with the association.

Subsurface Profile

The soil profile encountered consisted of a layer of asphaltic concrete underlain by a layer of silty sand fill with trace clay, brick, concrete, crushed stone, gravel, and cobbles. The fill layer ranges in thickness from 1.2 m at BH2 to 3 m at BH1, and demolition debris (brick, concrete, etc.) was observed in the fill at depths of up to 2.2 m below existing grade. The fill layer is underlain by glacial till, consisting of a grey silty clay to silty sand matrix with gravel, and cobbles. Practical auger refusal was encountered in all boreholes at depths ranging from 4.2 m to 5 m below existing grade. Based on the rock core samples obtained at BH1, BH2, and BH4, the glacial till layer is underlain by limestone bedrock. The specific details of the soil profile at each test hole location are presented on the attached Soil Profile and Test Data sheets.

Groundwater

Groundwater levels at the subject site were measured on July 20, 2012. Groundwater was encountered at depths of 3.7m and 4.5m below ground surface in BH1 and BH2. The groundwater in BH1-11 was encountered at 5.2 m below ground surface. Based on this data, the groundwater flow direction is considered to be in a northerly direction. The groundwater level identified in BH4 was not included in the groundwater flow direction analysis due to the fact that the monitoring well in BH 4 was screened at a much deeper interval than those in BH1, BH2 and BH1-11. Previous groundwater studies conducted in the vicinity of the subject property by Paterson, confirm that the groundwater flow direction in the general area of the subject site is to the north, towards the Ottawa River. It should be noted that groundwater levels fluctuate throughout the year with seasonal variations.

Soil Sample Headspace Analysis

A MiniRae photoionization detector (PID) was used to measure the vapour concentrations in the headspace of the soil samples recovered from the boreholes. The technical protocol was obtained from Appendix C of the MOE document entitled "Interim Guidelines for the Remediation of Petroleum Contamination at Operating Retail and Private Fuel Outlets in Ontario", dated March 1992.

Soil samples recovered at the time of sampling were placed immediately into airtight plastic bags with nominal headspace. All lumps of soil inside the bags were broken by hand, and the soil was allowed to come to 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 samples were agitated/manipulated gently as the measurements were taken. The peak reading registered within the first 15 seconds was recorded as the vapour measurement.

The vapour readings were found to range from 1.3 to 401 parts per million (ppm) in the soil samples obtained. The higher readings are considered to be potentially indicative of the presence of volatile organic compounds (VOCs) or petroleum hydrocarbons (PHCs). It should be noted that the vapour results can not be used to identify the presence of heavier petroleum hydrocarbons such as heavy oil. Please refer to the Soil Profile and Test Data sheets attached for soil sample headspace results.

4.0 Analytical Test Results

Soil and Groundwater Standards

The soil and groundwater standards for the subject property 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", prepared by the Ontario Ministry of Environment (MOE), April 15, 2011. The MOE Table 3 Standards are based on the following considerations:

- ❏ Coarse grained soil conditions.
- ❏ Non-potable groundwater situation.
- ❏ Residential land use.

Soil analytical results were also compared to the MOE Table 1 standards for the consideration of potential off-site disposal of soil, in the event that the site is redeveloped.

Soil

Five (5) soil samples were submitted to Paracel Laboratories. Three (3) samples were analyzed for petroleum hydrocarbons, fractions 1 through 4 (PHCs F1-F4) and volatile organic compounds (VOCs), two (2) samples were analyzed for metals, and sample BH1-AU1 was also analyzed for PAHs. The results of the analytical testing and the selected soil standards are presented in the following tables. Copies of the analytical test results are appended to this report.

Table 1
Analytical Test Results - Soil
PHCs (Fractions 1 to 4)

Parameter	MDL (µg/g)	Soil Samples (µg/g) July 17, 2012			Table 3 Standards Residential Land Use (µg/g)	Table 1 Standards Residential Land Use (µg/g)
		BH1-SS7	BH2-SS8	BH3-SS6		
F_1 PHCs (C_6-C_{10})	7	**182**	20	nd	55	25
F_2 PHCs (C_{10}-C_{16})	4	**118**	**18**	nd	98	10
F_3 PHCs (C_{16}-C_{34})	8	nd	nd	nd	300	240
F_4 PHCs (C_{34}-C_{50})	6	nd	nd	nd	2800	120

Notes:
- MDL - Method Detection Limit
- nd - Not Detected (< MDL)
- **Bold** - value exceeds MOE Table 3 standards
- **Bold** - value exceeds MOE Table 1 background standards

The concentrations of PHCs F1 and F2 in Sample BH1-SS7 exceeded the MOE Table 3 standards for residential property use. All other soil results are in compliance with the applicable MOE Table 3 standards for PHCs. The concentrations of PHCs F1 and F2 in BH1-SS7 and the concentration of PHCs F2 in BH2-SS8 exceed the MOE Table 1 background standards.

Table 2
Analytical Test Results - Soil
Volatile Organic Compounds (VOCs)

Parameter	MDL (µg/g)	Soil Samples (µg/g) July 17, 2012			Table 3 Standards Residential Land Use (µg/g)
		BH1-SS7	BH2-SS8	BH3-SS6	
Acetone	0.50	nd	nd	nd	16
Benzene	0.02	nd	nd	nd	0.21
Bromodichloromethane	0.05	nd	nd	nd	13
Bromoform	0.05	nd	nd	nd	0.27
Bromomethane	0.05	nd	nd	nd	0.05
Carbon Tetrachloride	0.05	nd	nd	nd	0.05
Chlorobenzene	0.05	nd	nd	nd	2.4
Chloroethane	0.05	nd	nd	nd	0.05
Chloroform	0.05	nd	nd	nd	0.05
Chloromethane	0.20	nd	nd	nd	NV
Dibromochloromethane	0.05	nd	nd	nd	9.4
Dichlorodifluoromethane	0.05	nd	nd	nd	16
1,2-Dibromoethane	0.05	nd	nd	nd	NV
1,2-Dichlorobenzene	0.05	nd	nd	nd	3.4
1,3-Dichlorobenzene	0.05	nd	nd	nd	4.8
1,4-Dichlorobenzene	0.05	nd	nd	nd	0.083
1,1-Dichloroethane	0.05	nd	nd	nd	3.5
1,2-Dichloroethane	0.05	nd	nd	nd	0.05
1,1-Dichloroethylene	0.05	nd	nd	nd	0.05
cis-1,2-Dichloroethylene	0.05	nd	nd	nd	3.4
trans-1,2-Dichloroethylene	0.05	nd	nd	nd	0.084
1,2-Dichloropropane	0.05	nd	nd	nd	0.05
1,3-Dichloropropene	0.05	nd	nd	nd	0.05

Notes:
- MDL - Method Detection Limit
- nd - not detected above the MDL
- **Bold** - Value exceeds applicable MOE Standard

Table 2 (continued)
Analytical Test Results - Soil
Volatile Organic Compounds (VOCs)

Parameter	MDL (µg/g)	Soil Samples (µg/g) July 17, 2012			Table 3 Standards Residential Land Use (µg/g)
		BH1-SS7	BH2-SS8	BH3-SS6	
Ethylbenzene	0.05	nd	nd	nd	2
Hexane (n)	0.05	nd	nd	nd	2.8
Methyl Ethyl Ketone	0.50	nd	nd	nd	16
Methyl Butyl Ketone	2.00	nd	nd	nd	NV
Methyl Isobutyl Ketone	0.50	nd	nd	nd	1.7
Methyl tert-Butyl Ether (MTBE)	0.05	nd	nd	nd	0.75
Methylene Chloride	0.05	nd	nd	nd	0.1
Styrene	0.05	nd	nd	nd	0.7
1,1,1,2-Tetrachloroethane	0.05	nd	nd	nd	0.058
1,1,2,2-Tetrachlorethane	0.05	nd	nd	nd	0.05
Tetrachloroethylene	0.05	nd	nd	nd	0.28
Toluene	0.05	nd	nd	nd	2.3
1,1,1-Trichloroethane	0.05	nd	nd	nd	0.38
1,1,2-Trichloroethane	0.05	nd	nd	nd	0.05
Trichloroethylene	0.05	nd	nd	nd	0.061
Trichlorofluoromethane	0.05	nd	nd	nd	4
1,3,5-Trimethylbenzene	0.05	nd	nd	nd	NV
Vinyl Chloride	0.02	nd	nd	nd	0.02
Xylenes	0.05	nd	nd	nd	3.1

Notes:
- MDL - Method Detection Limit
- nd - not detected above the MDL
- **Bold** - Value exceeds applicable MOE Standard

There were no VOC concentrations detected in the analyzed soil samples. All of the analyzed VOC concentrations are in compliance with the applicable MOE Table 3 residential standards and the Table 1 background standards.

Table 3
Analytical Test Results - Soil
Metals

Parameter	MDL (µg/g)	Soil Samples (µg/g) July 17-18, 2012		Table 3 Standards Residential Land Use (µg/g)	Table 1 Standards Residential Land Use (µg/g)
		BH1-AU1	BH4-SS3		
Antimony	1	nd	**2**	7.5	1.3
Arsenic	1	2	2	18	18
Barium	1	20	184	390	220
Beryllium	0.5	nd	nd	4	2.5
Boron	5.0	nd	nd	120	36
Cadmium	0.5	nd	0.5	1.9	1.2
Chromium	5	7	14	160	70
Cobalt	1	3	3	22	21
Copper	5	6	17	140	92
Lead	1	9	**524**	120	120
Molybdenum	1	2	1	6.9	2
Nickel	5	11	8	100	82
Selenium	1	nd	nd	2.4	1.5
Silver	0.3	1.8	1.5	20	0.5
Thallium	1	nd	nd	1	1
Uranium	1	nd	nd	23	2.5
Vanadium	10	30	20	86	86
Zinc	20	nd	191	340	290

Notes:
- MDL - Method Detection Limit
- nd - not detected above the MDL
- **Bold** - Value exceeds MOE Table 3 standard
- **Bold** - Value exceeds MOE Table 1 standard

The concentration of lead in Sample BH4-SS3 exceeded the MOE Table 3 standards for residential property use. All other soil results are in compliance with the MOE Table 3 standards. The concentrations of lead and antimony in BH4-SS3 exceed the MOE Table 1 standards. All other soil results meet the MOE Table 1 background standards.

Table 4
Analytical Test Results - Soil
Polycyclic Aromatic Hydrocarbons (PAHs)

Parameter	MDL (µg/g)	Soil Samples (µg/g) July 17, 2012	Table 3 Standards Residential Land Use (µg/g)	Table 1 Standards Residential Land Use (µg/g)
		BH1-AU1		
Acenaphthene	0.08	nd*	7.9	0.072
Acenaphthylene	0.08	nd	0.15	0.093
Anthracene	0.08	nd	0.67	0.16
Benzo[a]anthracene	0.02	0.09	0.5	0.36
Benzo[a]pyrene	0.08	nd	0.3	0.3
Benzo[b]fluoranthene	0.08	nd	0.78	0.47
Benzo[g,h,i]perylene	0.08	nd	6.6	0.68
Benzo[k]fluoranthene	0.08	nd	0.78	0.48
Biphenyl	0.08	nd*	0.31	0.05
Chrysene	0.02	0.82	7	2.8
Dibenzo[a,h]anthracene	0.08	nd	0.1	0.1
Fluoranthene	0.08	nd	0.69	0.56
Fluorene	0.08	nd	62	0.12
Indeno[1,2,3-cd]pyrene	0.08	nd	0.38	0.23
1-Methylnaphthalene	0.02	0.10	NV	NV
2-Methylnaphthalene	0.02	0.13	NV	NV
Methylnaphthalene (1&2)	0.04	0.23	0.99	0.59
Naphthalene	0.01	0.05	0.6	0.09
Phenanthrene	0.02	0.32	6.2	0.69
Pyrene	0.02	0.22	78	1

Notes:
- MDL - Method Detection Limit
- nd - not detected above the MDL
- **Bold** - Value exceeds MOE Table 3 standard
- **Bold** - Value exceeds MOE Table 1 standard
- *Detection limit is higher than Table 1 standard

All PAH concentrations detected in the soil sample are in compliance with the selected MOE Table 3 standards. All PAH concentrations also meet Table 1 standards, with the exception of acenapthene and biphenyl, for which the laboratory detection limits were higher than the Table 1 standards.

Groundwater

Groundwater samples were collected from the monitoring wells installed in BH1, BH2, and BH4 on July 20, 2012, with a second sampling event conducted on July 25, 2012. The second sampling event was conducted to address chloroform concentrations detected in all boreholes during the initial sampling event. It is our opinion that these chloroform concentrations are the result of municipally treated water being introduced into the boreholes during rock coring. During the second sampling event, a sample could not be obtained from BH1 due to insufficient volume, and only a limited sample volume could be obtained from BH2, which precluded the analysis of PHCs F2-F4. Sampling tubing not installed by Paterson was observed in these wells, indicating that they were sampled by others between the first and second sampling events. All water samples were submitted for analysis of PHCs and VOCs, and the water sample from BH2 was submitted for analysis of PAHs.

A third round of sampling was conducted on November 12, 2013. The purpose of the sampling event was to confirm that the chloroform concentrations previously identified, had decreased and to reassess the petroleum hydrocarbon (F2) concentration previously identified in BH1. However, due to insufficient volume, analysis of the F2 parameter could not be completed. Groundwater samples collected from BH1, BH2 and BH4 were submitted for analysis of VOC parameters. The results of the analytical testing and the selected groundwater standards are presented in the following tables. Copies of the certificates of analysis are attached to this report.

Table 5
Analytical Test Results - Groundwater
BTEX and PHCs (Fractions 1 to 4)

Parameter	MDL (ug/L)	Groundwater Samples (ug/L) July 20 and 25, 2012					Table 3 Standards Residential Land Use (ug/L)
		BH1-GW1	BH2-GW1	BH2-GW2	BH4-GW1	BH4-GW2	
F1 PHCs (C_6-C_{10})	25	45	43	nd	nd	nd	750
F2 PHCs (C_{10}-C_{16})	100	<287*	nd	-	nd	nd	150
F3 PHCs (C_{16}-C_{34})	100	<287*	nd	-	nd	nd	500
F4 PHCs (C_{34}-C_{50})	100	<287*	nd	-	nd	nd	500

Notes:
- MDL - Method Detection Limit
- nd - Not Detected (< MDL)
- *Elevated detection limit due to low sample volume.

All PHC concentrations detected in the groundwater samples are in compliance with the selected MOE Table 3 standards, with the exception of BH1-GW1, where compliance of the F2-F4 parameters could not be assessed due to elevated detection limits.

Table 6
Analytical Test Results - Groundwater
Volatile Organic Compounds (VOCs)

Parameter	MDL (µg/L)	Groundwater Samples (µg/L) July 20 and 25, 2012					Table 3 Standards Residential Land Use (µg/L)
		BH1-GW1	BH2-GW1	BH2-GW2	BH4-GW1	BH4-GW2	
Acetone	5	82.4	691	1020	40.6	104	130000
Benzene	0.5	nd	2.4	nd	1.1	nd	44
Bromodichloromethane	0.5	nd	nd	nd	3.8	nd	85000
Bromoform	0.5	nd	nd	nd	nd	nd	380
Bromomethane	0.5	nd	nd	nd	nd	nd	5.6
Carbon Tetrachloride	0.2	nd	nd	nd	nd	nd	0.79
Chlorobenzene	0.5	nd	nd	nd	nd	nd	630
Chloroethane	1	nd	nd	nd	nd	nd	NV
Chloroform	0.5	**16.1**	**14.4**	**9.9**	**21.8**	**3.1**	2.4
Chloromethane	3	nd	nd	nd	nd	nd	NV

Table 6 (continued)
Analytical Test Results - Groundwater
Volatile Organic Compounds (VOCs)

Parameter	MDL (µg/L)	Groundwater Samples (µg/L) July 20 and 25, 2012					Table 3 Standards Residential Land Use (µg/L)
		BH1-GW1	BH2-GW1	BH2-GW2	BH4-GW1	BH4-GW2	
Dibromochloromethane	0.5	nd	nd	nd	nd	nd	82000
Dichlorodifluoromethane	1	nd	nd	nd	nd	nd	4400
1,2-Dibromoethane	0.2	nd	nd	nd	nd	nd	NV
1,2-Dichlorobenzene	0.5	nd	nd	nd	nd	nd	4600
1,3-Dichlorobenzene	0.5	nd	nd	nd	nd	nd	9600
1,4-Dichlorobenzene	0.5	nd	nd	nd	nd	nd	8
1,1-Dichloroethane	0.5	nd	nd	nd	nd	nd	320
1,2-Dichloroethane	0.5	nd	nd	nd	nd	nd	1.6
1,1-Dichloroethylene	0.5	nd	nd	nd	nd	nd	1.6
cis-1,2-Dichloroethylene	0.5	nd	nd	nd	nd	nd	1.6
trans-1,2-Dichloroethylene	0.5	nd	nd	nd	nd	nd	1.6
1,2-Dichloropropane	0.5	nd	nd	nd	nd	nd	1.6
1,3-Dichloropropene	0.5	nd	nd	nd	nd	nd	5.2
Ethylbenzene	0.5	nd	1	nd	nd	nd	2300
Hexane (n)	1	2.1	2.2	nd	nd	nd	51
Methyl Ethyl Ketone	5	10.7	8	26.1	8.4	nd	470000
Methyl Butyl Ketone	10	nd	nd	nd	nd	nd	NV
Methyl Isobutyl Ketone	5	nd	nd	nd	nd	nd	140000
Methyl tert-Butyl Ether (MTBE)	2	nd	nd	nd	nd	nd	190
Methylene Chloride	5	nd	nd	nd	nd	nd	610
Styrene	0.5	nd	nd	nd	nd	nd	1300
1,1,1,2-Tetrachloroethane	0.5	nd	nd	nd	nd	nd	3.3
1,1,2,2-Tetrachlorethane	0.5	nd	nd	nd	nd	nd	3.2
Tetrachloroethylene	0.5	nd	nd	nd	nd	nd	1.6
Toluene	0.5	6.2	5.8	nd	5.6	nd	18000
1,2,4-Trichlorobenzene	0.5	nd	nd	nd	nd	nd	180

Table 6 (continued)
Analytical Test Results - Groundwater
Volatile Organic Compounds (VOCs)

Parameter	MDL (µg/L)	Groundwater Samples (µg/L) July 20 and 25, 2012					Table 3 Standards Residential Land Use (µg/L)
		BH1-GW1	BH2-GW1	BH2-GW2	BH4-GW1	BH4-GW2	
1,1,1-Trichloroethane	0.5	nd	nd	nd	nd	nd	640
1,1,2-Trichloroethane	0.5	nd	nd	nd	nd	nd	4.7
Trichloroethylene	0.5	nd	nd	nd	nd	nd	1.6
Trichlorofluoromethane	1.0	nd	nd	nd	nd	nd	2,500
1,3,5-Trimethylbenzene	0.5	nd	nd	nd	nd	nd	NV
Vinyl Chloride	0.5	nd	nd	nd	nd	nd	0.5
Xylenes	0.5	nd	2.8	nd	nd	nd	4,200

Notes:
- ❑ MDL - Method Detection Limit
- ❑ nd - not detected above the MDL
- ❑ **Bold** - Value exceeds applicable MOE Standard

The concentration of chloroform in all 2012 groundwater samples exceeded the selected MOE Table 3 standards. All other results are in compliance with the selected MOE Table 3 standards.

It is expected that the chloroform in the water samples is the result of municipally treated water having been introduced into the boreholes during bedrock coring. Chloroform concentrations were observed to have decreased upon re-sampling. To confirm this, another groundwater sampling event was completed, the result of which are presented in the following table.

Table 7
Analytical Test Results - Groundwater
Volatile Organic Compounds (VOCs)

Parameter	MDL (µg/L)	Groundwater Samples (µg/L) November 12, 2013			Table 3 Standards Residential Land Use (µg/L)
		BH1-GW2	BH2-GW3	BH4-GW3	
Acetone	5	nd	15.3	117	130000
Benzene	0.5	nd	11.7	8.0	44
Bromodichloromethane	0.5	nd	nd	nd	85000
Bromoform	0.5	nd	nd	nd	380
Bromomethane	0.5	nd	nd	nd	5.6
Carbon Tetrachloride	0.2	nd	nd	nd	0.79
Chlorobenzene	0.5	nd	nd	nd	630
Chloroethane	1	nd	nd	nd	NV
Chloroform	0.5	nd	nd	nd	2.4
Chloromethane	3	nd	nd	nd	NV
Dibromochloromethane	0.5	nd	nd	nd	82000
Dichlorodifluoromethane	1	nd	nd	nd	4400
1,2-Dibromoethane	0.2	nd	nd	nd	NV
1,2-Dichlorobenzene	0.5	nd	nd	nd	4600
1,3-Dichlorobenzene	0.5	nd	nd	nd	9600
1,4-Dichlorobenzene	0.5	nd	nd	nd	8
1,1-Dichloroethane	0.5	nd	nd	nd	320
1,2-Dichloroethane	0.5	nd	nd	nd	1.6
1,1-Dichloroethylene	0.5	nd	nd	nd	1.6
cis-1,2-Dichloroethylene	0.5	nd	nd	nd	1.6
trans-1,2-Dichloroethylene	nd	nd	nd	nd	1.6
1,2-Dichloropropane	0.5	nd	nd	nd	1.6
1,3-Dichloropropene	0.5	nd	nd	nd	5.2
Ethylbenzene	0.5	nd	5.9	1.2	2300
Hexane (n)	1	nd	nd	nd	51
Methyl Ethyl Ketone	5	nd	nd	nd	470000

Table 7
Analytical Test Results - Groundwater
Volatile Organic Compounds (VOCs)

Parameter	MDL (µg/L)	Groundwater Samples (µg/L) November 12, 2013			Table 3 Standards Residential Land Use (µg/L)
		BH1-GW2	BH2-GW3	BH4-GW3	
Methyl Butyl Ketone	10	nd	nd	nd	NV
Methyl Isobutyl Ketone	5	nd	nd	nd	140000
Methyl tert-Butyl Ether (MTBE)	2	nd	nd	nd	190
Methylene Chloride	5	nd	nd	nd	610
Styrene	0.5	nd	nd	nd	1300
1,1,1,2-Tetrachloroethane	0.5	nd	nd	nd	3.3
1,1,2,2-Tetrachlorethane	0.5	nd	nd	nd	3.2
Tetrachloroethylene	0.5	nd	nd	nd	1.6
Toluene	0.5	nd	nd	1.4	18000
1,2,4-Trichlorobenzene	0.5	nd	nd	nd	180
1,1,1-Trichloroethane	0.5	nd	nd	nd	640
1,1,2-Trichloroethane	0.5	nd	nd	nd	4.7
Trichloroethylene	0.5	nd	nd	nd	1.6
Trichlorofluoromethane	1.0	nd	nd	nd	2,500
1,3,5-Trimethylbenzene	0.5	nd	1.2	nd	NV
Vinyl Chloride	0.5	nd	nd	nd	0.5
Xylenes	0.5	nd	nd	2.8	4,200

Notes:
- MDL - Method Detection Limit
- nd - not detected above the MDL
- **Bold** - Value exceeds applicable MOE Standard

Chloroform was not detected above the method detection limit in any of the groundwater samples submitted for analytical testing. Other VOC parameters identified in the groundwater recovered from BH2 and BH4 are in compliance with the MOE Table 3 standards selected for the subject site.

Table 8
Analytical Test Results - Groundwater
Polycyclic Aromatic Hydrocarbons (PAHs)

Parameter	MDL (µg/L)	Groundwater Samples (µg/L) July 20, 2012	Table 3 Standards Commercial Land Use (µg/L)
		BH2-GW1	
Acenaphthene	0.05	nd	600
Acenaphthylene	0.05	nd	1.8
Anthracene	0.01	nd	2.4
Benzo[a]anthracene	0.01	nd	4.7
Benzo[a]pyrene	0.01	nd	0.81
Benzo[b]fluoranthene	0.05	nd	0.75
Benzo[g,h,i]perylene	0.05	nd	0.2
Benzo[k]fluoranthene	0.05	nd	0.4
Biphenyl	0.05	0.12	1000
Chrysene	0.05	nd	1
Dibenzo[a,h]anthracene	0.05	nd	0.52
Fluoranthene	0.01	nd	130
Fluorene	0.05	0.06	400
Indeno[1,2,3-cd]pyrene	0.05	nd	0.2
Methylnaphthalene (1&2)	0.1	0.73	1800
Naphthalene	0.05	0.82	1400
Phenanthrene	0.05	nd	580
Pyrene	0.01	nd	68

Notes:
- ❏ MDL - Method Detection Limit
- ❏ nd - not detected above the MDL
- ❏ **Bold** - Value exceeds applicable MOE Standard

All PAH concentrations detected in the groundwater samples are in compliance with the selected MOE Table 3 standards.

5.0 Assessment and Recommendations

Assessment

A Phase II-Environmental Site Assessment was carried out at the subject site to assess the potential for any soil and groundwater contamination based on the historical presence of two gas stations, a printing business, and a dry cleaning business which were historically present on-site or immediately adjacent to the site.

Soil

Four (4) boreholes were advanced on the subject property on July 17 and 18, 2012. The borehole locations were selected to provide general coverage of the potentially contaminating past property uses. Three (3) of the boreholes were cored into bedrock and instrumented with groundwater monitoring wells.

Soil samples were obtained from all boreholes. A total of five (5) soil samples were submitted to Paracel Laboratories for analysis of PHCs, VOCs, metals, and PAHs. The concentration of PHCs F1 and F2 in Sample BH1-SS7 exceeded the selected MOE Table 3 standards, and the concentration of lead in BH4-SS3 exceeded the Table 3 standard. All other analyzed parameters were in compliance with Table 3 standards.

Soil samples were also compared to MOE Table 1 standards. The concentration of PHCs F1 and F2 in Sample BH1-SS7 and the concentrations of antimony and lead in BH4-SS3 exceeded the MOE Table 1 standards. It is noted that demolition debris (brick, concrete) was observed in fill material on-site to a depth of up to 2.2 m below existing grade.

Groundwater

Three (3) groundwater sampling events were conducted as a part of this assessment. The first groundwater sampling event was conducted on July 20, 2012. Samples were obtained from the monitoring wells installed in BH1, BH2, and BH4. All samples were submitted for analysis of PHCs and VOCs, and the sample from BH2 was submitted for analysis of PAHs. PAH parameters were in compliance with Table 3 standards.

With the exception of an F1 concentration, which was in compliance with the MOE Table 3 standard, PHC parameters were not detected in the groundwater recovered from BH2 and BH4. An F1 concentration meeting the MOE Table 3 standard, was also identified in the groundwater recovered from BH1. However, due to elevated detection limits, it was not possible to confirm whether or not the F2 fraction was in compliance with the MOE standard.

The concentrations of chloroform in the initial 2012 groundwater samples exceeded the MOE Table 3 standards. It is our opinion that the chloroform concentrations observed in these samples were the result of municipally treated water introduced into the boreholes during the coring process, and were not indicative of a contamination problem.

The second groundwater sampling event was conducted on July 25, 2012. Chloroform concentrations in the analyzed samples were considerably lower, although still in excess of the MOE standard. All other analyzed parameters were in compliance with Table 3 standards. Due to low sample volume, it was not possibly to resample BH2 for F2. It was recommended that the monitoring wells be sampled again, prior to redevelopment, to confirm our opinion regarding the chloroform concentrations.

The third groundwater sampling event was conducted on November 12, 2013. All samples were submitted for VOC analysis. Chloroform concentrations were not detected above the method detection limit, in any of the groundwater samples. No other VOC parameters were detected in the groundwater sample recovered from BH1. Several parameters were detected in the groundwater samples recovered from BH2 and BH4, and are in compliance with the MOE Table 3 standards.

Recommendations

Soil

Based on the results of the Phase II-ESA, petroleum hydrocarbon impacted soil exceeding Table 3 standards is present on-site in the vicinity of BH1. Given the test results meeting Table 3 standards at nearby boreholes, the contaminated soil is considered to be limited in extent.

Lead-contaminated soil was observed in the upper fill layer underlying the asphalt pavement on-site. The fill layer varies in thickness from approximately 1.2 to 3 m. Given the nature of the petroleum hydrocarbon and lead impacts observed during the Phase II ESA, it is our opinion that these exceedences do not impact the subject site's current use as a parking lot. Impacted soil may be remediated at the time of site redevelopment. All remedial work should be supervised by a representative from Paterson to ensure the effectiveness of the program.

It should be noted that analyzed soil samples from the fill layer contain contaminant concentrations in excess of the MOE Table 1 (background) standards, which are used to characterize soil for off-site disposal. If this soil is required to be removed from the site during future redevelopment, it would have to be taken to an approved waste disposal facility. Demolition debris (concrete, brick, etc.) was encountered in the fill layer at depths of up to 2.2 m below grade. If, during redevelopment, a large percentage of this fill is observed to contain demolition debris, it will have to be disposed of as construction/ demolition debris, if it cannot be segregated.

Remedial Action Plan

The proposed redevelopment of the subject site will require the excavation and removal of all soil (non-impacted and impacted) from the property. A remediation program using a full depth approach is recommended. This will involve the excavation of all petroleum hydrocarbon and heavy metal impacted soil from within the boundaries of the subject site, at the time of redevelopment.

Non-impacted soil and bedrock will be transported off-site to a clean material disposal site, while impacted soil would be placed in trucks and hauled to an approved waste disposal facility.

A confirmatory sampling program will be carried out to ensure that the site meets 2011 MOE Table 3 standards and a final summary report will be prepared.

6.0 Statement of Limitations

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

This report was prepared for the use of Claridge Homes. Permission from Paterson and Claridge will be required to release this report to any other party.

We trust that this submission will satisfy your present requirements. If you have any questions regarding this report, please contact our office.

Paterson Group Inc.

Karyn Munch, P.Eng.

Mark D'Arcy, P.Eng

Report Distribution

- ❑ City of Ottawa (3 copies)
- ❑ Claridge Homes (1 copy)
- ❑ Paterson Group (1 copy)

Attachments

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

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Consulting Engineers

154 Colonnade Road South, Ottawa, Ontario K2E 7J5

SOIL PROFILE AND TEST DATA

Phase II - Environmental Site Assessment
110 York St., 321 Dalhousie St. & 167-141 George St.
Ottawa, Ontario

DATUM TBM - Top spindle of fire hydrant. Assumed elevation = 100.00m.

FILE NO. PE2709

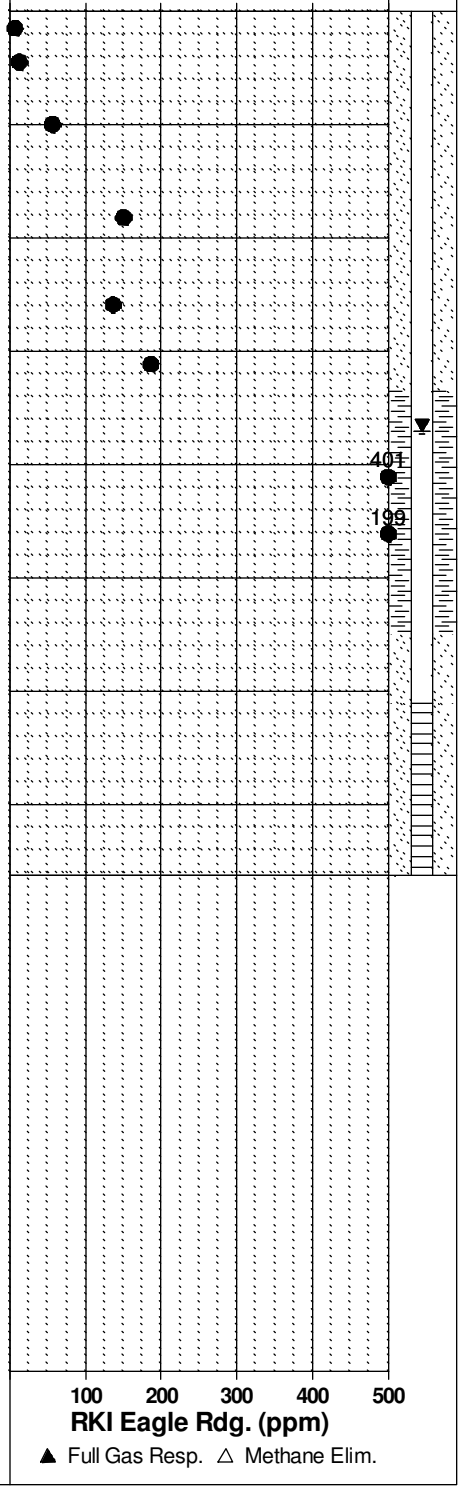
REMARKS

HOLE NO. BH 1

BORINGS BY CME 55 Power Auger **DATE** July 17, 2012

SOIL DESCRIPTION		STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)
GROUND SURFACE							0	99.71
50 mm Asphaltic concrete over crushed stone	0.25		AU	1				
			AU	2				
FILL: Sand and gravel	0.69							
			SS	3	42	9	1	98.71
FILL: Brown silty sand, trace clay, brick, gravel, cobbles			SS	4	50	26	2	97.71
	2.21							
FILL: Brown silty clay with sand and gravel			SS	5	33	9		
	2.97		SS	6	100	50+	3	96.71
GLACIAL TILL: Grey silty clay with sand, gravel, cobbles			SS	7	50	12	4	95.71
			SS	8	67	50+		
	5.00						5	94.71
			RC	1	92	67	6	93.71
BEDROCK: Grey limestone								
			RC	2	100	100	7	92.71
	7.62							
End of Borehole								
(GWL @ 3.71m-July 20, 2012)								

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



Monitoring Well Construction

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154 Colonnade Road South, Ottawa, Ontario K2E 7J5

SOIL PROFILE AND TEST DATA

Phase II - Environmental Site Assessment
110 York St., 321 Dalhousie St. & 167-141 George St.
Ottawa, Ontario

DATUM TBM - Top spindle of fire hydrant. Assumed elevation = 100.00m.

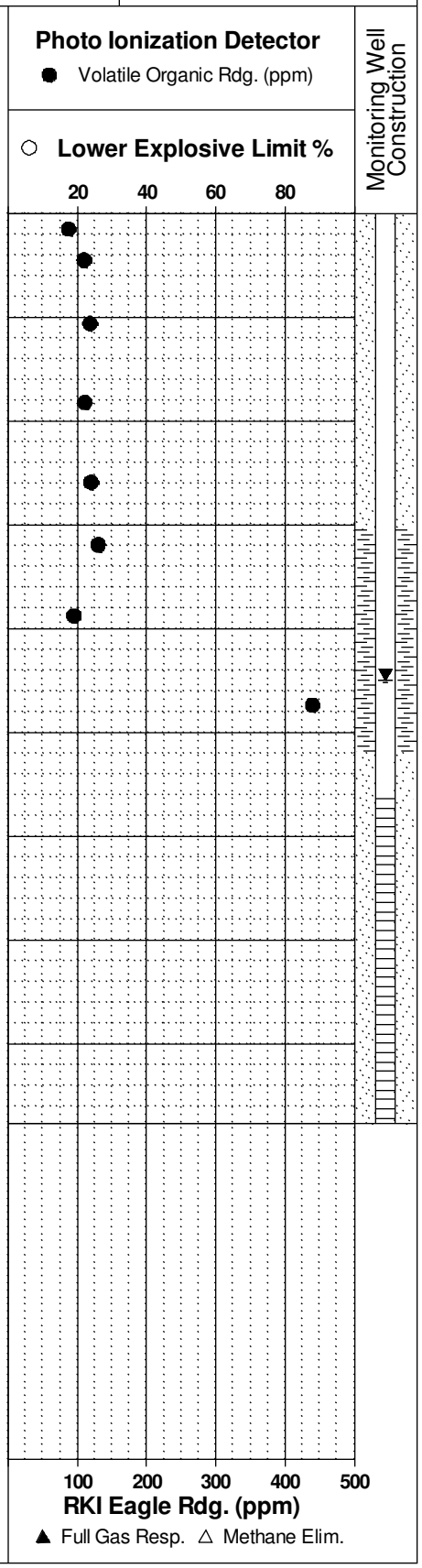
FILE NO. PE2709

REMARKS

HOLE NO. BH 2

BORINGS BY CME 55 Power Auger **DATE** July 17, 2012

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)
GROUND SURFACE						0	100.04
Asphaltic concrete 0.05		AU	1				
		AU	2				
FILL: Brown silty sand with gravel							
1.22		SS	3	29	6	1	99.04
		SS	4	21	23	2	98.04
GLACIAL TILL: Brown silty clay with sand, gravel, cobbles, boulders							
		SS	5	42	13	3	97.04
3.30		SS	6	36	50+		
		SS	7	80	50+	4	96.04
GLACIAL TILL: Brown silty sand with gravel, cobbles, boulders							
4.90		SS	8			5	95.04
		RC	1	100	47		
						6	94.04
BEDROCK: Grey limestone		RC	2	100	100		
						7	93.04
		RC	3	100	100	8	92.04
8.76							
End of Borehole							
(GWL @ 4.50m-July 20, 2012)							



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154 Colonnade Road South, Ottawa, Ontario K2E 7J5

SOIL PROFILE AND TEST DATA

Phase II - Environmental Site Assessment
110 York St., 321 Dalhousie St. & 167-141 George St.
Ottawa, Ontario

DATUM TBM - Top spindle of fire hydrant. Assumed elevation = 100.00m.

FILE NO. PE2709

REMARKS

HOLE NO. BH 3

BORINGS BY CME 55 Power Auger **DATE** July 17, 2012

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)
GROUND SURFACE						0	99.55
Asphaltic concrete 0.05		AU	1				
		AU	2				
FILL: Brown silty sand with gravel, crushed stone		SS	3	77	50+	1	98.55
1.40							
		SS	4	0	15	2	97.55
GLACIAL TILL: Brown silty sand with gravel, cobbles, boulders		SS	5	50	17		
		SS	6	50	34	3	96.55
		SS	7	0	50+		
4.24						4	95.55
End of Borehole							
Practical refusal to augering at 4.24m depth							

Photo Ionization Detector

● Volatile Organic Rdg. (ppm)

○ **Lower Explosive Limit %**

20 40 60 80

100 200 300 400 500

RKI Eagle Rdg. (ppm)

▲ Full Gas Resp. △ Methane Elim.

Monitoring Well Construction

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Consulting Engineers

154 Colonnade Road South, Ottawa, Ontario K2E 7J5

SOIL PROFILE AND TEST DATA

Phase II - Environmental Site Assessment
110 York St., 321 Dalhousie St. & 167-141 George St.
Ottawa, Ontario

DATUM TBM - Top spindle of fire hydrant. Assumed elevation = 100.00m.

FILE NO. PE2709

REMARKS

HOLE NO. BH 4

BORINGS BY CME 55 Power Auger **DATE** July 18, 2012

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)
GROUND SURFACE						0	99.93
25mm Asphaltic concrete over crushed stone 0.30		AU	1				
		AU	2				
FILL: Brown silty sand with gravel, cobbles, brick and concrete		SS	3	25	3	1	98.93
		SS	4	42	27	2	97.93
2.21							
		SS	5	33	24	3	96.93
GLACIAL TILL: Brown silty sand with gravel, cobbles, boulders		SS	6	50	33		
		SS	7	40	50+	4	95.93
4.70							
		RC	1	100	72	5	94.93
						6	93.93
		RC	2	100	100	7	92.93
BEDROCK: Grey limestone		RC	3	100	100	8	91.93
						9	90.93
		RC	4	100	100	10	89.93
						11	88.93
		RC	5	100	87	12	87.93

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

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Consulting Engineers

154 Colonnade Road South, Ottawa, Ontario K2E 7J5

SOIL PROFILE AND TEST DATA

Phase II - Environmental Site Assessment
110 York St., 321 Dalhousie St. & 167-141 George St.
Ottawa, Ontario

DATUM TBM - Top spindle of fire hydrant. Assumed elevation = 100.00m.

FILE NO. PE2709

REMARKS

HOLE NO. BH 4

BORINGS BY CME 55 Power Auger **DATE** July 18, 2012

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
						12	87.93		
		RC	6	100	100	13	86.93		
		RC	7	100	100	14	85.93		
		RC	8	100	98	15	84.93		
BEDROCK: Grey limestone		RC	9	100	100	16	83.93		
		RC	10	100	100	17	82.93		
		RC	11	100	100	18	81.93		
						19	80.93		
						20	79.93		
21.13						21	78.93		
End of Borehole									
(GWL @ 4.43m-July 20, 2012)									

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.

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

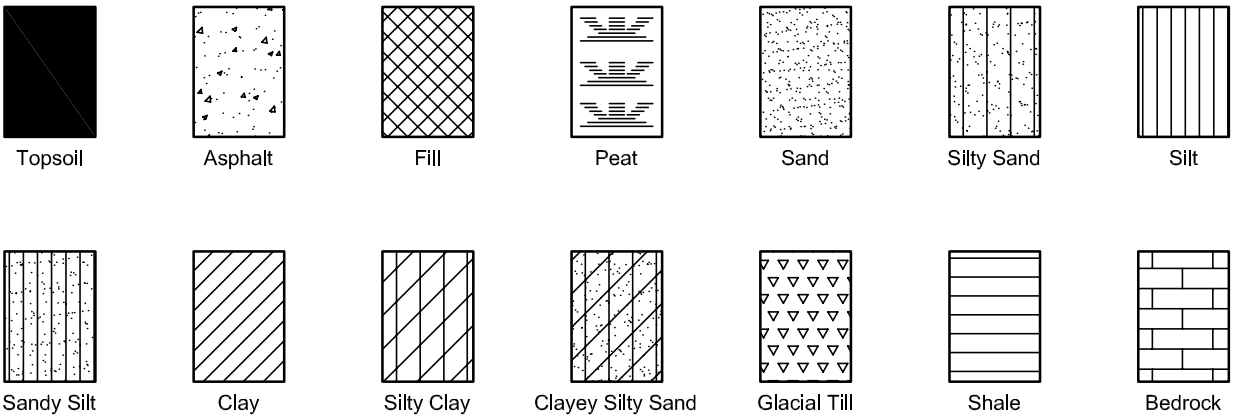
p'_o	-	Present effective overburden pressure at sample depth
p'_c	-	Preconsolidation pressure of (maximum past pressure on) sample
Ccr	-	Recompression index (in effect at pressures below p'_c)
Cc	-	Compression index (in effect at pressures above p'_c)
OC Ratio		Overconsolidaton ratio = p'_c / p'_o
Void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

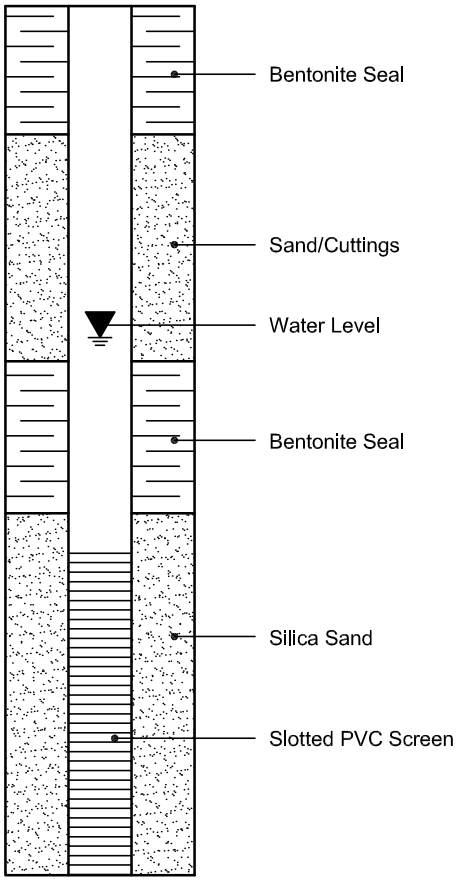
SYMBOLS AND TERMS (continued)

STRATA PLOT

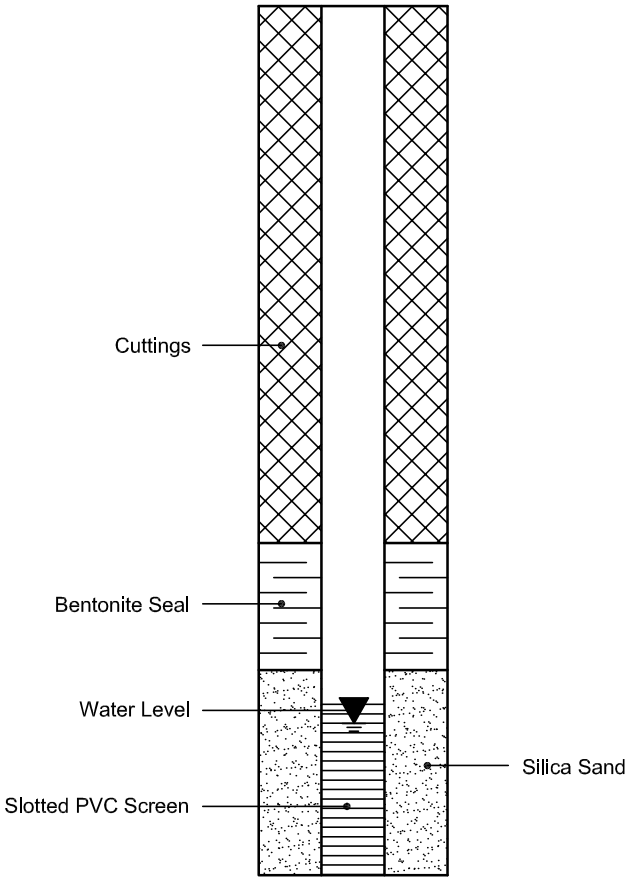


MONITORING WELL AND PIEZOMETER CONSTRUCTION

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: Dan Arnott

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

Client PO: 13160
Project: PE2709
Custody: 94851

Report Date: 20-Jul-2012
Order Date: 18-Jul-2012
Order #: 1229139

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

Paracel ID	Client ID
1229139-01	BH1-SS7
1229139-02	BH2-SS8
1229139-03	BH3-SS6

Approved By:

Dale Robertson, BSc
Laboratory Director

Certificate of Analysis

Report Date: 20-Jul-2012
Order Date:18-Jul-2012

Client: **Paterson Group Consulting Engineers**

Client PO: 13160 Project Description: PE2709

Analysis Summary Table

Analysis	Method Reference/Description	Extraction Date	Analysis Date
CCME PHC F1	CWS Tier 1 - P&T GC-FID	18-Jul-12	20-Jul-12
CCME PHC F2 - F4	CWS Tier 1 - GC-FID, extraction	19-Jul-12	20-Jul-12
Solids, %	Gravimetric, calculation	19-Jul-12	19-Jul-12
VOCs	EPA 8260 - P&T GC-MS	18-Jul-12	20-Jul-12

Certificate of Analysis

Report Date: 20-Jul-2012
Order Date:18-Jul-2012

Client: **Paterson Group Consulting Engineers**

Client PO: 13160 Project Description: PE2709

	Client ID:	BH1-SS7	BH2-SS8	BH3-SS6	-
	Sample Date:	17-Jul-12	17-Jul-12	17-Jul-12	-
	Sample ID:	1229139-01	1229139-02	1229139-03	-
	MDL/Units	Soil	Soil	Soil	-
Physical Characteristics					
% Solids	0.1 % by Wt.	89.1	91.7	90.4	-
Volatiles					
Acetone	0.50 ug/g dry	<0.50	<0.50	<0.50	-
Benzene	0.02 ug/g dry	<0.02	<0.02	<0.02	-
Bromodichloromethane	0.05 ug/g dry	<0.05	<0.05	<0.05	-
Bromoform	0.05 ug/g dry	<0.05	<0.05	<0.05	-
Bromomethane	0.05 ug/g dry	<0.05	<0.05	<0.05	-
Carbon Tetrachloride	0.05 ug/g dry	<0.05	<0.05	<0.05	-
Chlorobenzene	0.05 ug/g dry	<0.05	<0.05	<0.05	-
Chloroethane	0.05 ug/g dry	<0.05	<0.05	<0.05	-
Chloroform	0.05 ug/g dry	<0.05	<0.05	<0.05	-
Chloromethane	0.20 ug/g dry	<0.20	<0.20	<0.20	-
Dibromochloromethane	0.05 ug/g dry	<0.05	<0.05	<0.05	-
Dichlorodifluoromethane	0.05 ug/g dry	<0.05	<0.05	<0.05	-
1,2-Dibromoethane	0.05 ug/g dry	<0.05	<0.05	<0.05	-
1,2-Dichlorobenzene	0.05 ug/g dry	<0.05	<0.05	<0.05	-
1,3-Dichlorobenzene	0.05 ug/g dry	<0.05	<0.05	<0.05	-
1,4-Dichlorobenzene	0.05 ug/g dry	<0.05	<0.05	<0.05	-
1,1-Dichloroethane	0.05 ug/g dry	<0.05	<0.05	<0.05	-
1,2-Dichloroethane	0.05 ug/g dry	<0.05	<0.05	<0.05	-
1,1-Dichloroethylene	0.05 ug/g dry	<0.05	<0.05	<0.05	-
cis-1,2-Dichloroethylene	0.05 ug/g dry	<0.05	<0.05	<0.05	-
trans-1,2-Dichloroethylene	0.05 ug/g dry	<0.05	<0.05	<0.05	-
1,2-Dichloroethylene, total	0.05 ug/g dry	<0.05	<0.05	<0.05	-
1,2-Dichloropropane	0.05 ug/g dry	<0.05	<0.05	<0.05	-
cis-1,3-Dichloropropylene	0.05 ug/g dry	<0.05	<0.05	<0.05	-
trans-1,3-Dichloropropylene	0.05 ug/g dry	<0.05	<0.05	<0.05	-
1,3-Dichloropropene, total	0.05 ug/g dry	<0.05	<0.05	<0.05	-
Ethylbenzene	0.05 ug/g dry	<0.05	<0.05	<0.05	-
Hexane	0.05 ug/g dry	<0.05	<0.05	<0.05	-
Methyl Ethyl Ketone (2-Butanone)	0.50 ug/g dry	<0.50	<0.50	<0.50	-
Methyl Butyl Ketone (2-Hexanone)	2.00 ug/g dry	<2.00	<2.00	<2.00	-
Methyl Isobutyl Ketone	0.50 ug/g dry	<0.50	<0.50	<0.50	-

Certificate of Analysis

Report Date: 20-Jul-2012
Order Date:18-Jul-2012

Client: **Paterson Group Consulting Engineers**

Client PO: 13160 Project Description: PE2709

	Client ID:	BH1-SS7	BH2-SS8	BH3-SS6	-
	Sample Date:	17-Jul-12	17-Jul-12	17-Jul-12	-
	Sample ID:	1229139-01	1229139-02	1229139-03	-
	MDL/Units	Soil	Soil	Soil	-
Methyl tert-butyl ether	0.05 ug/g dry	<0.05	<0.05	<0.05	-
Methylene Chloride	0.05 ug/g dry	<0.05	<0.05	<0.05	-
Styrene	0.05 ug/g dry	<0.05	<0.05	<0.05	-
1,1,1,2-Tetrachloroethane	0.05 ug/g dry	<0.05	<0.05	<0.05	-
1,1,2,2-Tetrachloroethane	0.05 ug/g dry	<0.05	<0.05	<0.05	-
Tetrachloroethylene	0.05 ug/g dry	<0.05	<0.05	<0.05	-
Toluene	0.05 ug/g dry	<0.05	<0.05	<0.05	-
1,2,4-Trichlorobenzene	0.05 ug/g dry	<0.05	<0.05	<0.05	-
1,1,1-Trichloroethane	0.05 ug/g dry	<0.05	<0.05	<0.05	-
1,1,2-Trichloroethane	0.05 ug/g dry	<0.05	<0.05	<0.05	-
Trichloroethylene	0.05 ug/g dry	<0.05	<0.05	<0.05	-
Trichlorofluoromethane	0.05 ug/g dry	<0.05	<0.05	<0.05	-
1,3,5-Trimethylbenzene	0.05 ug/g dry	<0.05	<0.05	<0.05	-
Vinyl chloride	0.02 ug/g dry	<0.02	<0.02	<0.02	-
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	-
4-Bromofluorobenzene	Surrogate	102%	109%	115%	-
Dibromofluoromethane	Surrogate	92.6%	92.9%	91.6%	-
Toluene-d8	Surrogate	97.3%	100%	103%	-
Hydrocarbons					
F1 PHCs (C6-C10)	7 ug/g dry	182	20	<7	-
F2 PHCs (C10-C16)	4 ug/g dry	118	18	<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**

Report Date: 20-Jul-2012
Order Date:18-Jul-2012

Client PO: 13160 Project Description: PE2709

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									
Acetone	ND	0.50	ug/g						
Benzene	ND	0.02	ug/g						
Bromodichloromethane	ND	0.05	ug/g						
Bromoform	ND	0.05	ug/g						
Bromomethane	ND	0.05	ug/g						
Carbon Tetrachloride	ND	0.05	ug/g						
Chlorobenzene	ND	0.05	ug/g						
Chloroethane	ND	0.05	ug/g						
Chloroform	ND	0.05	ug/g						
Chloromethane	ND	0.20	ug/g						
Dibromochloromethane	ND	0.05	ug/g						
Dichlorodifluoromethane	ND	0.05	ug/g						
1,2-Dibromoethane	ND	0.05	ug/g						
1,2-Dichlorobenzene	ND	0.05	ug/g						
1,3-Dichlorobenzene	ND	0.05	ug/g						
1,4-Dichlorobenzene	ND	0.05	ug/g						
1,1-Dichloroethane	ND	0.05	ug/g						
1,2-Dichloroethane	ND	0.05	ug/g						
1,1-Dichloroethylene	ND	0.05	ug/g						
cis-1,2-Dichloroethylene	ND	0.05	ug/g						
trans-1,2-Dichloroethylene	ND	0.05	ug/g						
1,2-Dichloroethylene, total	ND	0.05	ug/g						
1,2-Dichloropropane	ND	0.05	ug/g						
cis-1,3-Dichloropropylene	ND	0.05	ug/g						
trans-1,3-Dichloropropylene	ND	0.05	ug/g						
1,3-Dichloropropene, total	ND	0.05	ug/g						
Ethylbenzene	ND	0.05	ug/g						
Hexane	ND	0.05	ug/g						
Methyl Ethyl Ketone (2-Butanone)	ND	0.50	ug/g						
Methyl Butyl Ketone (2-Hexanone)	ND	2.00	ug/g						
Methyl Isobutyl Ketone	ND	0.50	ug/g						
Methyl tert-butyl ether	ND	0.05	ug/g						
Methylene Chloride	ND	0.05	ug/g						
Styrene	ND	0.05	ug/g						
1,1,1,2-Tetrachloroethane	ND	0.05	ug/g						
1,1,2,2-Tetrachloroethane	ND	0.05	ug/g						
Tetrachloroethylene	ND	0.05	ug/g						
Toluene	ND	0.05	ug/g						
1,2,4-Trichlorobenzene	ND	0.05	ug/g						
1,1,1-Trichloroethane	ND	0.05	ug/g						
1,1,2-Trichloroethane	ND	0.05	ug/g						
Trichloroethylene	ND	0.05	ug/g						
Trichlorofluoromethane	ND	0.05	ug/g						
1,3,5-Trimethylbenzene	ND	0.05	ug/g						
Vinyl chloride	ND	0.02	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: 4-Bromofluorobenzene	*9.36*		*ug/g*		*117*	*50-140*			
Surrogate: Dibromofluoromethane	*7.69*		*ug/g*		*96.1*	*50-140*			
Surrogate: Toluene-d8	*8.43*		*ug/g*		*105*	*50-140*			

Certificate of Analysis

Client: **Paterson Group Consulting Engineers**

Report Date: 20-Jul-2012
Order Date:18-Jul-2012

Client PO: 13160 Project Description: PE2709

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)	37	8	ug/g dry	129			110.0	30	QR-01
F4 PHCs (C34-C50)	69	6	ug/g dry	136			65.1	30	QR-01
Physical Characteristics									
% Solids	87.3	0.1	% by Wt.	91.9			5.2	25	
Volatiles									
Acetone	ND	0.50	ug/g dry	ND				50	
Benzene	ND	0.02	ug/g dry	ND				50	
Bromodichloromethane	ND	0.05	ug/g dry	ND				50	
Bromoform	ND	0.05	ug/g dry	ND				50	
Bromomethane	ND	0.05	ug/g dry	ND				50	
Carbon Tetrachloride	ND	0.05	ug/g dry	ND				50	
Chlorobenzene	ND	0.05	ug/g dry	ND				50	
Chloroethane	ND	0.05	ug/g dry	ND				50	
Chloroform	ND	0.05	ug/g dry	ND				50	
Chloromethane	ND	0.20	ug/g dry	ND				50	
Dibromochloromethane	ND	0.05	ug/g dry	ND				50	
Dichlorodifluoromethane	ND	0.05	ug/g dry	ND				50	
1,2-Dibromoethane	ND	0.05	ug/g dry	ND				50	
1,2-Dichlorobenzene	ND	0.05	ug/g dry	ND				50	
1,3-Dichlorobenzene	ND	0.05	ug/g dry	ND				50	
1,4-Dichlorobenzene	ND	0.05	ug/g dry	ND				50	
1,1-Dichloroethane	ND	0.05	ug/g dry	ND				50	
1,2-Dichloroethane	ND	0.05	ug/g dry	ND				50	
1,1-Dichloroethylene	ND	0.05	ug/g dry	ND				50	
cis-1,2-Dichloroethylene	ND	0.05	ug/g dry	ND				50	
trans-1,2-Dichloroethylene	ND	0.05	ug/g dry	ND				50	
1,2-Dichloropropane	ND	0.05	ug/g dry	ND				50	
cis-1,3-Dichloropropylene	ND	0.05	ug/g dry	ND				50	
trans-1,3-Dichloropropylene	ND	0.05	ug/g dry	ND				50	
Ethylbenzene	ND	0.05	ug/g dry	ND				50	
Hexane	ND	0.05	ug/g dry	ND				50	
Methyl Ethyl Ketone (2-Butanone)	ND	0.50	ug/g dry	ND				50	
Methyl Butyl Ketone (2-Hexanone)	ND	2.00	ug/g dry	ND				50	
Methyl Isobutyl Ketone	ND	0.50	ug/g dry	ND				50	
Methyl tert-butyl ether	ND	0.05	ug/g dry	ND				50	
Methylene Chloride	ND	0.05	ug/g dry	ND				50	
Styrene	ND	0.05	ug/g dry	ND				50	
1,1,1,2-Tetrachloroethane	ND	0.05	ug/g dry	ND				50	
1,1,2,2-Tetrachloroethane	ND	0.05	ug/g dry	ND				50	
Tetrachloroethylene	ND	0.05	ug/g dry	ND				50	
Toluene	ND	0.05	ug/g dry	ND				50	
1,2,4-Trichlorobenzene	ND	0.05	ug/g dry	ND				50	
1,1,1-Trichloroethane	ND	0.05	ug/g dry	ND				50	
1,1,2-Trichloroethane	ND	0.05	ug/g dry	ND				50	
Trichloroethylene	ND	0.05	ug/g dry	ND				50	
Trichlorofluoromethane	ND	0.05	ug/g dry	ND				50	
1,3,5-Trimethylbenzene	ND	0.05	ug/g dry	ND				50	
Vinyl chloride	ND	0.02	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: 4-Bromofluorobenzene	*6.68*		*ug/g dry*	*ND*	*113*	*50-140*			
Surrogate: Dibromofluoromethane	*5.51*		*ug/g dry*	*ND*	*93.0*	*50-140*			

Certificate of Analysis

Report Date: 20-Jul-2012
Order Date:18-Jul-2012

Client: **Paterson Group Consulting Engineers**

Client PO: 13160 Project Description: PE2709

Method Quality Control: Duplicate

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Surrogate: Toluene-d8	*5.93*		*ug/g dry*	*ND*	*100*	*50-140*			

Certificate of Analysis

Client: **Paterson Group Consulting Engineers**

Report Date: 20-Jul-2012
Order Date:18-Jul-2012

Client PO: 13160 Project Description: PE2709

Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Hydrocarbons									
F1 PHCs (C6-C10)	218	7	ug/g	ND	109	80-120			
F2 PHCs (C10-C16)	66	4	ug/g	ND	82.5	80-120			
F3 PHCs (C16-C34)	189	8	ug/g	ND	94.5	80-120			
F4 PHCs (C34-C50)	100	6	ug/g	ND	83.6	80-120			
Volatiles									
Acetone	11.7	0.50	ug/g	ND	117	50-140			
Benzene	4.10	0.02	ug/g	ND	102	60-130			
Bromodichloromethane	4.63	0.05	ug/g	ND	116	60-130			
Bromoform	5.17	0.05	ug/g	ND	129	60-130			
Bromomethane	3.46	0.05	ug/g	ND	86.6	50-140			
Carbon Tetrachloride	4.20	0.05	ug/g	ND	105	60-130			
Chlorobenzene	4.53	0.05	ug/g	ND	113	60-130			
Chloroethane	4.37	0.05	ug/g	ND	109	50-140			
Chloroform	4.60	0.05	ug/g	ND	115	60-130			
Chloromethane	2.70	0.20	ug/g	ND	67.4	50-140			
Dibromochloromethane	5.17	0.05	ug/g	ND	129	60-130			
Dichlorodifluoromethane	3.18	0.05	ug/g	ND	79.6	50-140			
1,2-Dibromoethane	4.94	0.05	ug/g	ND	123	60-130			
1,2-Dichlorobenzene	5.09	0.05	ug/g	ND	127	60-130			
1,3-Dichlorobenzene	4.75	0.05	ug/g	ND	119	60-130			
1,4-Dichlorobenzene	4.79	0.05	ug/g	ND	120	60-130			
1,1-Dichloroethane	4.51	0.05	ug/g	ND	113	60-130			
1,2-Dichloroethane	4.37	0.05	ug/g	ND	109	60-130			
1,1-Dichloroethylene	2.92	0.05	ug/g	ND	73.1	60-130			
cis-1,2-Dichloroethylene	4.47	0.05	ug/g	ND	112	60-130			
trans-1,2-Dichloroethylene	3.45	0.05	ug/g	ND	86.3	60-130			
1,2-Dichloropropane	4.17	0.05	ug/g	ND	104	60-130			
cis-1,3-Dichloropropylene	4.87	0.05	ug/g	ND	122	60-130			
trans-1,3-Dichloropropylene	5.01	0.05	ug/g	ND	125	60-130			
Ethylbenzene	3.90	0.05	ug/g	ND	97.4	60-130			
Hexane	4.38	0.05	ug/g	ND	110	60-130			
Methyl Ethyl Ketone (2-Butanone)	10.8	0.50	ug/g	ND	108	50-140			
Methyl Butyl Ketone (2-Hexanone)	12.8	2.00	ug/g	ND	128	50-140			
Methyl Isobutyl Ketone	12.9	0.50	ug/g	ND	129	50-140			
Methyl tert-butyl ether	12.1	0.05	ug/g	ND	121	50-140			
Methylene Chloride	3.68	0.05	ug/g	ND	92.0	60-130			
Styrene	4.45	0.05	ug/g	ND	111	60-130			
1,1,1,2-Tetrachloroethane	4.66	0.05	ug/g	ND	117	60-130			
1,1,2,2-Tetrachloroethane	5.08	0.05	ug/g	ND	127	60-130			
Tetrachloroethylene	3.51	0.05	ug/g	ND	87.7	60-130			
Toluene	4.44	0.05	ug/g	ND	111	60-130			
1,2,4-Trichlorobenzene	3.61	0.05	ug/g	ND	90.3	60-130			
1,1,1-Trichloroethane	3.95	0.05	ug/g	ND	98.8	60-130			
1,1,2-Trichloroethane	5.15	0.05	ug/g	ND	129	60-130			
Trichloroethylene	3.49	0.05	ug/g	ND	87.3	60-130			
Trichlorofluoromethane	4.30	0.05	ug/g	ND	107	50-140			
1,3,5-Trimethylbenzene	3.53	0.05	ug/g	ND	88.2	60-130			
Vinyl chloride	3.16	0.02	ug/g	ND	79.1	50-140			
m,p-Xylenes	7.76	0.05	ug/g	ND	97.0	60-130			

Certificate of Analysis

Report Date: 20-Jul-2012
Order Date:18-Jul-2012

Client: **Paterson Group Consulting Engineers**

Client PO: 13160 Project Description: PE2709

Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
o-Xylene	4.23	0.05	ug/g	ND	106	60-130			
Surrogate: 4-Bromofluorobenzene	*7.10*		*ug/g*		*88.8*	*50-140*			

Certificate of Analysis

Report Date: 20-Jul-2012
Order Date:18-Jul-2012

Client: **Paterson Group Consulting Engineers**

Client PO: 13160 Project Description: PE2709

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
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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Chain of Custody
(Lab Use Only)
Nº 94851

Page 1 of 1

Client Name: Paterson Group Inc.	Project Reference: PE2709	TAT: [X] Regular [ ] 3 Day	
Contact Name: Dan Arnott	Quote #	[ ] 2 Day [ ] 1 Day	
Address: 154 Colonnade Rd Ottawa, ON K2E 7J5	PO # 13160		
Telephone: 613.226.7381	Email Address: darnott@patersongroup.ca	Date Required:	

Criteria: [ ] O. Reg. 153/04 Table __ [X] O. Reg. 153/11 (Current) 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)

Required Analyses

Paracel Order Number: 1229139

	Sample ID/Location Name	Matrix	Air Volume	# of Containers	Sample Taken Date	Sample Taken Time	PHCs F1-F4+BTEX	VOCs	PAHs	Metals by ICP/MS	Hg	CrVI	B (HWS)							
1	BH1-SS7	S		2	17-Jul-12		X	X												✓
2	BH2-SS8	S		↓	↓		X	X												✓
3	BH3-SS6	S		↓	↓		X	X												✓
4																				
5																				
6																				
7																				
8																				
9																				
10																				

Comments:

Method of Delivery: Walk-in

Relinquished By (Print & Sign): DAN ARNOTT	Received by Driver/Depot:	Received at Lab:	Verified By: MJC
Date/Time: 12:51pm 18-Jul-12	Date/Time:	Date/Time: July 18/12 12:50p	Date/Time: July 18/12 2:18
	Temperature: ____ °C	Temperature: 19.1 °C	pH Verified [ ] By: N/A

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Certificate of Analysis

Paterson Group Consulting Engineers
154 Colonnade Road South
Nepean, ON K2E 7J5
Attn: Dan Arnott

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

Client PO: 13161
Project: PE2709
Custody: 94801

Report Date: 24-Jul-2012
Order Date: 19-Jul-2012
Order #: 1229217

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

Paracel ID	Client ID
1229217-01	BH1-AU1
1229217-02	BH4-SS3

Approved By: Mark Foto

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

Certificate of Analysis

Report Date: 24-Jul-2012
Order Date:19-Jul-2012

Client: **Paterson Group Consulting Engineers**

Client PO: 13161 Project Description: PE2709

Analysis Summary Table

Analysis	Method Reference/Description	Extraction Date	Analysis Date
Metals	EPA 6020 - Digestion - ICP-MS	20-Jul-12	21-Jul-12
PAHs by GC-MS, standard scan	EPA 8270 - GC-MS, extraction	20-Jul-12	24-Jul-12
Solids, %	Gravimetric, calculation	20-Jul-12	20-Jul-12

PARACEL LABORATORIES LTD.

Order #: 1229217

Certificate of Analysis

Report Date: 24-Jul-2012
Order Date:19-Jul-2012

Client: **Paterson Group Consulting Engineers**

Client PO: 13161 Project Description: PE2709

	Client ID:	BH1-AU1	BH4-SS3	-	-
	Sample Date:	17-Jul-12	18-Jul-12	-	-
	Sample ID:	1229217-01	1229217-02	-	-
	MDL/Units	Soil	Soil	-	-
Physical Characteristics					
% Solids	0.1 % by Wt.	98.6	89.6	-	-
Metals					
Antimony	1 ug/g dry	<1	2	-	-
Arsenic	1 ug/g dry	2	2	-	-
Barium	1 ug/g dry	20	184	-	-
Beryllium	0.5 ug/g dry	<0.5	<0.5	-	-
Boron	5.0 ug/g dry	<5.0	<5.0	-	-
Cadmium	0.5 ug/g dry	<0.5	0.5	-	-
Chromium	5 ug/g dry	7	14	-	-
Cobalt	1 ug/g dry	3	3	-	-
Copper	5 ug/g dry	6	17	-	-
Lead	1 ug/g dry	9	524	-	-
Molybdenum	1 ug/g dry	2	1	-	-
Nickel	5 ug/g dry	11	8	-	-
Selenium	1 ug/g dry	<1	<1	-	-
Silver	0.3 ug/g dry	1.8	1.5	-	-
Thallium	1 ug/g dry	<1	<1	-	-
Uranium	1 ug/g dry	<1	<1	-	-
Vanadium	10 ug/g dry	30	20	-	-
Zinc	20 ug/g dry	<20	191	-	-
Semi-Volatiles					
Acenaphthene	0.02 ug/g dry	<0.08 [1]	-	-	-
Acenaphthylene	0.02 ug/g dry	<0.08 [1]	-	-	-
Anthracene	0.02 ug/g dry	<0.08 [1]	-	-	-
Benzo [a] anthracene	0.02 ug/g dry	0.09	-	-	-
Benzo [a] pyrene	0.02 ug/g dry	<0.08 [1]	-	-	-
Benzo [b] fluoranthene	0.02 ug/g dry	<0.08 [1]	-	-	-
Benzo [g,h,i] perylene	0.02 ug/g dry	<0.08 [1]	-	-	-
Benzo [k] fluoranthene	0.02 ug/g dry	<0.08 [1]	-	-	-
Biphenyl	0.02 ug/g dry	<0.08 [1]	-	-	-
Chrysene	0.02 ug/g dry	0.82	-	-	-
Dibenzo [a,h] anthracene	0.02 ug/g dry	<0.08 [1]	-	-	-
Fluoranthene	0.02 ug/g dry	<0.08 [1]	-	-	-

Certificate of Analysis

Report Date: 24-Jul-2012
Order Date:19-Jul-2012

Client: **Paterson Group Consulting Engineers**

Client PO: 13161 Project Description: PE2709

	Client ID:	BH1-AU1	BH4-SS3	-	-
	Sample Date:	17-Jul-12	18-Jul-12	-	-
	Sample ID:	1229217-01	1229217-02	-	-
	MDL/Units	Soil	Soil	-	-
Fluorene	0.02 ug/g dry	<0.08 [1]	-	-	-
Indeno [1,2,3-cd] pyrene	0.02 ug/g dry	<0.08 [1]	-	-	-
1-Methylnaphthalene	0.02 ug/g dry	0.10	-	-	-
2-Methylnaphthalene	0.02 ug/g dry	0.13	-	-	-
Methylnaphthalene (1&2)	0.04 ug/g dry	0.23	-	-	-
Naphthalene	0.01 ug/g dry	0.05	-	-	-
Phenanthrene	0.02 ug/g dry	0.32	-	-	-
Pyrene	0.02 ug/g dry	0.22	-	-	-
2-Fluorobiphenyl	Surrogate	113%	-	-	-
Terphenyl-d14	Surrogate	108%	-	-	-

Certificate of Analysis

Client: **Paterson Group Consulting Engineers**

Report Date: 24-Jul-2012
Order Date:19-Jul-2012

Client PO: 13161 Project Description: PE2709

Method Quality Control: Blank

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Metals									
Antimony	ND	1	ug/g						
Arsenic	ND	1	ug/g						
Barium	ND	1	ug/g						
Beryllium	ND	0.5	ug/g						
Boron	ND	5.0	ug/g						
Cadmium	ND	0.5	ug/g						
Chromium	ND	5	ug/g						
Cobalt	ND	1	ug/g						
Copper	ND	5	ug/g						
Lead	ND	1	ug/g						
Molybdenum	ND	1	ug/g						
Nickel	ND	5	ug/g						
Selenium	ND	1	ug/g						
Silver	ND	0.3	ug/g						
Thallium	ND	1	ug/g						
Uranium	ND	1	ug/g						
Vanadium	ND	10	ug/g						
Zinc	ND	20	ug/g						

Certificate of Analysis

Report Date: 24-Jul-2012
Order Date:19-Jul-2012

Client: **Paterson Group Consulting Engineers**

Client PO: 13161 Project Description: PE2709

Method Quality Control: Duplicate

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Metals									
Antimony	ND	1	ug/g dry	ND			0.0	30	
Arsenic	ND	1	ug/g dry	ND			0.0	30	
Barium	14.2	1	ug/g dry	13.9			2.8	30	
Beryllium	ND	0.5	ug/g dry	ND			0.0	30	
Boron	ND	5.0	ug/g dry	ND			0.0	30	
Cadmium	ND	0.5	ug/g dry	ND			0.0	30	
Chromium	10.2	5	ug/g dry	10.0			2.3	30	
Cobalt	2.4	1	ug/g dry	2.3			2.8	30	
Copper	ND	5	ug/g dry	ND			0.0	30	
Lead	ND	1	ug/g dry	1.8			0.0	30	
Molybdenum	1.2	1	ug/g dry	ND			0.0	30	
Nickel	6.3	5	ug/g dry	6.1			4.0	30	
Selenium	ND	1	ug/g dry	ND			0.0	30	
Silver	ND	0.3	ug/g dry	ND			0.0	30	
Thallium	ND	1	ug/g dry	ND			0.0	30	
Uranium	ND	1	ug/g dry	ND			0.0	30	
Vanadium	14.8	10	ug/g dry	13.8			6.7	30	
Zinc	ND	20	ug/g dry	ND			0.0	30	
Physical Characteristics									
% Solids	84.8	0.1	% by Wt.	88.0			3.6	25	

Certificate of Analysis

Client: **Paterson Group Consulting Engineers**

Report Date: 24-Jul-2012
Order Date:19-Jul-2012

Client PO: 13161 Project Description: PE2709

Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Metals									
Antimony	51.0		ug/L	0.01	102	70-130			
Arsenic	49.5		ug/L	0.1	98.7	70-130			
Barium	55.5		ug/L	5.5	100	70-130			
Beryllium	52.8		ug/L	0.08	105	70-130			
Boron	48.3		ug/L	0.5	95.6	70-130			
Cadmium	47.8		ug/L	0.007	95.5	70-130			
Chromium	55.4		ug/L	4.0	103	70-130			
Cobalt	50.9		ug/L	0.9	99.9	70-130			
Copper	50.9		ug/L	1.5	98.8	70-130			
Lead	51.4		ug/L	0.7	101	70-130			
Molybdenum	48.1		ug/L	0.07	96.1	70-130			
Nickel	52.8		ug/L	2.4	101	70-130			
Selenium	50.2		ug/L	ND	100	70-130			
Silver	41.4		ug/L	0.01	82.7	70-130			
Thallium	56.7		ug/L	ND	114	70-130			
Uranium	51.7		ug/L	0.1	103	70-130			
Vanadium	57.7		ug/L	5.5	104	70-130			
Zinc	53.2		ug/L	4.2	98.0	70-130			

Certificate of Analysis

Report Date: 24-Jul-2012
Order Date:19-Jul-2012

Client: **Paterson Group Consulting Engineers**

Client PO: 13161 Project Description: PE2709

Qualifier Notes:

Sample Qualifiers :

1 : Elevated detection limits due to the nature of the sample matrix.

Sample Data Revisions

None

Work Order Revisions / Comments:

None

Other Report Notes:

n/a: not applicable
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.

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Page 1 of 1

Client Name: Paterson Group Inc.	Project Reference: PE2709	TAT: [ ] Regular [ ] 3 Day
Contact Name: Dan Arnott	Quote #	[X] 2 Day [ ] 1 Day
Address: 154 Colonnade Rd, Ottawa, ON K2E 7J5	PO # 13161	Date Required:
Telephone: 613.226.7381	Email Address: darnott@patersongroup.ca	

Criteria: [ ] O. Reg. 153/04 Table ___ [X] O. Reg. 153/11 (Current) 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: 129217

	Sample ID/Location Name	Matrix	Air Volume	# of Containers	Sample Taken Date	Sample Taken Time	PHCs F1-F4+BTEX	VOCs	PAHs	Metals by ICP/MS	Hg	CrVI	B (HWS)							
1	BH1-AV1	S		1	17-Jul-12				X	X					250 ml					✓
2	BH4-SS3	S		1	18-Jul-12					X					"					✓
3																				
4																				
5																				
6																				
7																				
8																				
9																				
10																				

Comments:

Method of Delivery: Paracel

Relinquished By (Print & Sign):	Received by Driver/Depot:	Received at Lab:	Verified By:
DAN ARNOTT	M. Scouse	SUNEEPORN	MJC
Date/Time: 1:23 pm, 19-Jul-12	Date/Time: 19/07/12 3:35PM	Date/Time: JUL 19, 2012 05.05	Date/Time: July 19/12, 5:37
	Temperature: ___ °C	Temperature: 19.9 °C	pH Verified [ ] By: N/A

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Certificate of Analysis

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

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

Client PO: 12261
Project: PE2709
Custody: 94393

Report Date: 24-Jul-2012
Order Date: 20-Jul-2012
Order #: 1229249

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

Paracel ID	Client ID
1229249-01	BH1-GW1
1229249-02	BH2-GW1
1229249-03	BH4-GW1

Approved By: Mark Foto

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

Certificate of Analysis

Report Date: 24-Jul-2012
Order Date:20-Jul-2012

Client: **Paterson Group Consulting Engineers**

Client PO: 12261 Project Description: PE2709

Analysis Summary Table

Analysis	Method Reference/Description	Extraction Date	Analysis Date
CCME PHC F1	CWS Tier 1 - P&T GC-FID	20-Jul-12	23-Jul-12
CCME PHC F2 - F4	CWS Tier 1 - GC-FID, extraction	20-Jul-12	21-Jul-12
PAHs by GC-MS, standard scan	EPA 625 - GC-MS, extraction	23-Jul-12	24-Jul-12
VOCs	EPA 624 - P&T GC-MS	20-Jul-12	23-Jul-12

Certificate of Analysis

Report Date: 24-Jul-2012
Order Date:20-Jul-2012

Client: **Paterson Group Consulting Engineers**

Client PO: 12261 Project Description: PE2709

	Client ID:	BH1-GW1	BH2-GW1	BH4-GW1	-
	Sample Date:	20-Jul-12	20-Jul-12	20-Jul-12	-
	Sample ID:	1229249-01	1229249-02	1229249-03	-
	MDL/Units	Water	Water	Water	-
Volatiles					
Acetone	5.0 ug/L	82.4	691	40.6	-
Benzene	0.5 ug/L	<0.5	2.4	1.1	-
Bromodichloromethane	0.5 ug/L	<0.5	<0.5	3.8	-
Bromoform	0.5 ug/L	<0.5	<0.5	<0.5	-
Bromomethane	0.5 ug/L	<0.5	<0.5	<0.5	-
Carbon Tetrachloride	0.2 ug/L	<0.2	<0.2	<0.2	-
Chlorobenzene	0.5 ug/L	<0.5	<0.5	<0.5	-
Chloroethane	1.0 ug/L	<1.0	<1.0	<1.0	-
Chloroform	0.5 ug/L	16.1	14.4	21.8	-
Chloromethane	3.0 ug/L	<3.0	<3.0	<3.0	-
Dibromochloromethane	0.5 ug/L	<0.5	<0.5	<0.5	-
Dichlorodifluoromethane	1.0 ug/L	<1.0	<1.0	<1.0	-
1,2-Dibromoethane	0.2 ug/L	<0.2	<0.2	<0.2	-
1,2-Dichlorobenzene	0.5 ug/L	<0.5	<0.5	<0.5	-
1,3-Dichlorobenzene	0.5 ug/L	<0.5	<0.5	<0.5	-
1,4-Dichlorobenzene	0.5 ug/L	<0.5	<0.5	<0.5	-
1,1-Dichloroethane	0.5 ug/L	<0.5	<0.5	<0.5	-
1,2-Dichloroethane	0.5 ug/L	<0.5	<0.5	<0.5	-
1,1-Dichloroethylene	0.5 ug/L	<0.5	<0.5	<0.5	-
cis-1,2-Dichloroethylene	0.5 ug/L	<0.5	<0.5	<0.5	-
trans-1,2-Dichloroethylene	0.5 ug/L	<0.5	<0.5	<0.5	-
1,2-Dichloroethylene, total	0.5 ug/L	<0.5	<0.5	<0.5	-
1,2-Dichloropropane	0.5 ug/L	<0.5	<0.5	<0.5	-
cis-1,3-Dichloropropylene	0.5 ug/L	<0.5	<0.5	<0.5	-
trans-1,3-Dichloropropylene	0.5 ug/L	<0.5	<0.5	<0.5	-
1,3-Dichloropropene, total	0.5 ug/L	<0.5	<0.5	<0.5	-
Ethylbenzene	0.5 ug/L	<0.5	1.0	<0.5	-
Hexane	1.0 ug/L	2.1	2.2	<1.0	-
Methyl Ethyl Ketone (2-Butanone)	5.0 ug/L	10.7	8.0	8.4	-
Methyl Butyl Ketone (2-Hexanone)	10.0 ug/L	<10.0	<10.0	<10.0	-
Methyl Isobutyl Ketone	5.0 ug/L	<5.0	<5.0	<5.0	-
Methyl tert-butyl ether	2.0 ug/L	<2.0	<2.0	<2.0	-
Methylene Chloride	5.0 ug/L	<5.0	<5.0	<5.0	-

Certificate of Analysis

Report Date: 24-Jul-2012
Order Date:20-Jul-2012

Client: **Paterson Group Consulting Engineers**

Client PO: 12261 Project Description: PE2709

	Client ID:	BH1-GW1	BH2-GW1	BH4-GW1	-
	Sample Date:	20-Jul-12	20-Jul-12	20-Jul-12	-
	Sample ID:	1229249-01	1229249-02	1229249-03	-
	MDL/Units	Water	Water	Water	-
Styrene	0.5 ug/L	<0.5	<0.5	<0.5	-
1,1,1,2-Tetrachloroethane	0.5 ug/L	<0.5	<0.5	<0.5	-
1,1,2,2-Tetrachloroethane	0.5 ug/L	<0.5	<0.5	<0.5	-
Tetrachloroethylene	0.5 ug/L	<0.5	<0.5	<0.5	-
Toluene	0.5 ug/L	6.2	5.8	5.6	-
1,2,4-Trichlorobenzene	0.5 ug/L	<0.5	<0.5	<0.5	-
1,1,1-Trichloroethane	0.5 ug/L	<0.5	<0.5	<0.5	-
1,1,2-Trichloroethane	0.5 ug/L	<0.5	<0.5	<0.5	-
Trichloroethylene	0.5 ug/L	<0.5	<0.5	<0.5	-
Trichlorofluoromethane	1.0 ug/L	<1.0	<1.0	<1.0	-
1,3,5-Trimethylbenzene	0.5 ug/L	<0.5	<0.5	<0.5	-
Vinyl chloride	0.5 ug/L	<0.5	<0.5	<0.5	-
m,p-Xylenes	0.5 ug/L	<0.5	1.2	<0.5	-
o-Xylene	0.5 ug/L	<0.5	1.6	<0.5	-
Xylenes, total	0.5 ug/L	<0.5	2.8	<0.5	-
4-Bromofluorobenzene	Surrogate	110%	117%	109%	-
Dibromofluoromethane	Surrogate	106%	110%	106%	-
Toluene-d8	Surrogate	98.4%	94.8%	97.2%	-
Hydrocarbons					
F1 PHCs (C6-C10)	25 ug/L	45	43	<25	-
F2 PHCs (C10-C16)	100 ug/L	<287	<100	<100	-
F3 PHCs (C16-C34)	100 ug/L	<287	<100	<100	-
F4 PHCs (C34-C50)	100 ug/L	<287	<100	<100	-
Semi-Volatiles					
Acenaphthene	0.05 ug/L	-	<0.05	-	-
Acenaphthylene	0.05 ug/L	-	<0.05	-	-
Anthracene	0.01 ug/L	-	<0.01	-	-
Benzo [a] anthracene	0.01 ug/L	-	<0.01	-	-
Benzo [a] pyrene	0.01 ug/L	-	<0.01	-	-
Benzo [b] fluoranthene	0.05 ug/L	-	<0.05	-	-
Benzo [g,h,i] perylene	0.05 ug/L	-	<0.05	-	-
Benzo [k] fluoranthene	0.05 ug/L	-	<0.05	-	-
Biphenyl	0.05 ug/L	-	0.12	-	-
Chrysene	0.05 ug/L	-	<0.05	-	-
Dibenzo [a,h] anthracene	0.05 ug/L	-	<0.05	-	-

Certificate of Analysis

Report Date: 24-Jul-2012
Order Date:20-Jul-2012

Client: **Paterson Group Consulting Engineers**

Client PO: 12261 Project Description: PE2709

	Client ID:	BH1-GW1	BH2-GW1	BH4-GW1	-
	Sample Date:	20-Jul-12	20-Jul-12	20-Jul-12	-
	Sample ID:	1229249-01	1229249-02	1229249-03	-
	MDL/Units	Water	Water	Water	-
Fluoranthene	0.01 ug/L	-	<0.01	-	-
Fluorene	0.05 ug/L	-	0.06	-	-
Indeno [1,2,3-cd] pyrene	0.05 ug/L	-	<0.05	-	-
1-Methylnaphthalene	0.05 ug/L	-	0.33	-	-
2-Methylnaphthalene	0.05 ug/L	-	0.40	-	-
Methylnaphthalene (1&2)	0.10 ug/L	-	0.73	-	-
Naphthalene	0.05 ug/L	-	0.82	-	-
Phenanthrene	0.05 ug/L	-	<0.05	-	-
Pyrene	0.01 ug/L	-	<0.01	-	-
2-Fluorobiphenyl	Surrogate	-	73.4%	-	-
Terphenyl-d14	Surrogate	-	80.8%	-	-

Certificate of Analysis

Client: **Paterson Group Consulting Engineers**

Report Date: 24-Jul-2012
Order Date:20-Jul-2012

Client PO: 12261 Project Description: PE2709

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						
Semi-Volatiles									
Acenaphthene	ND	0.05	ug/L						
Acenaphthylene	ND	0.05	ug/L						
Anthracene	ND	0.01	ug/L						
Benzo [a] anthracene	ND	0.01	ug/L						
Benzo [a] pyrene	ND	0.01	ug/L						
Benzo [b] fluoranthene	ND	0.05	ug/L						
Benzo [g,h,i] perylene	ND	0.05	ug/L						
Benzo [k] fluoranthene	ND	0.05	ug/L						
Biphenyl	ND	0.05	ug/L						
Chrysene	ND	0.05	ug/L						
Dibenzo [a,h] anthracene	ND	0.05	ug/L						
Fluoranthene	ND	0.01	ug/L						
Fluorene	ND	0.05	ug/L						
Indeno [1,2,3-cd] pyrene	ND	0.05	ug/L						
1-Methylnaphthalene	ND	0.05	ug/L						
2-Methylnaphthalene	ND	0.05	ug/L						
Methylnaphthalene (1&2)	ND	0.10	ug/L						
Naphthalene	ND	0.05	ug/L						
Phenanthrene	ND	0.05	ug/L						
Pyrene	ND	0.01	ug/L						
Surrogate: 2-Fluorobiphenyl	*19.0*		*ug/L*		*95.2*	*50-140*			
Surrogate: Terphenyl-d14	*18.0*		*ug/L*		*90.0*	*50-140*			
Volatiles									
Acetone	ND	5.0	ug/L						
Benzene	ND	0.5	ug/L						
Bromodichloromethane	ND	0.5	ug/L						
Bromoform	ND	0.5	ug/L						
Bromomethane	ND	0.5	ug/L						
Carbon Tetrachloride	ND	0.2	ug/L						
Chlorobenzene	ND	0.5	ug/L						
Chloroethane	ND	1.0	ug/L						
Chloroform	ND	0.5	ug/L						
Chloromethane	ND	3.0	ug/L						
Dibromochloromethane	ND	0.5	ug/L						
Dichlorodifluoromethane	ND	1.0	ug/L						
1,2-Dibromoethane	ND	0.2	ug/L						
1,2-Dichlorobenzene	ND	0.5	ug/L						
1,3-Dichlorobenzene	ND	0.5	ug/L						
1,4-Dichlorobenzene	ND	0.5	ug/L						
1,1-Dichloroethane	ND	0.5	ug/L						
1,2-Dichloroethane	ND	0.5	ug/L						
1,1-Dichloroethylene	ND	0.5	ug/L						
cis-1,2-Dichloroethylene	ND	0.5	ug/L						
trans-1,2-Dichloroethylene	ND	0.5	ug/L						
1,2-Dichloroethylene, total	ND	0.5	ug/L						
1,2-Dichloropropane	ND	0.5	ug/L						
cis-1,3-Dichloropropylene	ND	0.5	ug/L						
trans-1,3-Dichloropropylene	ND	0.5	ug/L						
1,3-Dichloropropene, total	ND	0.5	ug/L						
Ethylbenzene	ND	0.5	ug/L						
Hexane	ND	1.0	ug/L						

Certificate of Analysis

Report Date: 24-Jul-2012
Order Date:20-Jul-2012

Client: **Paterson Group Consulting Engineers**

Client PO: 12261 Project Description: PE2709

Method Quality Control: Blank

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Methyl Ethyl Ketone (2-Butanone)	ND	5.0	ug/L						
Methyl Butyl Ketone (2-Hexanone)	ND	10.0	ug/L						
Methyl Isobutyl Ketone	ND	5.0	ug/L						
Methyl tert-butyl ether	ND	2.0	ug/L						
Methylene Chloride	ND	5.0	ug/L						
Styrene	ND	0.5	ug/L						
1,1,1,2-Tetrachloroethane	ND	0.5	ug/L						
1,1,2,2-Tetrachloroethane	ND	0.5	ug/L						
Tetrachloroethylene	ND	0.5	ug/L						
Toluene	ND	0.5	ug/L						
1,2,4-Trichlorobenzene	ND	0.5	ug/L						
1,1,1-Trichloroethane	ND	0.5	ug/L						
1,1,2-Trichloroethane	ND	0.5	ug/L						
Trichloroethylene	ND	0.5	ug/L						
Trichlorofluoromethane	ND	1.0	ug/L						
1,3,5-Trimethylbenzene	ND	0.5	ug/L						
Vinyl chloride	ND	0.5	ug/L						
m,p-Xylenes	ND	0.5	ug/L						
o-Xylene	ND	0.5	ug/L						
Xylenes, total	ND	0.5	ug/L						
Surrogate: 4-Bromofluorobenzene	*37.9*		*ug/L*		*118*	*50-140*			
Surrogate: Dibromofluoromethane	*25.4*		*ug/L*		*79.4*	*50-140*			
Surrogate: Toluene-d8	*34.7*		*ug/L*		*108*	*50-140*			

Certificate of Analysis

Client: **Paterson Group Consulting Engineers**

Report Date: 24-Jul-2012
Order Date:20-Jul-2012

Client PO: 12261 Project Description: PE2709

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									
Acetone	ND	5.0	ug/L	ND				30	
Benzene	ND	0.5	ug/L	ND				30	
Bromodichloromethane	ND	0.5	ug/L	ND				30	
Bromoform	ND	0.5	ug/L	ND				30	
Bromomethane	ND	0.5	ug/L	ND				30	
Carbon Tetrachloride	ND	0.2	ug/L	ND				30	
Chlorobenzene	ND	0.5	ug/L	ND				30	
Chloroethane	ND	1.0	ug/L	ND				30	
Chloroform	ND	0.5	ug/L	ND				30	
Chloromethane	ND	3.0	ug/L	ND				30	
Dibromochloromethane	ND	0.5	ug/L	ND				30	
Dichlorodifluoromethane	ND	1.0	ug/L	ND				30	
1,2-Dibromoethane	ND	0.2	ug/L	ND				30	
1,2-Dichlorobenzene	ND	0.5	ug/L	ND				30	
1,3-Dichlorobenzene	ND	0.5	ug/L	ND				30	
1,4-Dichlorobenzene	ND	0.5	ug/L	ND				30	
1,1-Dichloroethane	ND	0.5	ug/L	ND				30	
1,2-Dichloroethane	ND	0.5	ug/L	ND				30	
1,1-Dichloroethylene	ND	0.5	ug/L	ND				30	
cis-1,2-Dichloroethylene	ND	0.5	ug/L	ND				30	
trans-1,2-Dichloroethylene	ND	0.5	ug/L	ND				30	
1,2-Dichloropropane	ND	0.5	ug/L	ND				30	
cis-1,3-Dichloropropylene	ND	0.5	ug/L	ND				30	
trans-1,3-Dichloropropylene	ND	0.5	ug/L	ND				30	
Ethylbenzene	ND	0.5	ug/L	ND				30	
Hexane	ND	1.0	ug/L	ND				30	
Methyl Ethyl Ketone (2-Butanone)	ND	5.0	ug/L	ND				30	
Methyl Butyl Ketone (2-Hexanone)	ND	10.0	ug/L	ND				30	
Methyl Isobutyl Ketone	ND	5.0	ug/L	ND				30	
Methyl tert-butyl ether	ND	2.0	ug/L	ND				30	
Methylene Chloride	ND	5.0	ug/L	ND				30	
Styrene	ND	0.5	ug/L	ND				30	
1,1,1,2-Tetrachloroethane	ND	0.5	ug/L	ND				30	
1,1,2,2-Tetrachloroethane	ND	0.5	ug/L	ND				30	
Tetrachloroethylene	ND	0.5	ug/L	ND				30	
Toluene	ND	0.5	ug/L	ND				30	
1,2,4-Trichlorobenzene	ND	0.5	ug/L	ND				30	
1,1,1-Trichloroethane	ND	0.5	ug/L	ND				30	
1,1,2-Trichloroethane	ND	0.5	ug/L	ND				30	
Trichloroethylene	ND	0.5	ug/L	ND				30	
Trichlorofluoromethane	ND	1.0	ug/L	ND				30	
1,3,5-Trimethylbenzene	ND	0.5	ug/L	ND				30	
Vinyl chloride	ND	0.5	ug/L	ND				30	
m,p-Xylenes	ND	0.5	ug/L	ND				30	
o-Xylene	ND	0.5	ug/L	ND				30	
Surrogate: 4-Bromofluorobenzene	*38.4*		*ug/L*	*ND*	*120*	*50-140*			
Surrogate: Dibromofluoromethane	*35.1*		*ug/L*	*ND*	*110*	*50-140*			
Surrogate: Toluene-d8	*35.3*		*ug/L*	*ND*	*110*	*50-140*			

Certificate of Analysis

Report Date: 24-Jul-2012
Order Date:20-Jul-2012

Client: **Paterson Group Consulting Engineers**

Client PO: 12261 Project Description: PE2709

Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Hydrocarbons									
F1 PHCs (C6-C10)	1910	25	ug/L	ND	95.7	68-117			
F2 PHCs (C10-C16)	1230	100	ug/L	ND	76.7	60-140			
F3 PHCs (C16-C34)	3300	100	ug/L	ND	82.5	60-140			
F4 PHCs (C34-C50)	2390	100	ug/L	ND	99.6	60-140			
Semi-Volatiles									
Acenaphthene	3.44	0.05	ug/L	ND	68.9	50-140			
Acenaphthylene	3.49	0.05	ug/L	ND	69.7	50-140			
Anthracene	3.55	0.01	ug/L	ND	71.0	50-140			
Benzo [a] anthracene	3.88	0.01	ug/L	ND	77.6	50-140			
Benzo [a] pyrene	3.44	0.01	ug/L	ND	68.9	50-140			
Benzo [b] fluoranthene	4.66	0.05	ug/L	ND	93.2	50-140			
Benzo [g,h,i] perylene	3.22	0.05	ug/L	ND	64.3	50-140			
Benzo [k] fluoranthene	4.86	0.05	ug/L	ND	97.3	50-140			
Biphenyl	3.54	0.05	ug/L	ND	70.8	50-140			
Chrysene	4.10	0.05	ug/L	ND	82.1	50-140			
Dibenzo [a,h] anthracene	3.90	0.05	ug/L	ND	78.0	50-140			
Fluoranthene	4.20	0.01	ug/L	ND	84.1	50-140			
Fluorene	4.02	0.05	ug/L	ND	80.4	50-140			
Indeno [1,2,3-cd] pyrene	3.04	0.05	ug/L	ND	60.8	50-140			
1-Methylnaphthalene	3.13	0.05	ug/L	ND	62.6	50-140			
2-Methylnaphthalene	3.44	0.05	ug/L	ND	68.8	50-140			
Naphthalene	3.70	0.05	ug/L	ND	74.1	50-140			
Phenanthrene	3.89	0.05	ug/L	ND	77.8	50-140			
Pyrene	4.41	0.01	ug/L	ND	88.2	50-140			
Surrogate: 2-Fluorobiphenyl	*17.8*		*ug/L*		*89.1*	*50-140*			
Volatiles									
Acetone	75.4	5.0	ug/L	ND	75.4	50-140			
Benzene	43.2	0.5	ug/L	ND	108	50-140			
Bromodichloromethane	42.0	0.5	ug/L	ND	105	50-140			
Bromoform	38.1	0.5	ug/L	ND	95.2	50-140			
Bromomethane	30.1	0.5	ug/L	ND	75.3	50-140			
Carbon Tetrachloride	41.2	0.2	ug/L	ND	103	50-140			
Chlorobenzene	43.1	0.5	ug/L	ND	108	50-140			
Chloroethane	42.2	1.0	ug/L	ND	106	50-140			
Chloroform	43.5	0.5	ug/L	ND	109	50-140			
Chloromethane	34.1	3.0	ug/L	ND	85.2	50-140			
Dibromochloromethane	40.1	0.5	ug/L	ND	100	50-140			
Dichlorodifluoromethane	43.5	1.0	ug/L	ND	109	50-140			
1,2-Dibromoethane	36.9	0.2	ug/L	ND	92.2	50-140			
1,2-Dichlorobenzene	32.1	0.5	ug/L	ND	80.3	50-140			
1,3-Dichlorobenzene	32.4	0.5	ug/L	ND	80.9	50-140			
1,4-Dichlorobenzene	33.9	0.5	ug/L	ND	84.8	50-140			
1,1-Dichloroethane	46.0	0.5	ug/L	ND	115	50-140			
1,2-Dichloroethane	40.8	0.5	ug/L	ND	102	50-140			
1,1-Dichloroethylene	27.7	0.5	ug/L	ND	69.2	50-140			
cis-1,2-Dichloroethylene	35.0	0.5	ug/L	ND	87.6	50-140			
trans-1,2-Dichloroethylene	34.6	0.5	ug/L	ND	86.4	50-140			
1,2-Dichloropropane	41.1	0.5	ug/L	ND	103	50-140			

Certificate of Analysis

Report Date: 24-Jul-2012
Order Date:20-Jul-2012

Client: **Paterson Group Consulting Engineers**

Client PO: 12261 Project Description: PE2709

Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
cis-1,3-Dichloropropylene	33.9	0.5	ug/L	ND	84.8	50-140			
trans-1,3-Dichloropropylene	44.0	0.5	ug/L	ND	110	50-140			
Ethylbenzene	36.4	0.5	ug/L	ND	91.1	50-140			
Hexane	43.3	1.0	ug/L	ND	108	50-140			
Methyl Ethyl Ketone (2-Butanone)	62.5	5.0	ug/L	ND	62.5	50-140			
Methyl Butyl Ketone (2-Hexanone)	67.9	10.0	ug/L	ND	67.9	50-140			
Methyl Isobutyl Ketone	63.7	5.0	ug/L	ND	63.7	50-140			
Methyl tert-butyl ether	72.8	2.0	ug/L	ND	72.8	50-140			
Methylene Chloride	34.3	5.0	ug/L	ND	85.8	50-140			
Styrene	29.9	0.5	ug/L	ND	74.8	50-140			
1,1,1,2-Tetrachloroethane	42.6	0.5	ug/L	ND	107	50-140			
1,1,2,2-Tetrachloroethane	49.5	0.5	ug/L	ND	124	50-140			
Tetrachloroethylene	43.0	0.5	ug/L	ND	108	50-140			
Toluene	40.0	0.5	ug/L	ND	100	50-140			
1,2,4-Trichlorobenzene	43.2	0.5	ug/L	ND	108	50-140			
1,1,1-Trichloroethane	41.4	0.5	ug/L	ND	104	50-140			
1,1,2-Trichloroethane	37.5	0.5	ug/L	ND	93.8	50-140			
Trichloroethylene	36.9	0.5	ug/L	ND	92.4	50-140			
Trichlorofluoromethane	34.8	1.0	ug/L	ND	87.0	50-140			
1,3,5-Trimethylbenzene	28.6	0.5	ug/L	ND	71.5	50-140			
Vinyl chloride	43.7	0.5	ug/L	ND	109	50-140			
m,p-Xylenes	89.0	0.5	ug/L	ND	111	50-140			
o-Xylene	39.6	0.5	ug/L	ND	98.9	50-140			

Certificate of Analysis

Report Date: 24-Jul-2012
Order Date:20-Jul-2012

Client: **Paterson Group Consulting Engineers**

Client PO: 12261 Project Description: PE2709

Qualifier Notes:

None

Sample Data Revisions

None

Work Order Revisions / Comments:

None

Other Report Notes:

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

CCME PHC additional information:

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

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Chain of Custody
(Lab Use Only)
Nº 94393

Page 1 of 1

Client Name: Paterson Group INC	Project Reference: PE2709	TAT: [ ] Regular [ ] 3 Day
Contact Name: Mark D'Arcy	Quote #	[ ] 2 Day [X] 1 Day
Address: 154 Colonnade Road South	PO # 12261	Date Required:
Telephone: (613)226-7381	Email Address: MDArcy@PatersonGroup.ca	

Criteria: [ ] O. Reg. 153/04 Table __ [X] O. Reg. 153/11 (Current) 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)

Required Analyses

Paracel Order Number: 1229249

	Sample ID/Location Name	Matrix	Air Volume	# of Containers	Sample Taken Date	Sample Taken Time	PHCs F1-F4+BTEX	VOCs	PAHs	Metals by ICP/MS	Hg	CrVI	B (HWS)							
1	BH1-GW1	GW		2	July 20 2012		X	X												✓
2	BH2-GW1	GW		4	July 20, 2012		X	X	X											✓
3	BH4-GW1	GW		3	July 20 2012		X	X	X	→				no PAH analysis per Sean.						✓
4																				
5																				
6																				
7																				
8																				
9																				
10																				

Comments: Unable to recover enough sample for 2x vials & 5 cont for BH1-GW1, please just do what you can for PHCs & VOCs. -Thanks, Sean Moggridge Decant where necessary per Sean.

Method of Delivery: Walk in

Relinquished By (Print & Sign):	Received by Driver/Depot:	Received at Lab:	Verified By:
Sean Moggridge			MC
Date/Time: July 20, 2012, 1/1n	Date/Time:	Date/Time: July 20/12 11:01a	Date/Time: July 20/12 12:28
	Temperature: ____ °C	Temperature: 22.4 °C	pH Verified [ ] By: N/A

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Certificate of Analysis

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

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

Client PO: 12263
Project: PE2709
Custody: 94819

Report Date: 26-Jul-2012
Order Date: 25-Jul-2012
Order #: 1230199

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

Paracel ID	Client ID
1230199-01	BH4-GW2
1230199-02	BH2-GW2

Approved By: Mark Foto

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

Certificate of Analysis

Report Date: 26-Jul-2012
Order Date:25-Jul-2012

Client: **Paterson Group Consulting Engineers**

Client PO: 12263 Project Description: PE2709

Analysis Summary Table

Analysis	Method Reference/Description	Extraction Date	Analysis Date
CCME PHC F1	CWS Tier 1 - P&T GC-FID	26-Jul-12	26-Jul-12
CCME PHC F2 - F4	CWS Tier 1 - GC-FID, extraction	26-Jul-12	26-Jul-12
VOCs	EPA 624 - P&T GC-MS	26-Jul-12	26-Jul-12

Certificate of Analysis

Report Date: 26-Jul-2012
Order Date:25-Jul-2012

Client: **Paterson Group Consulting Engineers**

Client PO: 12263 Project Description: PE2709

	Client ID:	BH4-GW2	BH2-GW2	-	-
	Sample Date:	25-Jul-12	25-Jul-12	-	-
	Sample ID:	1230199-01	1230199-02	-	-
	MDL/Units	Water	Water	-	-
Volatiles					
Acetone	5.0 ug/L	104	1020	-	-
Benzene	0.5 ug/L	<0.5	<0.5	-	-
Bromodichloromethane	0.5 ug/L	<0.5	<0.5	-	-
Bromoform	0.5 ug/L	<0.5	<0.5	-	-
Bromomethane	0.5 ug/L	<0.5	<0.5	-	-
Carbon Tetrachloride	0.2 ug/L	<0.2	<0.2	-	-
Chlorobenzene	0.5 ug/L	<0.5	<0.5	-	-
Chloroethane	1.0 ug/L	<1.0	<1.0	-	-
Chloroform	0.5 ug/L	3.1	9.9	-	-
Chloromethane	3.0 ug/L	<3.0	<3.0	-	-
Dibromochloromethane	0.5 ug/L	<0.5	<0.5	-	-
Dichlorodifluoromethane	1.0 ug/L	<1.0	<1.0	-	-
1,2-Dibromoethane	0.2 ug/L	<0.2	<0.2	-	-
1,2-Dichlorobenzene	0.5 ug/L	<0.5	<0.5	-	-
1,3-Dichlorobenzene	0.5 ug/L	<0.5	<0.5	-	-
1,4-Dichlorobenzene	0.5 ug/L	<0.5	<0.5	-	-
1,1-Dichloroethane	0.5 ug/L	<0.5	<0.5	-	-
1,2-Dichloroethane	0.5 ug/L	<0.5	<0.5	-	-
1,1-Dichloroethylene	0.5 ug/L	<0.5	<0.5	-	-
cis-1,2-Dichloroethylene	0.5 ug/L	<0.5	<0.5	-	-
trans-1,2-Dichloroethylene	0.5 ug/L	<0.5	<0.5	-	-
1,2-Dichloroethylene, total	0.5 ug/L	<0.5	<0.5	-	-
1,2-Dichloropropane	0.5 ug/L	<0.5	<0.5	-	-
cis-1,3-Dichloropropylene	0.5 ug/L	<0.5	<0.5	-	-
trans-1,3-Dichloropropylene	0.5 ug/L	<0.5	<0.5	-	-
1,3-Dichloropropene, total	0.5 ug/L	<0.5	<0.5	-	-
Ethylbenzene	0.5 ug/L	<0.5	<0.5	-	-
Hexane	1.0 ug/L	<1.0	<1.0	-	-
Methyl Ethyl Ketone (2-Butanone)	5.0 ug/L	<5.0	26.1	-	-
Methyl Butyl Ketone (2-Hexanone)	10.0 ug/L	<10.0	<10.0	-	-
Methyl Isobutyl Ketone	5.0 ug/L	<5.0	<5.0	-	-
Methyl tert-butyl ether	2.0 ug/L	<2.0	<2.0	-	-
Methylene Chloride	5.0 ug/L	<5.0	<5.0	-	-

Certificate of Analysis

Report Date: 26-Jul-2012
Order Date:25-Jul-2012

Client: **Paterson Group Consulting Engineers**

Client PO: 12263 Project Description: PE2709

	Client ID:	BH4-GW2	BH2-GW2	-	-
	Sample Date:	25-Jul-12	25-Jul-12	-	-
	Sample ID:	1230199-01	1230199-02	-	-
	MDL/Units	Water	Water	-	-
Styrene	0.5 ug/L	<0.5	<0.5	-	-
1,1,1,2-Tetrachloroethane	0.5 ug/L	<0.5	<0.5	-	-
1,1,2,2-Tetrachloroethane	0.5 ug/L	<0.5	<0.5	-	-
Tetrachloroethylene	0.5 ug/L	<0.5	<0.5	-	-
Toluene	0.5 ug/L	<0.5	<0.5	-	-
1,2,4-Trichlorobenzene	0.5 ug/L	<0.5	<0.5	-	-
1,1,1-Trichloroethane	0.5 ug/L	<0.5	<0.5	-	-
1,1,2-Trichloroethane	0.5 ug/L	<0.5	<0.5	-	-
Trichloroethylene	0.5 ug/L	<0.5	<0.5	-	-
Trichlorofluoromethane	1.0 ug/L	<1.0	<1.0	-	-
1,3,5-Trimethylbenzene	0.5 ug/L	<0.5	<0.5	-	-
Vinyl chloride	0.5 ug/L	<0.5	<0.5	-	-
m,p-Xylenes	0.5 ug/L	<0.5	<0.5	-	-
o-Xylene	0.5 ug/L	<0.5	<0.5	-	-
Xylenes, total	0.5 ug/L	<0.5	<0.5	-	-
4-Bromofluorobenzene	Surrogate	110%	108%	-	-
Dibromofluoromethane	Surrogate	110%	109%	-	-
Toluene-d8	Surrogate	112%	106%	-	-
Hydrocarbons					
F1 PHCs (C6-C10)	25 ug/L	<25	<25	-	-
F2 PHCs (C10-C16)	100 ug/L	<100	-	-	-
F3 PHCs (C16-C34)	100 ug/L	<100	-	-	-
F4 PHCs (C34-C50)	100 ug/L	<100	-	-	-

Certificate of Analysis

Client: **Paterson Group Consulting Engineers**

Report Date: 26-Jul-2012
Order Date:25-Jul-2012

Client PO: 12263 Project Description: PE2709

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						
Volatiles									
Acetone	ND	5.0	ug/L						
Benzene	ND	0.5	ug/L						
Bromodichloromethane	ND	0.5	ug/L						
Bromoform	ND	0.5	ug/L						
Bromomethane	ND	0.5	ug/L						
Carbon Tetrachloride	ND	0.2	ug/L						
Chlorobenzene	ND	0.5	ug/L						
Chloroethane	ND	1.0	ug/L						
Chloroform	ND	0.5	ug/L						
Chloromethane	ND	3.0	ug/L						
Dibromochloromethane	ND	0.5	ug/L						
Dichlorodifluoromethane	ND	1.0	ug/L						
1,2-Dibromoethane	ND	0.2	ug/L						
1,2-Dichlorobenzene	ND	0.5	ug/L						
1,3-Dichlorobenzene	ND	0.5	ug/L						
1,4-Dichlorobenzene	ND	0.5	ug/L						
1,1-Dichloroethane	ND	0.5	ug/L						
1,2-Dichloroethane	ND	0.5	ug/L						
1,1-Dichloroethylene	ND	0.5	ug/L						
cis-1,2-Dichloroethylene	ND	0.5	ug/L						
trans-1,2-Dichloroethylene	ND	0.5	ug/L						
1,2-Dichloroethylene, total	ND	0.5	ug/L						
1,2-Dichloropropane	ND	0.5	ug/L						
cis-1,3-Dichloropropylene	ND	0.5	ug/L						
trans-1,3-Dichloropropylene	ND	0.5	ug/L						
1,3-Dichloropropene, total	ND	0.5	ug/L						
Ethylbenzene	ND	0.5	ug/L						
Hexane	ND	1.0	ug/L						
Methyl Ethyl Ketone (2-Butanone)	ND	5.0	ug/L						
Methyl Butyl Ketone (2-Hexanone)	ND	10.0	ug/L						
Methyl Isobutyl Ketone	ND	5.0	ug/L						
Methyl tert-butyl ether	ND	2.0	ug/L						
Methylene Chloride	ND	5.0	ug/L						
Styrene	ND	0.5	ug/L						
1,1,1,2-Tetrachloroethane	ND	0.5	ug/L						
1,1,2,2-Tetrachloroethane	ND	0.5	ug/L						
Tetrachloroethylene	ND	0.5	ug/L						
Toluene	ND	0.5	ug/L						
1,2,4-Trichlorobenzene	ND	0.5	ug/L						
1,1,1-Trichloroethane	ND	0.5	ug/L						
1,1,2-Trichloroethane	ND	0.5	ug/L						
Trichloroethylene	ND	0.5	ug/L						
Trichlorofluoromethane	ND	1.0	ug/L						
1,3,5-Trimethylbenzene	ND	0.5	ug/L						
Vinyl chloride	ND	0.5	ug/L						
m,p-Xylenes	ND	0.5	ug/L						
o-Xylene	ND	0.5	ug/L						
Xylenes, total	ND	0.5	ug/L						
Surrogate: 4-Bromofluorobenzene	*37.1*		*ug/L*		*116*	*50-140*			
Surrogate: Dibromofluoromethane	*31.8*		*ug/L*		*99.5*	*50-140*			
Surrogate: Toluene-d8	*38.5*		*ug/L*		*120*	*50-140*			

Certificate of Analysis

Report Date: 26-Jul-2012
Order Date:25-Jul-2012

Client: **Paterson Group Consulting Engineers**

Client PO: 12263 Project Description: PE2709

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									
Acetone	ND	5.0	ug/L	ND				30	
Benzene	ND	0.5	ug/L	ND				30	
Bromodichloromethane	ND	0.5	ug/L	ND				30	
Bromoform	ND	0.5	ug/L	ND				30	
Bromomethane	ND	0.5	ug/L	ND				30	
Carbon Tetrachloride	ND	0.2	ug/L	ND				30	
Chlorobenzene	ND	0.5	ug/L	ND				30	
Chloroethane	ND	1.0	ug/L	ND				30	
Chloroform	ND	0.5	ug/L	ND				30	
Chloromethane	ND	3.0	ug/L	ND				30	
Dibromochloromethane	ND	0.5	ug/L	ND				30	
Dichlorodifluoromethane	ND	1.0	ug/L	ND				30	
1,2-Dibromoethane	ND	0.2	ug/L	ND				30	
1,2-Dichlorobenzene	ND	0.5	ug/L	ND				30	
1,3-Dichlorobenzene	ND	0.5	ug/L	ND				30	
1,4-Dichlorobenzene	ND	0.5	ug/L	ND				30	
1,1-Dichloroethane	ND	0.5	ug/L	ND				30	
1,2-Dichloroethane	ND	0.5	ug/L	ND				30	
1,1-Dichloroethylene	ND	0.5	ug/L	ND				30	
cis-1,2-Dichloroethylene	ND	0.5	ug/L	ND				30	
trans-1,2-Dichloroethylene	ND	0.5	ug/L	ND				30	
1,2-Dichloropropane	ND	0.5	ug/L	ND				30	
cis-1,3-Dichloropropylene	ND	0.5	ug/L	ND				30	
trans-1,3-Dichloropropylene	ND	0.5	ug/L	ND				30	
Ethylbenzene	ND	0.5	ug/L	ND				30	
Hexane	ND	1.0	ug/L	ND				30	
Methyl Ethyl Ketone (2-Butanone)	ND	5.0	ug/L	ND				30	
Methyl Butyl Ketone (2-Hexanone)	ND	10.0	ug/L	ND				30	
Methyl Isobutyl Ketone	ND	5.0	ug/L	ND				30	
Methyl tert-butyl ether	ND	2.0	ug/L	ND				30	
Methylene Chloride	ND	5.0	ug/L	ND				30	
Styrene	ND	0.5	ug/L	ND				30	
1,1,1,2-Tetrachloroethane	ND	0.5	ug/L	ND				30	
1,1,2,2-Tetrachloroethane	ND	0.5	ug/L	ND				30	
Tetrachloroethylene	ND	0.5	ug/L	ND				30	
Toluene	ND	0.5	ug/L	ND				30	
1,2,4-Trichlorobenzene	ND	0.5	ug/L	ND				30	
1,1,1-Trichloroethane	ND	0.5	ug/L	ND				30	
1,1,2-Trichloroethane	ND	0.5	ug/L	ND				30	
Trichloroethylene	ND	0.5	ug/L	ND				30	
Trichlorofluoromethane	ND	1.0	ug/L	ND				30	
1,3,5-Trimethylbenzene	ND	0.5	ug/L	ND				30	
Vinyl chloride	ND	0.5	ug/L	ND				30	
m,p-Xylenes	ND	0.5	ug/L	ND				30	
o-Xylene	ND	0.5	ug/L	ND				30	
Surrogate: 4-Bromofluorobenzene	*34.9*		*ug/L*	*ND*	*109*	*50-140*			
Surrogate: Dibromofluoromethane	*35.1*		*ug/L*	*ND*	*110*	*50-140*			
Surrogate: Toluene-d8	*37.2*		*ug/L*	*ND*	*116*	*50-140*			

Certificate of Analysis

Client: **Paterson Group Consulting Engineers**

Report Date: 26-Jul-2012
Order Date:25-Jul-2012

Client PO: 12263 Project Description: PE2709

Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Hydrocarbons									
F1 PHCs (C6-C10)	1910	25	ug/L	ND	95.4	68-117			
Volatiles									
Acetone	87.7	5.0	ug/L	ND	87.7	50-140			
Benzene	34.4	0.5	ug/L	ND	86.1	50-140			
Bromodichloromethane	31.0	0.5	ug/L	ND	77.6	50-140			
Bromoform	35.8	0.5	ug/L	ND	89.6	50-140			
Bromomethane	26.3	0.5	ug/L	ND	65.7	50-140			
Carbon Tetrachloride	30.3	0.2	ug/L	ND	75.8	50-140			
Chlorobenzene	42.4	0.5	ug/L	ND	106	50-140			
Chloroethane	37.6	1.0	ug/L	ND	93.9	50-140			
Chloroform	32.3	0.5	ug/L	ND	80.8	50-140			
Chloromethane	30.1	3.0	ug/L	ND	75.2	50-140			
Dibromochloromethane	39.0	0.5	ug/L	ND	97.6	50-140			
Dichlorodifluoromethane	27.9	1.0	ug/L	ND	69.8	50-140			
1,2-Dibromoethane	39.2	0.2	ug/L	ND	98.0	50-140			
1,2-Dichlorobenzene	32.3	0.5	ug/L	ND	80.8	50-140			
1,3-Dichlorobenzene	32.3	0.5	ug/L	ND	80.8	50-140			
1,4-Dichlorobenzene	33.0	0.5	ug/L	ND	82.4	50-140			
1,1-Dichloroethane	43.9	0.5	ug/L	ND	110	50-140			
1,2-Dichloroethane	29.7	0.5	ug/L	ND	74.3	50-140			
1,1-Dichloroethylene	36.2	0.5	ug/L	ND	90.4	50-140			
cis-1,2-Dichloroethylene	29.6	0.5	ug/L	ND	74.1	50-140			
trans-1,2-Dichloroethylene	47.4	0.5	ug/L	ND	119	50-140			
1,2-Dichloropropane	34.1	0.5	ug/L	ND	85.2	50-140			
cis-1,3-Dichloropropylene	49.7	0.5	ug/L	ND	124	50-140			
trans-1,3-Dichloropropylene	46.9	0.5	ug/L	ND	117	50-140			
Ethylbenzene	33.5	0.5	ug/L	ND	83.7	50-140			
Hexane	30.0	1.0	ug/L	ND	75.0	50-140			
Methyl Ethyl Ketone (2-Butanone)	104	5.0	ug/L	ND	104	50-140			
Methyl Butyl Ketone (2-Hexanone)	76.8	10.0	ug/L	ND	76.8	50-140			
Methyl Isobutyl Ketone	74.5	5.0	ug/L	ND	74.5	50-140			
Methyl tert-butyl ether	99.8	2.0	ug/L	ND	99.8	50-140			
Methylene Chloride	37.6	5.0	ug/L	ND	94.1	50-140			
Styrene	29.1	0.5	ug/L	ND	72.7	50-140			
1,1,1,2-Tetrachloroethane	40.3	0.5	ug/L	ND	101	50-140			
1,1,2,2-Tetrachloroethane	51.5	0.5	ug/L	ND	129	50-140			
Tetrachloroethylene	39.5	0.5	ug/L	ND	98.7	50-140			
Toluene	30.0	0.5	ug/L	ND	75.0	50-140			
1,2,4-Trichlorobenzene	27.0	0.5	ug/L	ND	67.6	50-140			
1,1,1-Trichloroethane	30.1	0.5	ug/L	ND	75.2	50-140			
1,1,2-Trichloroethane	30.5	0.5	ug/L	ND	76.2	50-140			
Trichloroethylene	28.5	0.5	ug/L	ND	71.2	50-140			
Trichlorofluoromethane	32.2	1.0	ug/L	ND	80.6	50-140			
1,3,5-Trimethylbenzene	26.0	0.5	ug/L	ND	65.0	50-140			
Vinyl chloride	29.3	0.5	ug/L	ND	73.2	50-140			
m,p-Xylenes	68.0	0.5	ug/L	ND	85.0	50-140			
o-Xylene	36.6	0.5	ug/L	ND	91.5	50-140			
Surrogate: 4-Bromofluorobenzene	*25.8*		*ug/L*		*80.8*	*50-140*			

Certificate of Analysis

Report Date: 26-Jul-2012
Order Date:25-Jul-2012

Client: **Paterson Group Consulting Engineers**

Client PO: 12263 Project Description: PE2709

Qualifier Notes:

None

Sample Data Revisions

None

Work Order Revisions / Comments:

None

Other Report Notes:

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

CCME PHC additional information:

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

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Page 1 of 1

Client Name: PATERSON GROUP INC.	Project Reference: PE2709	TAT: [ ] Regular [ ] 3 Day
Contact Name: MARK D'ARCY	Quote #	[ ] 2 Day [X] 1 Day
Address: 154 COLONNADE ROAD SOUTH	PO # 12263	Date Required:
Telephone: (613) 226-7381	Email Address: MDARCY@PATERSONGROUP.CA	

Criteria: [ ] O. Reg. 153/04 Table __ [X] O. Reg. 153/11 (Current) 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)

Required Analyses

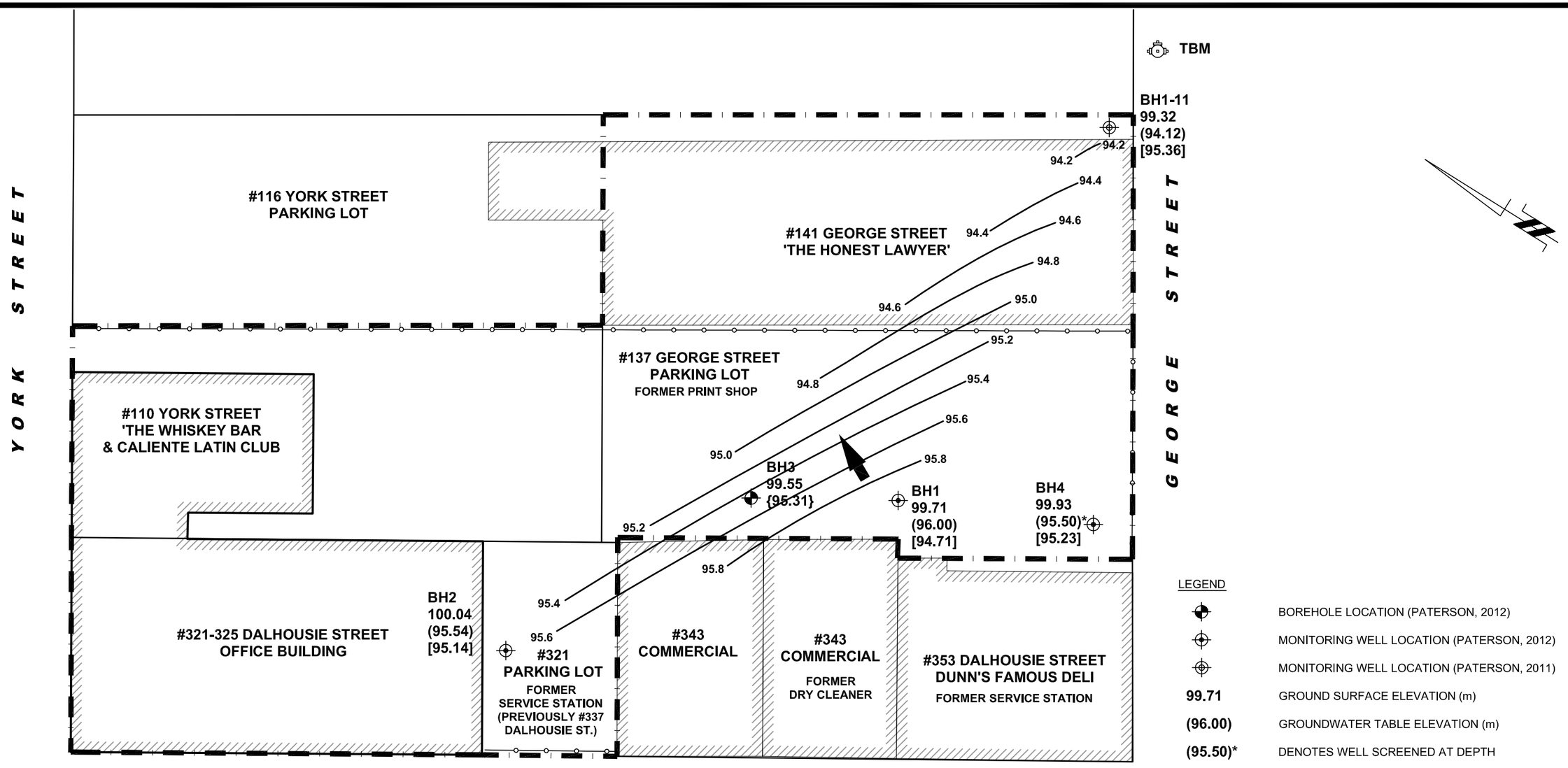
Paracel Order Number: 1230199

	Sample ID/Location Name	Matrix	Air Volume	# of Containers	Sample Taken Date	Sample Taken Time	PHCs F1-F4+BTEX	VOCs	PAHs	Metals by ICP/MS	Hg	CrVI	B (HWS)							
1	BH4-GW2	GW			July 25	12:30pm	X	X												
2	BH2-GW2	GW			July 25	10 am	X	X												
3																				
4																				
5																				
6																				
7																				
8																				
9																				
10																				

Comments: PHCs F1 @ BH2-GW2.

Method of Delivery: Walk-in

Relinquished By (Print & Sign):	Received by Driver/Depot:	Received at Lab: MJC	Verified By: MJC
	Date/Time:	Date/Time: July 25/12 5:43	Date/Time: July 25/12 6:03
Date/Time:	Temperature: ____ °C	Temperature: 19.8°C	pH Verified [ ] By: N/A



LEGEND

	BOREHOLE LOCATION (PATERSON, 2012)
	MONITORING WELL LOCATION (PATERSON, 2012)
	MONITORING WELL LOCATION (PATERSON, 2011)
99.71	GROUND SURFACE ELEVATION (m)
(96.00)	GROUNDWATER TABLE ELEVATION (m)
(95.50)*	DENOTES WELL SCREENED AT DEPTH
{95.31}	ELEVATION OF PRACTICAL AUGER REFUSAL
[94.71]	ELEVATION OF BEDROCK SURFACE (m)
TBM	TEMPORARY BENCHMARK - FIRE HYDRANT ON NORTH SIDE OF GEORGE STREET ELEVATION 100.00 m (ASSUMED)
	GROUNDWATER FLOW DIRECTION
95.0	GROUNDWATER ELEVATION CONTOUR

BASE PLAN PROVIDED BY STANTEC.

SCALE - 1:400

0 5 10 15 30m

paterson group
consulting engineers
154 Colonnade Road South, Ottawa, Ontario K2E 7J5

Scale:	1:400
Des.:	DJA
Dwn:	DJA
Chkd:	MSD

CLARIDGE HOMES

PHASE II ENVIRONMENTAL SITE ASSESSMENT
321 DALHOUSIE STREET, 110 YORK STREET, AND
137-141 GEORGE STREET
OTTAWA, ONTARIO

TEST HOLE LOCATION PLAN

Dwg. No. PE2709-1
Report No.: PE2709-REP.01R
Date: 12/2013

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