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Phase II - Environmental Site Assessment

Residential and Commercial Properties
93, 95, 97, 99, 103, and 105 Norman Street
Ottawa, Ontario

Prepared For

Taggart Investments

September 14, 2012

Report: PE2755-2

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1.0 EXECUTIVE SUMMARY

Assessment

A Phase II ESA was conducted for the properties at 93-105 Norman Street, Ottawa, Ontario. A subsurface investigation previously completed at the subject property identified metals concentrations exceeding Table 7 standards in the fill material at the subject site. Based on the location of these samples, the contaminated fill material is interpreted to extend across the eastern and central portions of the subject site. The current Phase II ESA, completed in order to comply with current MOE standards in support of the filing of a Record of Site Condition (RSC) at the subject site, involved the drilling of four (4) boreholes and the installation of three (3) monitoring wells to assess soil and groundwater quality.

Soil samples were obtained from the boreholes and were screened using visual observations and organic vapour measurements. Based on the screening results and the results of the previous Phase II ESA, three (3) samples were selected for analysis of BTEX, PHCs, and metals. Sample BH1-12-AU2 failed the MOE Table 7 soil standards for lead. The remaining soil samples were in compliance with selected MOE Table 7 soil standards.

Groundwater samples were obtained from four (4) of the boreholes at the subject site and analyzed for PHCs, metals, and VOCs. All analytical results were in compliance with selected MOE Table 7 standards. It is our opinion that the presence of chloroform in the initial sample taken at BH1-12 was due to the use of municipally treated water as core water during the drilling process. It is our opinion that the second sample (BH1-12-GW2) is the more representative sample from the well.

Recommendations

Based on the above results, soil exists at the subject property with metals concentrations which exceed the applicable MOE Table 7 soil standards. It is our understanding that the subject site is to be redeveloped as a multi-storey residential building with up to three levels of underground parking. It is our recommendation that an environmental site remediation program, involving the removal of all contaminated soil, be completed concurrently with site redevelopment.

As part of the redevelopment of the property, the existing site buildings will be demolished. Prior to the demolition of the buildings, a designated substance survey (DSS) will be required to be conducted in accordance with the Occupational Health and Safety Act.

2.0 INTRODUCTION

At the request of Taggart Investments (Taggart), Paterson Group (Paterson) conducted a Phase II Environmental Site Assessment of the residential and commercial properties at 93, 95, 97, 99, 103, and 105 Norman Street, in the City of Ottawa, Ontario. The purpose of this Phase II ESA was to address concerns identified in the Phase I ESA, including the presence an automotive garage (Frank's Auto Centre) and historical concerns identified on-site, as well as metals-contaminated fill identified by previous subsurface investigations at the site.

2.1 Site Description

Address:	93, 95, 97, 99, 103, and 105 Norman Street, Ottawa, Ontario.
Legal Description:	Lots 1503, 1504, 1505, 1506, and 1507 north of Norman Street, Plan 38, in the City of Ottawa, Ontario.
Property Identification Number:	04102-0107; 04102-0108; 04102-0109; 04102-0110; 04102-0111; 04102-0112.
Location:	The subject site consists of the properties on the north side of Norman Street, west of Preston Street and east of the O-Train railway cut. The subject site is shown on Figure 1 - Key Plan following the body of this report.
Latitude and Longitude:	45° 23' 59" N, 75° 42' 36" W.
Configuration:	Rectangular.
Site Area:	0.23 hectares (approximate).

2.2 Property Ownership

The subject property is currently owned by Taggart. Paterson's contact at Taggart is Ms. Michelle Taggart. Ms. Taggart can be reached by telephone at (613) 521-3000.

2.3 Current and Proposed Future Uses

The subject site is currently occupied by a commercial office building (97 Norman Street), a vacant automotive service garage (95 Norman Street), a residential dwelling and attached garage/shop (93 Norman Street), and residential dwellings (99, 103, and 105 Norman Street). Historical research indicates that the subject site was residential from its first developed use. The proposed future use of the site is residential condominiums. As such, the proposed property use represents a change to a more sensitive use.

2.4 Applicable Site Condition Standard

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

- Shallow bedrock
- Coarse-grained soil conditions
- Non-potable groundwater conditions
- Residential land use

3.0 BACKGROUND INFORMATION

3.1 Physical Setting

The subject site is currently occupied by residential dwellings (93, 99, 103, 105 Norman Street) and commercial buildings (93, 95, 97 Norman Street). The ground surface at the site consists of asphaltic concrete and grass. Site topography is generally flat, with a railway cut associated with the O-Train line located to the west of the subject site. Site drainage consists primarily of sheet flow to catch basins along Norman Street, with a small amount of infiltration present in grass areas. No areas of stained soil, vegetation, or pavement, or stressed vegetation were observed on-site. No wells or private sewage systems were observed on the subject property at the time of the site visit. No rail lines or loading areas were observed at the subject site. No unidentified substances were observed on-site.

No water bodies are present on the subject site. The nearest water body is Dow's Lake, on the Rideau Canal system, located approximately 400 m to the south of the site. No Areas of Natural or Scientific Interest (ANSIs) are present within 250 m of the subject site.

3.2 Past Investigations

The following reports were available for review:

- 'Phase I-II Environmental Site Assessment, 95, 97, and 99 Norman Street, Ottawa, Ontario', prepared by Paterson Group Inc., dated June 23, 2011.
- 'Phase I Environmental Site Assessment, 93, 95, 97, 99, 103, and 105 Norman Street, Ottawa, Ontario', prepared by Paterson Group Inc., dated September 7, 2012.

The 2011 Phase I-II ESA identified the presence of Frank's Auto Centre at 95 Norman Street as an Area of Potential Environmental Concern. Four (4) boreholes were drilled to address the potential environmental concerns. Fill was identified in the boreholes, and of three (3) soil samples submitted for laboratory analysis, all samples exceeded the Table 7 standards for lead. Soil samples were also analyzed for VOCs, and were in compliance with the Table 7 standards.

Groundwater monitoring wells were installed in two (2) of the boreholes at the subject site. Two (2) groundwater samples were analyzed for VOCs and PHCs. No detectable concentrations of any of the analyzed parameters were identified. All groundwater samples were in compliance with Table 7 standards.

The 2012 Phase I ESA generally confirmed the findings of the 2011 Phase I-II ESA. The historical presence of a machine shop at 93 Norman Street was identified as an Area of Potential Environmental Concern with respect to the subject properties. Conditions at the subject site were not observed to have changed substantially since the completion of the 2011 Phase I-II ESA, although the former automotive service garage at 95-97 Norman Street was no longer in use. The 2012 Phase I ESA was completed in general accordance with O.Reg. 269/11 amending O.Reg. 153/04. A Phase II ESA was recommended to be conducted concurrently with a geotechnical investigation at the site, in order to confirm that the groundwater and soil beneath the site had not been impacted by the property use. This Phase II ESA is intended to meet the requirements of O.Reg. 269/11 amending O.Reg. 153/04, in support of a potential future Record of Site Condition submission for the site.

4.0 SCOPE OF INVESTIGATION

4.1 Overview of Site Investigation

The subsurface investigation conducted as a component of this Phase II ESA consisted of the drilling of four (4) boreholes at the subject site. Boreholes were drilled to a maximum depth of 11.7 m below ground surface. Three (3) of the boreholes were cored into bedrock. Groundwater monitoring wells were installed in three (3) of the boreholes. Including the four (4) boreholes advanced during the 2011 Phase II ESA at the subject property, a total of eight (8) boreholes with five (5) monitoring wells are present on the subject site.

4.2 Media Investigated

During the subsurface investigation, soil samples and groundwater samples were obtained and submitted for laboratory analysis. The rationale for sampling and analyzing these media is based on the Contaminants of Potential Concern identified in the Phase I ESA. Contaminants of concern for soil are metals, PHCs, and VOCs. Metals and VOCs in soil were analyzed during the 2011 Phase II ESA; only PHCs in soil have been analyzed during the current Phase II ESA. Contaminants of concern for groundwater are metals, PHCs, and VOCs.

4.3 Phase I Conceptual Site Model

Geological and Hydrogeological Setting

A review of geological information from maps and previous subsurface investigations indicates that the Phase I property is located in an area of shallow overburden soils, with bedrock encountered between 1.5 and 1.8 m below existing ground surface. Based on the previous Phase II ESA, groundwater is present within the bedrock unit at depths between 1.4 and 1.7 m below ground surface. Based on topography, particularly the presence of the O-Train railway cut immediately to the west of the site, groundwater is interpreted to be moving to the west. Groundwater movement within the fractured upper bedrock will be confined to preferential fracture flowpaths.

Contaminants of Potential Concern

Based on the past and current uses of the subject site, the following Contaminants of Potential Concern (CPCs) have been identified:

- Petroleum Hydrocarbon Fractions 1 through 4 (PHCs F1-F4) – this suite of parameters encompasses gasoline (Fraction 1), diesel and fuel oil (Fraction 2), and heavy oils (Fractions 3 and 4). PHCs F1-F4 were selected as CPCs for the Phase I property based on the presence of Frank's Auto Centre at 95 Norman Street. Gasoline and diesel are commonly used motor vehicle fuels, and heavy oils may be present in the form of hydraulic fluids or lubricants. PHCs may be present in the soil matrix, sorbed to soil particles, as well as in free or dissolved phase in the groundwater system. PHCs are generally considered to be LNAPLs – light non-aqueous phase liquids, indicating that when present in sufficient concentrations above the solubility limit, they will partition into a separate phase above the water table, due to their lower density

- Volatile Organic Compounds (VOCs) – this suite of parameters includes Benzene, Toluene, Ethylbenzene, and Xylenes (BTEX), associated with gasoline, as well as chlorinated solvents (Tetrachloroethylene, Trichloroethylene, Dichloroethylenes, and Vinyl Chloride) associated with de-greasing and dry cleaning. These parameters were selected as CPCs for the Phase I study area due to the potential use of solvents at Frank's Auto Centre and General Grinding and Machine Works. VOCs may be present in the soil matrix as well as in the dissolved phase in the groundwater system.

- Metals – this suite of parameters encompasses various metals for which MOE standards exist. Metals may be present in the soil matrix or dissolved in site groundwater. Metals were selected as CPCs for the Phase I property based on the presence of fill material identified during the previous Phase I-II ESA by Paterson, and on the presence of General Grinding and Machine Works at 93 Norman Street.

The mechanisms of contaminant transport within the site soils include physical transportation and leaching. Physical transport is not anticipated to be an issue at the subject site, since soil disturbances and excavation were not noted and the site has been developed in its current configuration for a significant period of time. Leaching is anticipated to be limited by the low permeability of the asphalt pavement over most of the site. As such, contaminants identified in the soil are considered to have a low potential to migrate to the groundwater below the site.

The mechanisms of contaminant transport within the groundwater system include advection, dispersion, and diffusion. Advection and dispersion will be the dominant mechanism of contaminant transport in soils with higher hydraulic conductivities, such as sands, gravels, silts, and some glacial till soils, whereas diffusion will dominate in soils with lower hydraulic conductivity, such as clays. Groundwater flow and contaminant transport within bedrock will tend to follow preferential fracture flowpaths.

Existing Buildings and Structures

The following buildings and structures were observed on the subject properties:

- 93 Norman Street: One 2 ½ storey brick house with poured concrete foundation, one basement level, asphalt shingle roof, wood frame construction, currently heated with gas. One 1-storey cinder block garage, slab-on-grade, with poured concrete foundation, flat tar-and-gravel roof, steel-frame construction, currently heated with gas. Electric service to both buildings is above-ground.
- 95 Norman Street: One 1-storey concrete block automotive garage building, slab-on-grade, with poured concrete foundation, flat tar-and-gravel roof, steel-frame construction, currently heated with gas, with above-ground electric service.
- 97 Norman Street: One 1-storey stucco-sided commercial office building, slab-on-grade, with poured concrete foundation, flat tar-and-gravel roof, steel-frame construction, currently heated with gas, with above-ground electric service.
- 99 Norman Street: One 2 ½ storey brick house with poured concrete foundation, one basement level, asphalt shingle roof, wood frame construction, currently heated with gas, with above-ground electric service.
- 103 Norman Street: One 2 ½ storey stucco-sided house with poured concrete foundation, one basement level, asphalt shingle roof, wood frame construction, currently heated with gas, with above-ground electric service.
- 105 Norman street: One 2 storey vinyl-sided with poured concrete foundation, one basement level, asphalt shingle roof, wood frame construction, currently heated with gas, with above-ground electric service.

Water Bodies

There are no water bodies on the subject site or within the Phase I study area. The closest water body is Dow's Lake, on the Rideau Canal system, located approximately 400 m to the south of the site.

Areas of Natural Significance

No areas of natural significance were identified on the site or in the Phase I study area.

Drinking Water Wells

No drinking water wells are located at the subject site or within the Phase I study area.

Neighbouring Land Use

Neighbouring land use in the Phase I study area is currently primarily commercial and residential. Immediately adjacent properties have been listed as residential or commercial since their first developed use. Several former industrial properties and gas stations were identified within the Phase I study area; however, based on their separation distance from the subject site and/or inferred cross-gradient or downgradient locations, they are not considered to have the potential to have impacted the subject site.

Areas of Potential Contaminating Activities and Potential Environmental Concerns

Areas of Potential Contaminating Activities and Potential Environmental Concerns identified on the subject site include Frank's Auto Centre and General Grinding and Machine Works. These areas are considered to have the potential to have introduced contamination to the soil and/or groundwater under the subject site.

Assessment of Uncertainty and/or Absence of Information

The information available for review as part of the preparation of this Phase I ESA is considered to be sufficient to conclude that there are areas of potential environmental concern on the subject site which have the potential to have impacted the subject site. The presence of potentially contaminating activities was confirmed by a variety of independent sources, and as such, the conclusions of this report are not affected by uncertainty which may be present with respect to the individual sources.

4.4 Deviations from Sampling and Analysis Plan

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

4.5 Impediments

No physical impediments or denial of access were encountered during the Phase II Environmental Site Assessment.

5.0 INVESTIGATION METHOD

5.1 Subsurface Investigation

The subsurface investigation was conducted on August 29 and 30, 2012, and consisted of the placement of four (4) boreholes on-site. The boreholes were placed to provide general coverage and to address the Areas of Potential Environmental Concern identified in the Phase I Conceptual Site Model. The boreholes were advanced using a truck-mounted CME 55 power auger drill rig. The drilling contractor was George Downing Estate Drilling of Hawkesbury, Ontario. Drilling occurred under full-time supervision of Paterson personnel. Borehole locations are shown on Drawing No. PE2755-3 – Test Hole Location and Groundwater Contour Plan, appended to this report.

5.2 Soil Sampling

A total of 16 soil samples were obtained from the boreholes by means of split spoon sampling and the sampling of shallow soils directly from auger flights. Split spoon samples were taken at approximate 0.76 m intervals. The depths at which split spoon and auger flight samples were obtained from the boreholes are shown as "**SS**" and "**AU**" respectively on the Soil Profile and Test Data Sheets, appended to this report.

Upon refusal of the augers, selected boreholes were advanced into bedrock using a diamond coring system. Rock core samples were recovered, and are shown as "**RC**" on the Soil Profile and Test Data Sheets.

Site soils consist of fill over brown silty sand with some gravel and trace clay, underlain by limestone bedrock. The fill material varied in thickness between approximately 0.6 and 1.6 m, and generally consisted of dark brown silty sand with gravel, cobbles, and brick. Peat was observed in BH3-11 and BH4-11, varying in thickness between approximately 0.1 and 1.1 m. The silty sand material varied in thickness from 0.1 to 0.6 m. Depth to bedrock varied between 1.6 m and 2.0 m below existing grade.

5.3 Field Screening Measurements

All soil samples collected were submitted to a preliminary screening procedure, which included visual screening for colour and evidence of metals, as well as screening with a MiniRae photoionization detector (PID). The detection limit is 0.1 ppm, with a precision of +/- 0.1 ppm.

The soil vapours were measured by inserting the analyzer probe into the nominal headspace above the soil sample. Samples were then agitated and the peak readings recorded. The combustible vapour readings were found to range from 0 parts per million (ppm) to 10.2 ppm. Combustible vapour readings are noted on the Soil Profile and Test Data Sheets in Appendix 1.

Soil samples were selected for analysis based on visual appearance, location, vapour readings, and the location of previously analyzed samples.

5.4 Groundwater Monitoring Well Installation

Three (3) groundwater monitoring wells were installed during the drilling investigation by George Downing Estate Drilling of Hawkesbury, Ontario, under full-time supervision by Paterson personnel. The monitoring wells consisted of 32 mm (1¼") diameter Schedule 40 threaded PVC risers and screens. A sand pack consisting of silica sand was placed around the screen, and a bentonite seal was placed above the screen to minimize cross-contamination. Monitoring well construction details are provided on the Soil Profile and Test Data Sheets in Appendix 1. A summary of monitoring well construction details is provided below in Table 1.

The groundwater monitoring wells were developed upon completion using a dedicated inertial lift pump. A minimum of three (3) well volumes were removed from the wells.

Table 1: Monitoring Well Construction Details

Well ID	Ground Surface Elevation	Total Depth (m BGS)	Screened Interval (m BGS)	Sand Pack (m BGS)	Bentonite Seal (m BGS)	Casing Type
2011 Phase II ESA						
BH1-11		6.10	2.44 - 5.49	2.13 - 6.10	1.22 - 2.13	Flushmount
BH3-11		6.25	2.59 - 5.64	2.29 - 6.25	1.22 - 2.29	Flushmount
2012 Phase II ESA						
BH1-12		7.62	3.73 – 6.78	3.23 – 7.62	1.52 - 3.23	Flushmount
BH2-12		5.74	2.69 – 5.74	2.18 – 5.74	1.22 - 2.18	Flushmount
BH4-12		11.68	8.64 – 11.68	8.03 – 11.68	1.20 – 8.03	Flushmount

5.5 Field Measurement of Water Quality Parameters

Prior to sampling, water quality parameters were measured in the field using a multi-parameter analyzer. Parameters measured in the field included pH, temperature, electrical conductivity, and total dissolved solids. Field parameters were measured after each well volume purged. Wells were purged prior to sampling until at least three well volumes had been removed or the field parameters were relatively stable. Stabilized field parameter values are summarized below in Table 2.

Table 2: Field Measurement of Water Quality Parameters, September 5, 2012

Parameter	BH1-11	BH3-11	BH1-12	BH2-12
Temperature (°C)	16.4	17.7	16.5	18.0
pH	8.41	7.91	8.73	8.59
Electrical Conductivity (µS/cm)	879	723	562	801
Total Dissolved Solids (ppm)	656	481	384	551

5.6 Groundwater Sampling

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. Groundwater samples were obtained from each monitoring well, using dedicated sampling equipment. Standing water was purged from each well prior to sampling. Samples were stored in coolers to reduce analyte volatilization during transportation. Details of our standard operating procedure for groundwater sampling are provided in the Sampling and Analysis Plan in Appendix 1.

5.7 Analytical Testing

Based on the guidelines outlined in the Sampling and Analysis Plan appended to this report, and on the sampling previously conducted during the 2011 Phase II ESA, the following groundwater and soil samples were submitted for analysis:

Table 3: Soil Samples Submitted

Sample ID	Sample Depth/ Stratigraphic Unit	Parameters Analyzed					Rationale
		PHCs F_1-F_4	BTEX	PAHs	VOCs	Metals	
BH1-AU2	0.30 - 0.61 m; fill	X	X			X	Determine eastern extent of metals contamination and determine presence of PHCs
BH3-SS4	1.52 - 1.73 m; silty sand	X	X				Determine the presence of PHCs in the vicinity of the garage.
BH4-AU2	0.30 - 0.61 m; fill	X	X			X	Determine western extent of metals contamination and determine presence of PHCs

Table 4: Groundwater Samples Submitted

Sample ID	Screened Interval/ Stratigraphic Unit	Parameters Analyzed				Rationale
		PHCs F_1-F_4	PAHs	VOCs	Metals	
BH1-11-GW1	2.13 - 6.10	X		X	X	General assessment of groundwater quality in support of RSC application. CoCs selected based on AoPECs previously identified.
BH3-11-GW1	2.29 - 6.25	X		X	X	
BH1-12-GW1	3.73 – 6.78	X		X	X	
BH2-12-GW1	2.69 – 5.74	X		X	X	
BH1-12-GW2	3.73 – 6.78			X		Test for chloroform following additional purging.

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

5.8 Residue Management

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

5.9 Elevation Surveying

Monitoring well locations were surveyed using a laser level. Elevations were surveyed relative to the top spindle of a fire hydrant on the south side of Norman Street. An elevation of 100.00 m was assumed. The location of the site temporary benchmark is shown on Drawing PE2755-3 – Test Hole Location Plan and Groundwater Contour Map.

5.10 Quality Assurance and Quality Control Measures

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

6.0 REVIEW AND EVALUATION

6.1 Geology

Site geology details are provided in the Soil Profile and Test Data Sheets provided in Appendix 1. Site soils consisted of fill over silty sand with some gravel and trace clay, underlain by limestone bedrock. The fill material varied in thickness between approximately 0.6 and 1.6 m, and generally consisted of dark brown silty sand with gravel, cobbles, and brick. The silty sand material varied in thickness from 0.1 to 0.6 m. Depth to bedrock varied between 1.6 m and 2.0 m below existing grade. The bedrock material consisted of grey limestone. Rock quality designation (RQD) was generally fair to excellent. Groundwater was not encountered within overburden soils. All monitoring wells were screened within the bedrock unit.

6.2 Groundwater Elevations, Flow Direction, and Hydraulic Gradient

Groundwater levels were measured during the groundwater sampling events, using an electronic water level meter. Groundwater levels are summarized below in Tables 5 and 6. All measurements are relative to assumed elevation of site temporary benchmark.

Table 5: Groundwater Level Measurements - Upper Bedrock Unit

Borehole Location	Ground Surface Elevation (m)	Water Level Depth (m below grade)	Water Level Elevation (m ASL)	Date of Measurement
BH1-11	99.07	1.86	97.21	September 5, 2012
BH3-11	99.11	1.80	97.31	September 5, 2012
BH1-12	99.15	2.05	97.10	September 5, 2012
BH2-12	98.98	1.84	97.14	September 5, 2012

These measurements represent the water levels in the fractured upper bedrock unit. Seasonal variations in groundwater levels may occur.

Table 6: Groundwater Level Measurements - Lower Bedrock Unit

Borehole Location	Ground Surface Elevation (m)	Water Level Depth (m below grade)	Water Level Elevation (m ASL)	Date of Measurement
BH4-12	99.32	2.53	96.79	September 5, 2012

These measurements represent the water levels in the lower bedrock unit at the approximate footing depth of the proposed site redevelopment. Seasonal variations in groundwater levels may occur.

Based on the above water level measurements, a downward vertical hydraulic gradient is inferred to be present between the upper and lower bedrock units. The magnitude of this vertical hydraulic gradient was not determined as a part of this assessment.

Based on the groundwater elevations from the September 2012 monitoring event, groundwater contour mapping was completed for the shallow bedrock aquifer. Groundwater contours are shown on Drawing PE2755-3 - Test Hole Location and Groundwater Contour Plan. Based on the contour mapping, groundwater flow at the subject site appears to be in a southwesterly direction. A horizontal hydraulic gradient of approximately 0.008 m/m was calculated.

No free product was observed in the monitoring wells at the subject site.

6.3 Fine-Medium Soil Texture

Based on the composition of the fill and silty sand materials, fine to medium textured soil standards are not applicable to this site, and coarse textured soil standards will be used. Samples were not submitted for grain-size analysis as a part of this assessment.

6.4 Soil: Field Screening

Field screening of the soil samples collected during drilling resulted in organic vapour readings of 0 ppm to 10.2 ppm. Field screening results of each individual soil sample are provided on the Soil Profile and Test Data Sheets appended to this report.

The organic vapour readings obtained from field screening of soil samples indicates that there is low potential for VOC, PHC F1, or PHC F2 hydrocarbon contamination. However, the soil samples from the fill unit were visually consistent with the samples which failed the Table 7 standards for metals in the 2011 Phase II ESA. Based on visual observations, previous results, and borehole locations, it was determined that the vast majority of fill at the subject site is impacted with metals, and that further analytical testing was unlikely to identify an amount of clean material which could be practically segregated. As such, no further metals testing of soil samples was completed.

Despite screening readings indicating low potential for PHC contamination, one soil sample was submitted for analysis of BTEX and PHCs based on its proximity to the garage and the fact that PHCs were not analyzed during the 2011 Phase II ESA.

6.5 Soil Quality

Three (3) soil samples were submitted for analysis of BTEX and PHCs. The results of the analytical testing are presented below in Table 7. The laboratory certificates of analysis are provided in Appendix 1.

Table 7:
Analytical Test Results – Soil
BTEX/PHCs

Parameter	MDL (µg/g)	Soil Sample (µg/g) August 29 and 30, 2012			Table 7 Residential Coarse
		BH1-12-AU2	BH3-12-SS4	BH4-12-AU2	
Benzene	0.02	0.10	nd	0.09	0.17
Ethylbenzene	0.05	nd	nd	nd	2
Toluene	0.05	nd	nd	nd	2.3
Xylenes	0.05	nd	nd	nd	3.1
PHCs F1	7	nd	nd	nd	55
PHCs F2	4	nd	nd	nd	98
PHCs F3	8	24	nd	nd	300
PHCs F4	6	nd	nd	nd	2,800

Notes:
- MDL – Method Detection Limit
- Nd – not detected above the MDL
- **Bold** – Value exceeds selected MOE Standard

All BTEX and PHC concentrations in the analyzed samples were below laboratory detection limits and, as such, in compliance with the selected MOE standards.

Table 8:
Analytical Test Results – Soil - 2011 Phase II ESA
Metals

Parameter	MDL (µg/L)	Soil Samples (µg/g) August 29 and 30, 2012		Table 7 Residential Coarse
		BH1-12-AU2	BH4-12-AU2	
Antimony	1	1	nd	7.5
Arsenic	1	5	2	18
Barium	10	185	38	390
Beryllium	0.5	nd	nd	4
Boron	5.0	8.6	nd	120
Cadmium	0.5	nd	nd	1.2
Chromium	5	22	8	160
Cobalt	1	7	3	22
Copper	5	39	11	140
Lead	1	**250**	8	120
Molybdenum	1	1	nd	6.9
Nickel	5	18	5	100
Selenium	1	nd	nd	2.4
Silver	0.3	nd	nd	20
Thallium	1	nd	nd	1
Uranium	1	nd	nd	23
Vanadium	10	32	15	86
Zinc	20	121	nd	340

Notes:
- MDL – Method Detection Limit
- Nd – not detected above the MDL
- N/V – no value provided by the MOE
- **Bold** – Value exceeds selected MOE Standard

Lead concentrations exceed Table 7 standards in Sample BH1-12-AU2. All other results are in compliance with Table 7 standards.

The analytical results for metals in the fill material from the 2011 Phase II ESA are provided below. The fill material was also analyzed for VOCs during the 2011 Phase II ESA; however, all VOC concentrations were below laboratory detection limits, and therefore comply with the MOE Table 7 standards.

Table 9:
Analytical Test Results – Soil - 2011 Phase II ESA
Metals

Parameter	MDL (µg/L)	Soil Samples (µg/g) May 31, 2011			Table 7 Residential Coarse
		BH1-AU1	BH2-AU2	BH3-SS2	
Antimony	1	2	6	**213**	7.5
Arsenic	1	nd	7	9	18
Barium	10	190	383	268	390
Beryllium	0.5	nd	0.8	nd	4
Boron	0.5	11.4	9.7	4.3	120
Cadmium	0.5	0.8	0.9	nd	1.2
Chromium	5	2.4	29	13	160
Cobalt	1	6	11	5	22
Copper	5	45	65	81	140
Lead	1	**206**	**701**	**2480**	120
Molybdenum	1	1	3	**7**	6.9
Nickel	5	23	27	14	100
Selenium	1	1	2	1	2.4
Silver	0.3	nd	0.4	nd	20
Thallium	1	nd	nd	nd	1
Uranium	1	nd	2	-	23
Vanadium	10	18	43	21	86
Zinc	20	156	294	198	340

Notes:
- MDL – Method Detection Limit
- Nd – not detected above the MDL
- N/V – no value provided by the MOE
- **Bold** – Value exceeds selected MOE Standard

Lead concentrations exceed Table 7 standards at all sample locations. Antimony and molybdenum concentrations also exceed Table 7 standards at BH3. All other results are in compliance with Table 7 standards.

Based on the above analytical results, the analytical results of the previous Phase II ESA, and visual and organic vapour screening of the soil samples collected during the subsurface investigation, the approximate horizontal and vertical limits of the contaminated soil on the subject site have been defined. These limits are shown on Drawing No. PE2577-3 – Test Hole Location and Groundwater Contour Plan, and on Drawing No. PE2755-4 – Cross-Section A-A'.

Based on the analytical results, no contaminants were identified as being by-products of chemical or biological transformations which have or may have occurred.

The maximum concentrations of analyzed parameters in the soil at the site are summarized below in Table 10. This table combines results from the current (2012) and 2011 Phase II ESA reports.

Table 10: Maximum Concentrations – Soil

Parameter	Maximum Concentration (µg/g)	Borehole	Depth Interval (m BGS)
Antimony	**213**	BH3-11	0.76 - 1.37
Arsenic	9	BH3-11	0.76 - 1.37
Barium	383	BH2-11	0.30 - 0.60
Beryllium	0.8	BH2-11	0.30 - 0.60
Boron	11.4	BH1-11	0.15 - 0.25
Cadmium	0.9	BH2-11	0.30 - 0.60
Chromium	29	BH2-11	0.30 - 0.60
Cobalt	11	BH2-11	0.30 - 0.60
Copper	81	BH3-11	0.76 - 1.37
Lead	**2480**	BH3-11	0.76 - 1.37
Mercury	0.2	BH3-11	0.76 - 1.37
Molybdenum	**7**	BH3-11	0.76 - 1.37
Nickel	27	BH2-11	0.30 - 0.60
Selenium	2	BH2-11	0.30 - 0.60
Silver	0.4	BH2-11	0.30 - 0.60
Uranium	2	BH2-11	0.30 - 0.60
Vanadium	43	BH2-11	0.30 - 0.60
Zinc	294	BH2-11	0.30 - 0.60

Notes:
- **Bold** – Value exceeds applicable MOE Standard

All other parameter concentrations were below laboratory detection limits.

6.6 Groundwater Quality

Groundwater samples from the monitoring wells at BH1-11, BH3-11, BH1-12, and BH2-12 were submitted for laboratory analysis of PHCs, VOCs, and metals. The groundwater samples were obtained from the screened intervals noted on Table 1, above. The results of the analytical testing are presented below in Tables 11 through 13. The laboratory certificates of analysis are provided in Appendix 1.

During the first sampling event of 2012, chloroform was detected in BH1-12 at concentrations exceeding Table 7 standards. It is our interpretation that the presence of chloroform is due to the municipal water used to core bedrock for well installation. As a result, the well was purged and re-sampled.

Table 11:
Analytical Test Results – Groundwater
PHCs

Parameter	MDL (µg/L)	Groundwater Samples (µg/L) September 5, 2012					Table 7 Residential Coarse
		BH1-11-GW2	BH3-11-GW2	BH3-11-DUP	BH1-12-GW1	BH2-12-GW1	
PHCs F1	25	nd	nd	nd	34	nd	420
PHCs F2	100	nd	nd	nd	nd	nd	150
PHCs F3	100	nd	nd	nd	nd	nd	500
PHCs F4	100	nd	nd	nd	nd	nd	500

Notes:
- MDL – Method Detection Limit
- Nd – not detected above the MDL
- N/V – no value provided by the MOE
- **Bold** – Value exceeds selected MOE Standard

Table 12:
Analytical Test Results – Groundwater
Metals

Parameter	MDL (µg/L)	Groundwater Samples (µg/L) September 5, 2012					Table 7 Residential Coarse
		BH1-11-GW2	BH3-11-GW2	BH3-11-DUP	BH1-12-GW1	BH2-12-GW1	
Antimony	0.5	4.5	1.9	1.7	1.2	0.6	16,000
Arsenic	1	7	3	2	2	2	1,500
Barium	1	160	322	315	254	193	23,000
Beryllium	0.5	nd	nd	nd	nd	nd	53
Boron	10	107	91	91	101	79	36,000
Cadmium	0.1	nd	nd	nd	nd	nd	2.1
Chromium	1	4	3	3	2	4	640
Chromium (VI)	10	-	-	-	-	-	110
Cobalt	0.5	1.4	nd	2.3	6.1	3.9	52
Copper	0.5	0.6	nd	nd	1.6	1.1	69
Lead	0.1	nd	nd	nd	nd	nd	20
Mercury	0.1	-	-	-	-	-	0.1
Molybdenum	0.5	6.1	11.6	10.4	337	10.6	7,300
Nickel	1	8	2	2	4	6	390
Selenium	1	nd	2	2	2	1	50
Silver	0.1	nd	nd	nd	nd	nd	1.2
Sodium	200	13,000	30,000	30,100	118,000	41,500	NV
Thallium	0.1	nd	nd	nd	nd	nd	400
Uranium	0.1	3.8	0.4	0.4	4.9	4.4	330
Vanadium	0.5	14.9	14.6	14.3	4.7	16.9	200
Zinc	5	5	7	nd	6	9	890

Notes:
- MDL – Method Detection Limit
- Nd – not detected above the MDL
- **Bold** – Value exceeds selected MOE Standard

Table 13:
Analytical Test Results – Groundwater
VOCs

Parameter	MDL (µg/L)	Groundwater Sample (µg/L) September 5, 2012			Table 7 Residential Coarse
		BH1-11-GW2	BH3-11-GW2	BH3-11-DUP	
Acetone	5.0	nd	nd	nd	100,000
Benzene	0.5	nd	nd	nd	0.5
Bromodichloromethane	0.5	nd	nd	nd	67,000
Bromoform	0.5	nd	nd	nd	5
Bromomethane	0.5	nd	nd	nd	0.89
Carbon Tetrachloride	0.2	nd	nd	nd	0.2
Chlorobenzene	0.5	nd	nd	nd	140
Chloroform	0.5	nd	nd	nd	2
Dibromochloromethane	0.5	nd	nd	nd	65,000
Dichlorodifluoromethane	1.0	nd	nd	nd	3,500
1,2-Dichlorobenzene	0.5	nd	nd	nd	150
1,3-Dichlorobenzene	0.5	nd	nd	nd	7,600
1,4-Dichlorobenzene	0.5	nd	nd	nd	0.5
1,1-Dichloroethane	0.5	nd	nd	nd	11
1,2-Dichloroethane	0.5	nd	nd	nd	0.5
1,1-Dichloroethylene	0.5	nd	nd	nd	0.5
cis-1,2-Dichloroethylene	0.5	nd	nd	nd	1.6
trans-1,2-Dichloroethylene	0.5	nd	nd	nd	1.6
1,2-Dichloropropane	0.5	nd	nd	nd	0.58
1,3-Dichloropropene	0.5	nd	nd	nd	0.5
Ethylbenzene	0.5	nd	nd	nd	54
Hexane	1.0	nd	nd	nd	5
Methyl Ethyl Ketone	5.0	nd	nd	nd	21,000
Methyl Isobutyl Ketone	5.0	nd	nd	nd	5,200
Methyl tert-butyl Ether	2.0	nd	nd	nd	15
Methylene Chloride	5.0	nd	nd	nd	26
Styrene	0.5	nd	nd	nd	43
1,1,1,2-Tetrachloroethane	0.5	nd	nd	nd	1.1
1,1,2,2-Tetrachloroethane	0.5	nd	nd	nd	0.5
Tetrachloroethylene	0.5	nd	nd	nd	0.5
Toluene	0.5	nd	nd	nd	320
1,1,1-Trichloroethane	0.5	nd	nd	nd	23
1,1,2-Trichloroethane	0.5	nd	nd	nd	0.5
Trichloroethylene	0.5	nd	nd	nd	0.5
Trichlorofluoromethane	1.0	nd	nd	nd	2,000
Vinyl Chloride	0.5	nd	nd	nd	0.5
Xylenes	0.5	nd	nd	nd	72

Notes:
- MDL – Method Detection Limit
- Nd – not detected above the MDL
- N/V – no value provided by the MOE
- **Bold** – Value exceeds applicable MOE Standard

Table 13 Continued:
Analytical Test Results – Groundwater
VOCs

Parameter	MDL (µg/L)	Groundwater Sample (µg/L) September 5 and 12, 2012				Table 7 Residential Coarse
		BH1-12-GW1	BH1-12-GW2	BH2-12-GW1	Trip Blank	
Acetone	5.0	nd	nd	nd	nd	100,000
Benzene	0.5	nd	nd	nd	nd	0.5
Bromodichloromethane	0.5	0.8	nd	nd	nd	67,000
Bromoform	0.5	nd	nd	nd	nd	5
Bromomethane	0.5	nd	nd	nd	nd	0.89
Carbon Tetrachloride	0.2	nd	nd	nd	nd	0.2
Chlorobenzene	0.5	nd	nd	nd	nd	140
Chloroform	0.5	**8.8**	1.5	nd	nd	2
Dibromochloromethane	0.5	nd	nd	nd	nd	65,000
Dichlorodifluoromethane	1.0	nd	nd	nd	nd	3,500
1,2-Dichlorobenzene	0.5	nd	nd	nd	nd	150
1,3-Dichlorobenzene	0.5	nd	nd	nd	nd	7,600
1,4-Dichlorobenzene	0.5	nd	nd	nd	nd	0.5
1,1-Dichloroethane	0.5	nd	nd	nd	nd	11
1,2-Dichloroethane	0.5	nd	nd	nd	nd	0.5
1,1-Dichloroethylene	0.5	nd	nd	nd	nd	0.5
cis-1,2-Dichloroethylene	0.5	nd	nd	nd	nd	1.6
trans-1,2-Dichloroethylene	0.5	nd	nd	nd	nd	1.6
1,2-Dichloropropane	0.5	nd	nd	nd	nd	0.58
1,3-Dichloropropene	0.5	nd	nd	nd	nd	0.5
Ethylbenzene	0.5	2.2	nd	nd	nd	54
Hexane	1.0	3.1	nd	nd	nd	5
Methyl Ethyl Ketone	5.0	nd	nd	nd	nd	21,000
Methyl Isobutyl Ketone	5.0	nd	nd	nd	nd	5,200
Methyl tert-butyl Ether	2.0	nd	nd	nd	nd	15
Methylene Chloride	5.0	nd	nd	nd	nd	26
Styrene	0.5	0.6	nd	nd	nd	43
1,1,1,2-Tetrachloroethane	0.5	nd	nd	nd	nd	1.1
1,1,2,2-Tetrachloroethane	0.5	nd	nd	nd	nd	0.5
Tetrachloroethylene	0.5	nd	nd	nd	nd	0.5
Toluene	0.5	6.3	nd	nd	nd	320
1,1,1-Trichloroethane	0.5	nd	nd	nd	nd	23
1,1,2-Trichloroethane	0.5	nd	nd	nd	nd	0.5
Trichloroethylene	0.5	nd	nd	nd	nd	0.5
Trichlorofluoromethane	1.0	nd	nd	nd	nd	2,000
Vinyl Chloride	0.5	nd	nd	nd	nd	0.5
Xylenes	0.5	28.3	nd	nd	nd	72

Notes:
- MDL – Method Detection Limit
- Nd – not detected above the MDL
- N/V – no value provided by the MOE
- **Bold** – Value exceeds applicable MOE Standard

All final analytical results for groundwater were in compliance with selected MOE Table 7 standards. It is our opinion that the presence of chloroform in the initial sample at BH1-12 is due to the use of municipally treated water as core water during the drilling process. After purging additional water from BH1-12 and re-testing the groundwater, the chloroform concentration meets Table 7 standards. Furthermore, no other parameter concentrations were detected in the second water sample from BH1, which is considered to be the more representative water sample from this well.

The duplicate sample for BH3-11-GW2 appears as "GW1-Dup" on the laboratory certificate of analysis.

The analytical results for PHCs and VOCs in the groundwater from the 2011 Phase II ESA are provided below.

Table 14:
Analytical Test Results – Groundwater - 2011 Phase II ESA
PHCs

Parameter	MDL (µg/L)	Groundwater Samples (µg/L) June 6, 2011		Table 7 Residential Coarse
		BH1-11-GW1	BH3-11-GW1	
PHCs F1	25	nd	nd	420
PHCs F2	100	nd	nd	150
PHCs F3	100	nd	nd	500
PHCs F4	100	nd	nd	500

Notes:
- MDL – Method Detection Limit
- Nd – not detected above the MDL
- N/V – no value provided by the MOE
- **Bold** – Value exceeds selected MOE Standard

Table 15:
Analytical Test Results – Groundwater - 2011 Phase II ESA
VOCs

Parameter	MDL (µg/L)	Groundwater Sample (µg/L) June 6, 2011		Table 7 Residential Coarse
		BH1-11-GW1	BH3-11-GW1	
Acetone	5.0	nd	nd	100,000
Benzene	0.5	nd	nd	0.5
Bromodichloromethane	0.5	nd	nd	67,000
Bromoform	0.5	nd	nd	5
Bromomethane	0.5	nd	nd	0.89
Carbon Tetrachloride	0.2	nd	nd	0.2
Chlorobenzene	0.5	nd	nd	140
Chloroform	0.5	nd	nd	2
Dibromochloromethane	0.5	nd	nd	65,000
Dichlorodifluoromethane	1.0	nd	nd	3,500
1,2-Dichlorobenzene	0.5	nd	nd	150
1,3-Dichlorobenzene	0.5	nd	nd	7,600
1,4-Dichlorobenzene	0.5	nd	nd	0.5
1,1-Dichloroethane	0.5	nd	nd	11
1,2-Dichloroethane	0.5	nd	nd	0.5
1,1-Dichloroethylene	0.5	nd	nd	0.5
cis-1,2-Dichloroethylene	0.5	nd	nd	1.6
trans-1,2-Dichloroethylene	0.5	nd	nd	1.6
1,2-Dichloropropane	0.5	nd	nd	0.58
1,3-Dichloropropene	0.5	nd	nd	0.5
Ethylbenzene	0.5	nd	nd	54
Hexane	1.0	nd	nd	5
Methyl Ethyl Ketone	5.0	nd	nd	21,000
Methyl Isobutyl Ketone	5.0	nd	nd	5,200
Methyl tert-butyl Ether	2.0	nd	nd	15
Methylene Chloride	5.0	nd	nd	26
Styrene	0.5	nd	nd	43
1,1,1,2-Tetrachloroethane	0.5	nd	nd	1.1
1,1,2,2-Tetrachloroethane	0.5	nd	nd	0.5
Tetrachloroethylene	0.5	nd	nd	0.5
Toluene	0.5	nd	nd	320
1,1,1-Trichloroethane	0.5	nd	nd	23
1,1,2-Trichloroethane	0.5	nd	nd	0.5
Trichloroethylene	0.5	nd	nd	0.5
Trichlorofluoromethane	1.0	nd	nd	2,000
Vinyl Chloride	0.5	nd	nd	0.5
Xylenes	0.5	nd	nd	72

Notes:
- MDL – Method Detection Limit
- Nd – not detected above the MDL
- N/V – no value provided by the MOE
- **Bold** – Value exceeds applicable MOE Standard

All 2011 analytical results for groundwater were below laboratory detection limits for all parameters analyzed, and therefore in compliance with MOE Table 7 standards

The maximum final concentrations of all parameters analyzed in groundwater are summarized below.

Table 16: Maximum Concentrations – Groundwater

Parameter	Maximum Concentration (µg/L)	Borehole	Depth Interval (m BGS)
Antimony	4.5	BH1-11	2.13 - 6.10
Arsenic	7	BH1-11	2.13 - 6.10
Barium	322	BH3-11	2.29 - 6.25
Boron	107	BH1-11	2.13 - 6.10
Chromium	4	BH1-11; BH2-12	2.13 - 6.10; 2.18 – 5.74
Cobalt	6.1	BH1-12	3.23 – 7.62
Copper	1.6	BH1-12	3.23 – 7.62
Molybdenum	337	BH1-12	3.23 – 7.62
Nickel	8	BH1-11	2.13 - 6.10
Selenium	2	BH3-11; BH1-12	2.29 - 6.25; 3.23 – 7.62
Sodium	18,000	BH1-12	3.23 – 7.62
Uranium	4.9	BH1-12	3.23 – 7.62
Vanadium	16.9	BH2-12	2.18 – 5.74
Zinc	9	BH2-12	2.18 – 5.74
Bromodichloromethane	0.8	BH1-12	3.23 – 7.62
Chloroform	1.5	BH1-12	3.23 – 7.62
Ethylbenzene	2.2	BH1-12	3.23 – 7.62
Hexane	3.1	BH1-12	3.23 – 7.62
Styrene	0.6	BH1-12	3.23 – 7.62
Toluene	6.3	BH1-12	3.23 – 7.62
Xylenes	28.3	BH1-12	3.23 – 7.62
PHCs F1	34	BH1-12	3.23 – 7.62

The concentrations of all other parameters were below laboratory detection limits.

It is our interpretation that the analyzed parameter concentrations do not indicate the presence of dense non-aqueous phase liquids (DNAPLs) or light non-aqueous phase liquids (LNAPLs).

6.7 Quality Assurance and Quality Control Results

As per the Sampling and Analysis Plan, a duplicate groundwater sample was obtained at BH3-11 during the sampling event and analyzed for metals, PHCs, and VOCs. The RPD calculations for the original and duplicate sample are provided below in Table 17.

Table 17: QA/QC Calculations – Groundwater – Second Sampling Event

Parameter	MDL (µg/L)	BH3-11-GW1	GW1-DUP	RPD (%)	QA/QC Result
Antimony	0.5	1.9	1.7	11.1	Acceptable
Arsenic	1	3	2	40	Deficient
Barium	1	322	315	2.2	Acceptable
Boron	10	91	91	0	Acceptable
Chromium	1	3	3	0	Acceptable
Cobalt	0.5	nd	2.3	128.6	Deficient
Molybdenum	0.5	11.6	10.4	10.9	Acceptable
Nickel	1	2	2	0	Acceptable
Selenium	1	2	2	0	Acceptable
Sodium	200	30,000	30,100	0.3	Acceptable
Uranium	0.1	0.4	0.4	0	Acceptable
Vanadium	0.5	14.6	14.3	2.1	Acceptable
Zinc	5	7	nd	33.3	Deficient

Notes:

* All other parameter concentrations were below laboratory detection limits for both BH3-11-GW1 and GW1-DUP, and as such, are within acceptable QA/QC parameters.

** Where one parameter concentration is below the laboratory detection limit, the value of the detection limit is used for RPD calculations.

The majority of calculated RPD values were within 20%, and as such, are considered acceptable. The acceptable range was exceeded for three parameters (arsenic, cobalt, and zinc). However, the concentrations of arsenic, cobalt, and zinc are well below the selected MOE standards. As such, the conclusions of the report are not considered to be affected.

All samples submitted as part of this Phase II ESA were handled in accordance with the Analytical Protocol with respect to holding time, preservation method, storage requirement, and container type.

As per Subsection 47(3) of O.Reg. 153/04 as amended by O.Reg. 269/11, a Certificate of Analysis has been received for each sample submitted for analysis, and all Certificates of Analysis are appended to this report. It is noted that Sample BH1-12-AU2 exceeded its hold time for BTEX and PHCs when submitted. This does not change the conclusions of this report.

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

6.9 Phase II Conceptual Site Model

The following section has been prepared in accordance with the requirements of O.Reg. 269/11 amending O.Reg. 153/04 - Record of Site Condition regulation, made under the Environmental Protection Act. Conclusions and recommendations are discussed in a subsequent section.

Site Description

Areas of Potentially Contaminating Activity

Based on the results of the Phase I ESA and Phase II ESA completed for the subject site, the properties at 95 and 93 Norman Street are considered to be Areas of Potentially Contaminating Activity. The historical presence of an automotive garage at 95 Norman Street constitutes Item 68, Column A, Table 2, O.Reg. 153/04 as amended by O.Reg. 269/11 - "Automotive Repair or Maintenance". The historical presence of General Grinding and Machine Works at 93 Norman Street constitutes Item 44, Column A, Table 2, O.Reg. 153/04 as amended by O.Reg. 269/11 - "Machine Operation and Maintenance, Metal Fabrication". The rationale for identifying these Areas of Potential Contaminating Activity is based on city directories, aerial photographs, field observations, and personal interviews.

Areas of Potential Environmental Concern

Based on the results of the Phase I ESA and the Phase II ESA completed for the subject site, as well as the results of the 2011 Phase II ESA, part of the subject site (as shown on Drawings PE2755-3 and PE2755-4) represents an Area of Potential Environmental Concern. A layer of metals-contaminated fill was identified, with lead concentrations in excess of MOE standards in the eastern and central portions of the site. Metals are identified as the Contaminants of Concern with respect to the subject site.

Subsurface Structures and Utilities

Water, sewer, and gas utilities are present between the site buildings and Norman Street. The locations of the aforementioned utilities are shown on Drawing PE2755-3. The subsurface utilities are not considered to have had the potential to affect contaminant distribution and transport at the subject site.

Physical Setting

Site Stratigraphy

The site stratigraphy, from ground surface to the deepest aquifer or aquitard investigated, is illustrated on Drawing PE2755-4 - Cross-Section A-A'. Stratigraphy consists of:

- Fill, consisting of brown silty sand with trace silt, clay, gravel, cobbles, and brick, varying in thickness from 0.3 to 1.6 m. Groundwater was not observed in this stratigraphic unit.
- An intermittent layer of topsoil and peat was observed in BH1-11 and BH4-11. This layer varied in thickness from 1.0 to 1.1 m. Groundwater was not observed in this stratigraphic unit.
- Brown silty sand with some gravel, cobbles, boulders, and trace clay, varying in thickness from 0.3 to 0.9 m. At BH1-11 and BH3-11, static groundwater elevations are within this unit.
- Grey limestone bedrock. The upper bedrock is fractured, becoming more competent with depth. Groundwater was observed within the limestone unit. Four (4) wells were screened in the upper limestone unit, at depths of approximately 2.4 to 6.8 m, and one (1) was screened in the lower limestone unit, at depths of approximately 8.6 to 11.7 m. This unit is considered to be an aquifer. This is the deepest unit investigated.

Hydrogeological Characteristics

The overburden stratigraphic units described in the previous section are all generally above the water table, with the exception of BH1-11 and BH3-11. These monitoring well locations are screened in the bedrock unit; however, water level measurements at BH1-11 and BH3-11 put the static water level at the approximate interface of the limestone and silty sand units, although these wells were screened in the limestone unit only. The upper fractured limestone unit is interpreted to function as a local unconfined aquifer at the subject site.

Water levels were measured at the subject site on September 5, 2012. Water levels are summarized above in Section 6.2 of this report and are shown on Drawing PE2755-4.

Based on the groundwater elevations from the September 5, 2012 monitoring event, groundwater contour mapping was completed and the horizontal hydraulic gradient for the subject site was calculated. Groundwater flow at the subject site was in a southerly/southwesterly direction, towards the rail cut. A hydraulic gradient of approximately 0.008 m/m was calculated.

Approximate Depth to Bedrock

Depth to bedrock at the subject site varies between 1.5 and 2.2 m below existing grade.

Approximate Depth to Water Table

Depth to water table at the subject site varies between approximately 1.8 and 2.1 m below existing grade.

Sections 41 and 43.1 of the Regulation

Section 41 of the Regulation (Site Condition Standards, Environmentally Sensitive Areas) does not apply to the subject site.

Section 43.1 of the Regulation applies to the subject site in that the subject site is a Shallow Soil Property. As per the Regulation, generic site condition standards (not stratified site condition standards) have been used. The subject site is not within 30 m of a water body.

Fill Placement

A layer of fill is present on-site as the uppermost layer of overburden soil. Based on city directories and aerial photo research, and on the presence of peat and topsoil below the fill layer in BH1-11 and BH4-11, this fill material was likely placed at the time of the initial development of the subject site. Visual screening and analytical testing indicate that this fill material is contaminated with metals exceeding Table 7 standards.

Proposed Buildings and Other Structures

It is our understanding that a high-rise residential development with up to three (3) storeys of underground parking is proposed for the subject site. No further information is available at this time.

Existing Buildings and Structures

The following buildings and structures were observed on the subject properties:

- 93 Norman Street: One 2 ½ storey brick house with a poured concrete, concrete block, and stone and mortar foundation, one basement level, asphalt shingle roof, wood frame construction, currently heated with gas. One 1-storey cinder block garage, slab-on-grade, with poured concrete foundation, flat tar-and-gravel roof, steel-frame construction, currently heated with gas. Electric service to both buildings is above-ground.
- 95 Norman Street: One 1-storey concrete block automotive garage building, slab-on-grade, with poured concrete foundation, flat tar-and-gravel roof, steel-frame construction, currently heated with gas, with above-ground electric service.
- 97 Norman Street: One 1-storey stucco-sided commercial office building, slab-on-grade, with poured concrete foundation, flat tar-and-gravel roof, steel-frame construction, currently heated with gas, with above-ground electric service.
- 99 Norman Street: One 2 ½ storey brick house with poured concrete foundation, one basement level, asphalt shingle roof, wood frame construction, currently heated with gas, with above-ground electric service.
- 103 Norman Street: One 2 ½ storey stucco-sided house with poured concrete foundation, one basement level, asphalt shingle roof, wood frame construction, currently heated with gas, with above-ground electric service.
- 105 Norman street: One 2 storey vinyl-sided with poured concrete foundation, one basement level, asphalt shingle roof, wood frame construction, currently heated with gas, with above-ground electric service.

No ASTs or evidence of USTs or fuels or chemical storage were observed on the exterior of the subject site.

Water Bodies

No creeks, rivers, streams, lakes or any other water body was identified in the Phase I study area. The majority of the study area consists of residential dwellings, commercial businesses, and roads. Past known land use in the study area is residential and commercial. Dow's Lake, on the Rideau Canal system, is the closest significant water body and is present approximately 400 m south of the site.

Areas of Natural Significance

No areas of natural significance are present on the subject site.

Environmental Condition

Areas Where Contaminants are Present

Based on visual screening and analytical testing, the horizontal and vertical extents of the areas where contaminants (metals) are present at concentrations greater than the selected site condition standards are shown on Drawings PE2755-3 and PE2755-4.

Types of Contaminants

Based on the potentially contaminating activities identified at the subject site as part of the Phase I ESA and the subsurface investigation and analytical testing completed as part of the 2011 and 2012 subsurface investigations, contaminants of concern (COCs) at the subject site are considered to be **metals**.

Contaminated Media

Based on the results of the Phase II ESA, the contaminants of concern are present in the soil on the subject site, specifically the upper fill layer. Analytical testing indicates that the groundwater beneath the site is not contaminated.

What Is Known About Areas Where Contaminants Are Present

The area of contamination discussed in previous sections is interpreted to extend across the eastern and central portions of the site, as shown on Drawing PE2755-3. The vertical extent of contamination extends throughout the fill layer, as shown on Drawing PE2755-4. It is unlikely that the metals contamination extends into the silty sand layer, due to the limited mobility of metals. The contamination appears to be exclusively present in the overburden soils, and absent in the bedrock. It is our interpretation that the presence of these contaminants is related to the placement of the fill layer during site development.

Distribution of Contaminants

The vertical and horizontal distribution of contaminants are shown on Drawings PE2755-3 and PE2755-4.

Discharge of Contaminants

It is our interpretation that the presence of contaminants on-site is a result of the presence of the fill layer. The contaminants may have been present in the fill, which originated elsewhere. The exact mechanisms of discharge of contaminants are not known, and cannot be linked to a single particular occurrence or activity on-site.

Migration of Contaminants

The contaminants are present in the overburden soils above the water table. Based on the results of the subsurface investigations, the contaminants have not migrated from the soil to the site groundwater. Contaminant transport mechanisms are discussed further in subsequent sections.

Climatic and Meteorological Conditions

In general, climatic and meteorological conditions have the potential to affect contaminant distribution. Two ways by which climatic and meteorological conditions may affect contaminant distribution include the downward leaching of contaminants by means of the infiltration of precipitation, and the migration of contaminants via groundwater levels and/or flow, which may fluctuate seasonally. Based on the results of the subsurface investigation, the contaminated areas appear to be restricted to the overburden soils, and as such, the aforementioned climatic and meteorological conditions are not considered to have affected contaminant distribution at the subject site.

Potential for Vapour Intrusion

The contaminants of concern identified at the subject site (metals) are not volatile and are not considered to have the potential to result in vapour intrusion into the site buildings.

Contaminant Transport Diagram

Please refer to Drawing PE2755-5, which illustrates and provides narrative notes explaining the contaminant release mechanisms, contaminant transport pathways, human and ecological receptors, receptor exposure points, and routes of exposure at the subject property.

7.0 CONCLUSIONS

A Phase II ESA was conducted for the properties at 93-105 Norman Street, Ottawa, Ontario. A subsurface investigation previously completed at the subject property identified metals concentrations exceeding Table 7 standards in the fill material at the subject site. Based on the location of these samples, the contaminated fill material is interpreted to extend across the eastern and central portions of the subject site. The current Phase II ESA, completed in order to comply with current MOE standards in support of the filing of a Record of Site Condition (RSC) at the subject site, involved the drilling of four (4) boreholes and the installation of three (3) monitoring wells to assess soil and groundwater quality.

Soil samples were obtained from the boreholes and were screened using visual observations and organic vapour measurements. Based on the screening results and the results of the previous Phase II ESA, three (3) samples were selected for analysis of BTEX, PHCs, and metals. Sample BH1-12-AU2 failed the MOE Table 7 soil standards for lead. The remaining soil samples were in compliance with selected MOE Table 7 soil standards.

Groundwater samples were obtained from four (4) of the boreholes at the subject site and analyzed for PHCs, metals, and VOCs. All analytical results were in compliance with selected MOE Table 7 standards. It is our opinion that the presence of chloroform in the initial sample taken at BH1-12 was due to the use of municipally treated water as core water during the drilling process. It is our opinion that the second sample (BH1-12-GW2) is the more representative sample from the well.

Recommendations

Based on the above results, soil exists at the subject property with metals concentrations which exceed the applicable MOE Table 7 soil standards. It is our understanding that the subject site is to be redeveloped as a multi-storey residential building with up to three levels of underground parking. It is our recommendation that an environmental site remediation program, involving the removal of all contaminated soil, be completed concurrently with site redevelopment.

As part of the redevelopment of the property, the existing site buildings will be demolished. Prior to the demolition of the buildings, a designated substance survey (DSS) will be required to be conducted in accordance with the Occupational Health and Safety Act.

8.0 STATEMENT OF LIMITATIONS

This Phase II - Environmental Site Assessment report has been prepared in general accordance with the agreed scope-of-work, in compliance with O.Reg. 153/04 as amended by O.Reg. 269/11, and meets the requirements of CSA Z769-00. The conclusions presented herein are based on information gathered from a limited sampling and testing program. The test results represent conditions at specific test locations at the time of the field program.

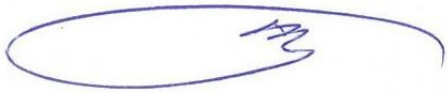
The client should be aware that any information pertaining to soils and all test hole logs are furnished as a matter of general information only and test hole descriptions or logs are not to be interpreted as descriptive of conditions at locations other than those of the test holes themselves.

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

This report was prepared for the sole use of Taggart Investments. Permission and notification from Taggart and Paterson will be required to release this report to any other party.

Paterson Group Inc.

Daniel J. Arnott, P.Eng.



Mark S. D'Arcy, P.Eng.

Report Distribution:

- Taggart Investments (11 copies and 1 PDF copy)
- Paterson Group (1 copy)

FIGURES

FIGURE 1 – KEY PLAN

DRAWING PE2755-3 – TEST HOLE LOCATION PLAN

DRAWING PE2755-4 - CROSS-SECTION A-A'

DRAWING PE2755-6 - CONTAMINANT TRANSPORT DIAGRAM

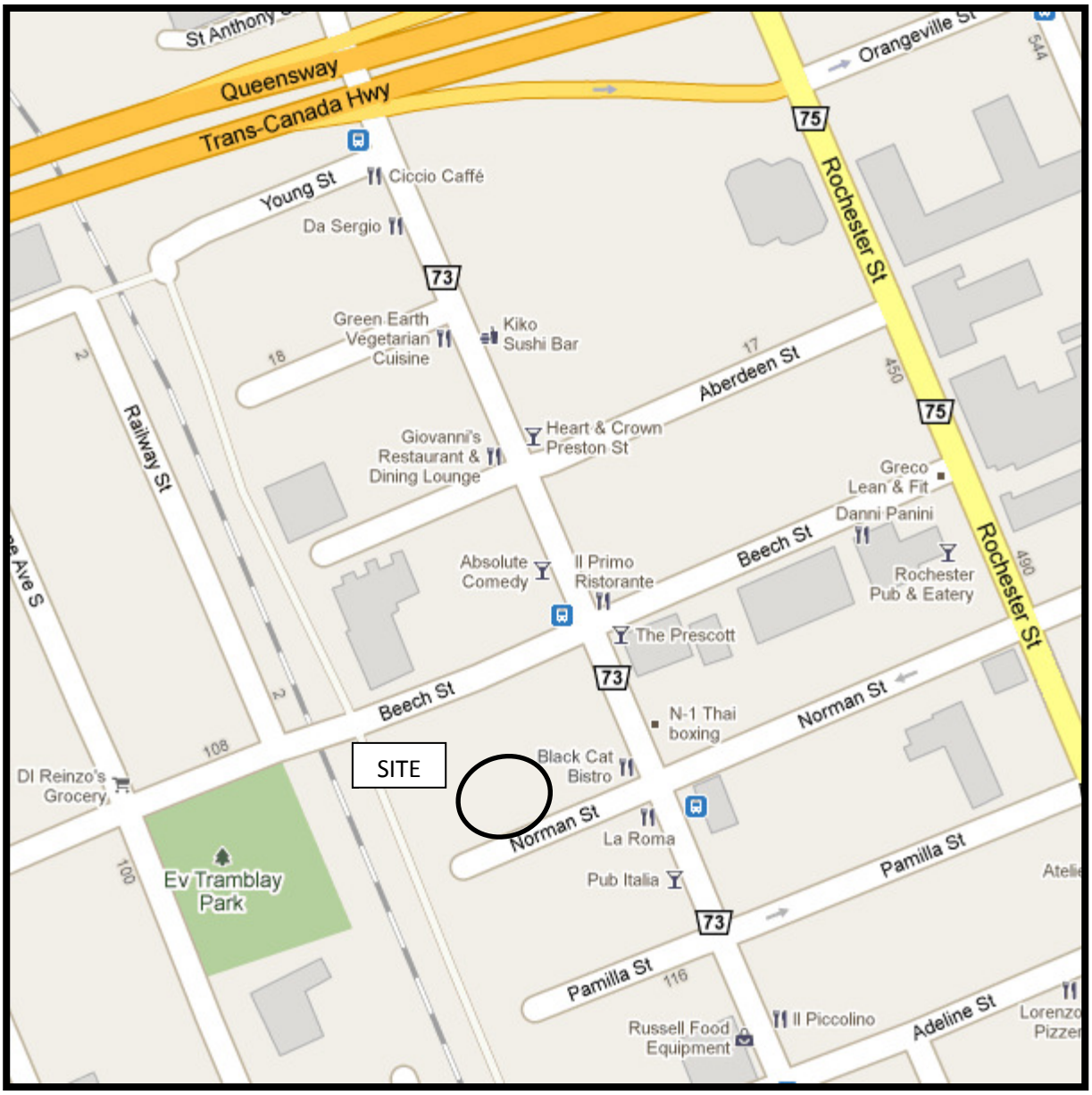
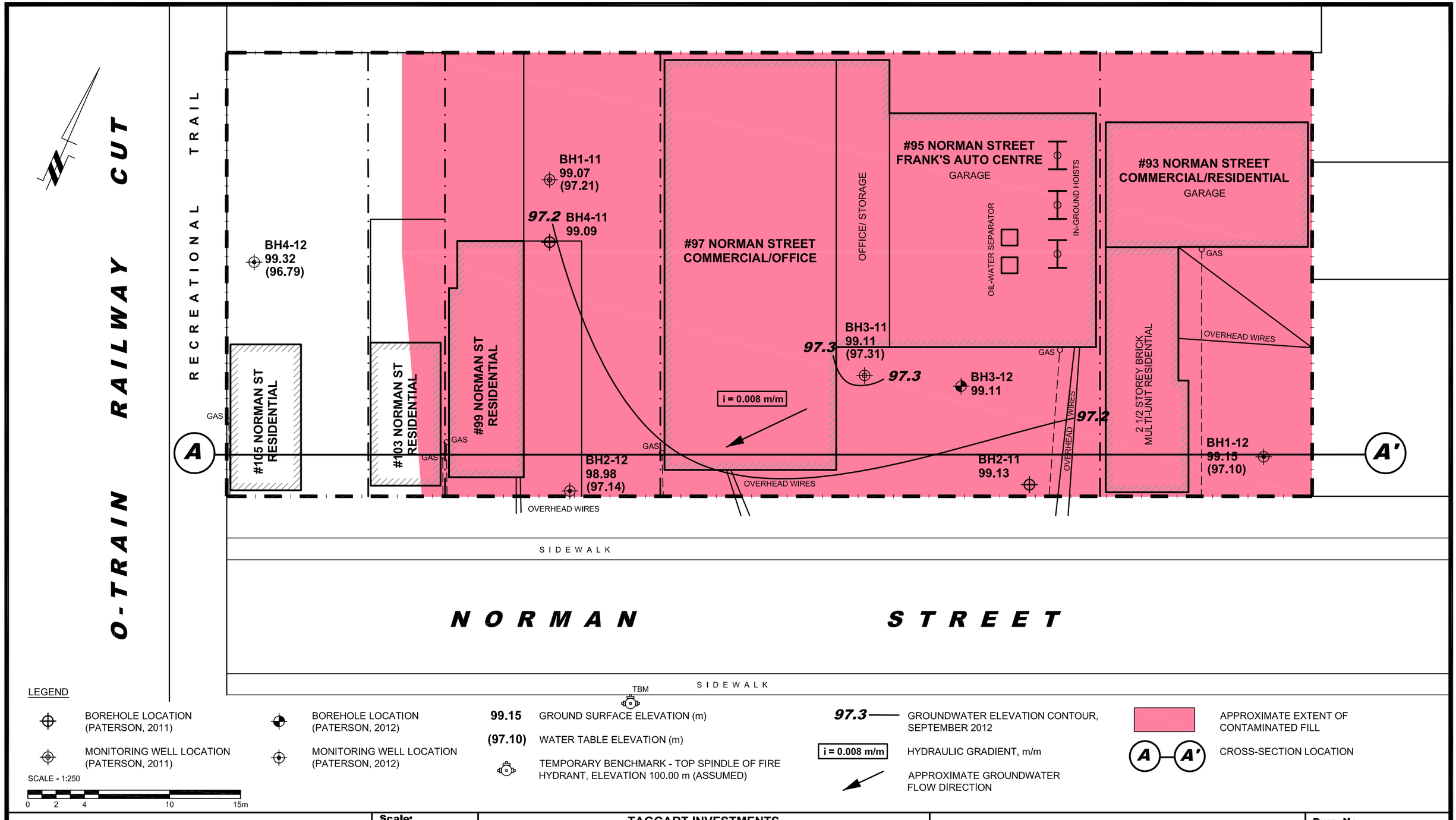


FIGURE 1

KEY PLAN



LEGEND

- BOREHOLE LOCATION (PATERSON, 2011)
- BOREHOLE LOCATION (PATERSON, 2012)
- MONITORING WELL LOCATION (PATERSON, 2011)
- MONITORING WELL LOCATION (PATERSON, 2012)
- 99.15 GROUND SURFACE ELEVATION (m)
- (97.10) WATER TABLE ELEVATION (m)
- TEMPORARY BENCHMARK - TOP SPINDLE OF FIRE HYDRANT, ELEVATION 100.00 m (ASSUMED)
- 97.3 GROUNDWATER ELEVATION CONTOUR, SEPTEMBER 2012
- i = 0.008 m/m HYDRAULIC GRADIENT, m/m
- APPROXIMATE GROUNDWATER FLOW DIRECTION
- APPROXIMATE EXTENT OF CONTAMINATED FILL
- A — A' CROSS-SECTION LOCATION

SCALE - 1:250

0 2 4 10 15m

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

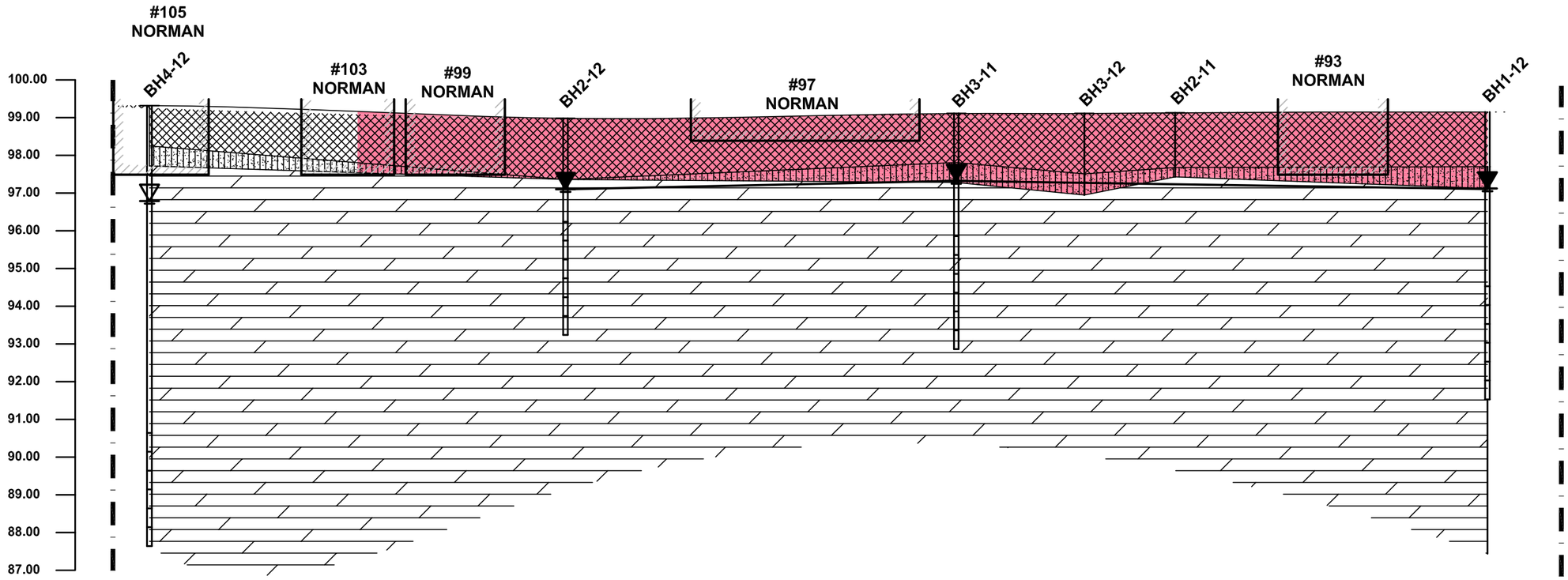
Scale:	1:250
Des.:	DJA
Dwn:	DJA
Chkd:	MSD

TAGGART INVESTMENTS

PHASE II ENVIRONMENTAL SITE ASSESSMENT
93, 95, 97, 99, 103, AND 105 NORMAN STREET
OTTAWA, ONTARIO

TEST HOLE LOCATION PLAN & GROUNDWATER CONTOUR MAP

Dwg. No. PE2755-3
Report No.: PE2755-REP.02
Date: 09/2012



LEGEND

FILL - BROWN SILTY SAND WITH GRAVEL, BRICK

BROWN SILTY SAND WITH GRAVEL, TRACE CLAY

LIMESTONE BEDROCK (AQUIFER)

EXTENTS OF CONTAMINATED FILL MATERIAL

GROUNDWATER ELEVATION - SHALLOW BEDROCK AQUIFER

GROUNDWATER ELEVATION - DEEP BEDROCK AQUIFER

SCALE - 1:250

0 2 4 10 15m

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

Scale:	1:250H; 1:125V
Des.:	DJA
Dwn:	DJA
Chkd:	MSD

TAGGART INVESTMENTS

PHASE II ENVIRONMENTAL SITE ASSESSMENT
93, 95, 97, 99, 103, AND 105 NORMAN STREET

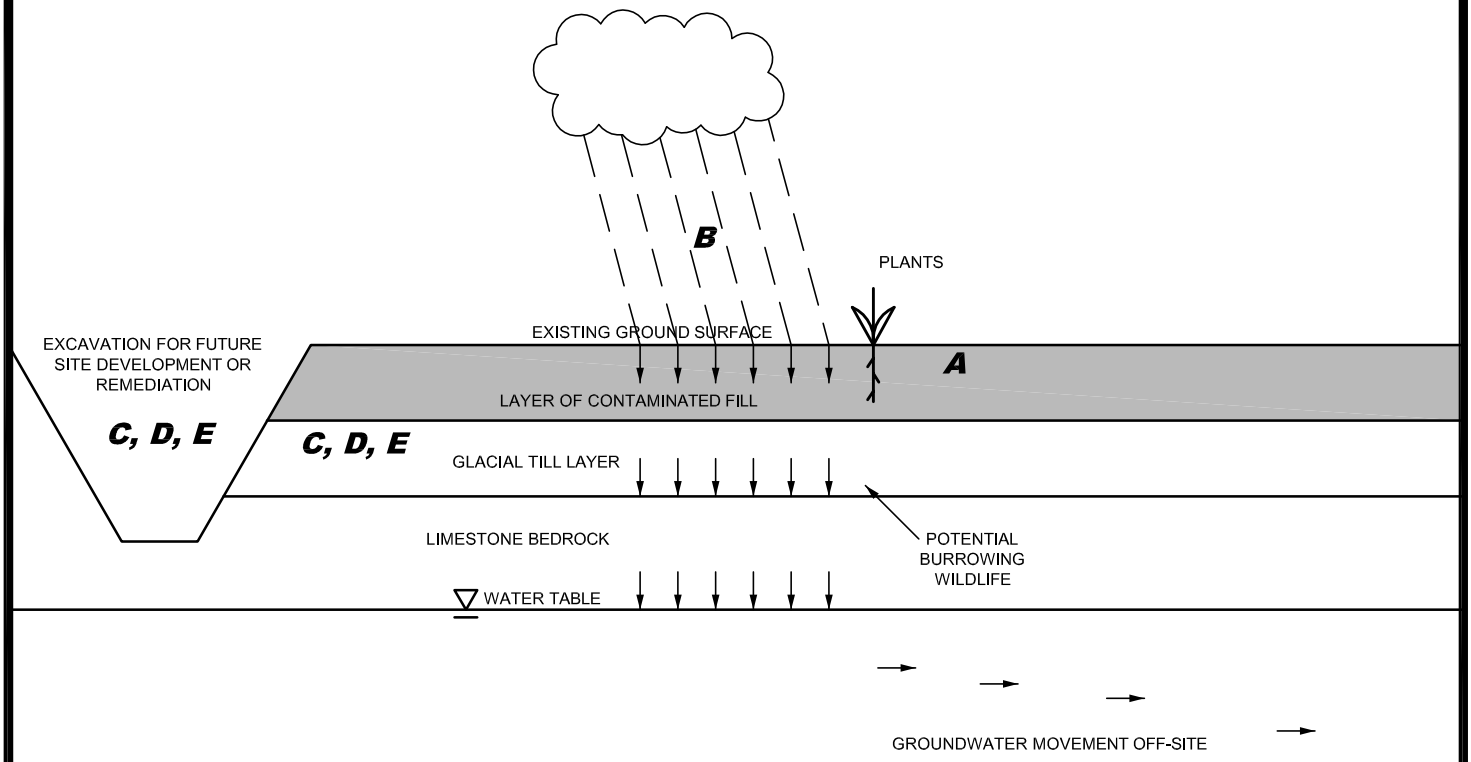
OTTAWA, ONTARIO

CROSS-SECTION A-A'

Dwg. No. PE2755-4

Report No.: PE2755-REP.02

Date: 09/2012



NARRATIVE NOTES

A CONTAMINANT RELEASE MECHANISMS

Contaminants of concern for the subject site include metals. The source of these contaminants is considered to be the fill material which was historically placed on the subject site. Metals contamination was either present in the fill material during its initial placement (c. 1910), or resulted from past site use. Due to the widespread distribution of metals contamination in site fill (i.e. not confined to a single area/release point), it is our interpretation that the metals contamination was present in the fill at the time of placement.

B CONTAMINANT TRANSPORT PATHWAYS

1. PHYSICAL TRANSPORT - One potential contaminant transport pathway is the physical transport from one location to another of the metalsl-impacted soil, either intentionally or unintentionally, by earth moving equipment, vehicle traffic, or pedestrian traffic. Due to the presence of asphalt overtop the contaminated soil layer, physical transport of contaminants was not observed during the Phase I or Phase II ESA.
2. PRECIPITATION/INFILTRATION/LEACHING - As precipitation falls on the ground surface at the subject site and subsequently infiltrates through the soil and bedrock layers to the groundwater table, there is the potential that contaminants in the soil phase could enter the groundwater. This depends on the solubility of the contaminants; metals are generally not highly soluble. Analytical testing of groundwater conducted during the Phase II ESA indicated that the site groundwater was not impacted with metals, so it is concluded that the precipitation/infiltration/leaching contaminant transport pathway has not significantly contributed to the movement of contaminants on-site.

C HUMAN AND ECOLOGICAL RECEPTORS

1. HUMAN RECEPTORS - The subject site is privately owned and not open to the general public, and the contaminated soil layer is covered by asphaltic concrete over most of the site. Soil disturbance (i.e. gardening) by residents was not observed. Potential human receptors are considered to be limited to construction workers and environmental professionals who may contact the soil during the remediation and/or redevelopment of the site. The site is located in a municipally serviced area, so there are no groundwater well users in the area who may be potential receptors.
2. ECOLOGICAL RECEPTORS - Potential ecological receptors include plants whose root structures may intercept the contaminated soil layer, wildlife which may contact the contaminated soil at ground surface, wildlife which may intercept the contaminated soil layer during burrowing, and groundwater/surface water receptors downgradient of the subject site at groundwater discharge points.

D RECEPTOR EXPOSURE POINTS

1. HUMAN RECEPTORS - Exposure points for human receptors consist of remedial excavations, service trenches, excavations for site buildings, and/or test pits.
2. ECOLOGICAL RECEPTORS - Based on the presence of asphalt paving over most of the site, there is limited potential for contact with ecological receptors at ground surface. Based on the analytical testing of groundwater and the absence of metals or other impacts, there is no potential for contact with groundwater/ surface water receptors at downgradient groundwater discharge points. The most likely exposure points for ecological receptors include the root zones of plants and the burrows of burrowing wildlife.

E ROUTES OF EXPOSURE

1. HUMAN RECEPTORS - Routes of exposure for human receptors (construction workers and environmental professionals) includes dermal contact, accidental ingestion, and inhalation (metals are not volatile; however, metals-impacted soil could be inhaled as particulate dust).
2. ECOLOGICAL RECEPTORS - Routes of exposure for ecological receptors include ingestion, dermal contact, and inhalation.

paterson group consulting engineers	**TAGGART INVESTMENTS** **CONTAMINANT TRANSPORT** **93-105 NORMAN STREET, OTTAWA, ONTARIO**	Drawing No.: PE2755-5	Scale: NTS	
		Date: 09/2012	Drawn: DJA	Approved: MSD

APPENDIX 1

SAMPLING AND ANALYSIS PLAN

SOIL PROFILE AND TEST DATA SHEETS (2011 and 2012)

LABORATORY CERTIFICATES OF ANALYSIS

SURVEY OF PHASE II PROPERTY

Geotechnical Engineering

Environmental Engineering

Hydrogeology

Geological Engineering

Materials Testing

Building Science

Archaeological Studies

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patersongroup

Sampling & Analysis Plan

Phase II ESA, Commercial & Residential Properties
93, 95, 97, 99, 103, and 105 Norman Street
Ottawa, Ontario

Prepared For

Taggart Realty Management

August 2012

Report: PE2755-SAP

Table of Contents

1.0 SAMPLING PROGRAM

Paterson Group Inc. (Paterson) was commissioned by Taggart Investments (Taggart) to conduct a Phase II Environmental Site Assessment (ESA) for the properties at 93, 95, 97, 99, 103, and 105 Norman Street, Ottawa, Ontario. Based on previous subsurface investigations and a Phase I ESA previously completed by Paterson for the subject property, the following subsurface investigation program, consisting of borehole drilling and test pit excavation, was developed:

Borehole	Location & Rationale	Proposed Depth & Rationale
BH1-12	Located as close as possible to garage at 93 Norman to assess soil and groundwater impacts associated with garage and to provide general coverage of 93 Norman Street (not drilled during previous Phase II ESA).	Into shallow bedrock aquifer to provide groundwater sampling in vicinity of 93 Norman Street and triangulation for groundwater flow interpretation in shallow bedrock aquifer.
BH2-12	Located at south property boundary, downgradient of 95/97 Norman Street, to provide triangulation for groundwater flow interpretation in shallow bedrock aquifer.	Into shallow bedrock aquifer to provide groundwater sampling downgradient of 95/97 Norman Street and triangulation for groundwater flow interpretation in shallow bedrock aquifer.
BH3-12	Located adjacent to garage at 95 Norman Street to identify any overburden contamination, in particular analysis of PHCs (not tested during previous Phase II ESA).	To practical refusal, for soil analysis only. Adjacent monitoring well from previous Phase II ESA to provide groundwater coverage in general vicinity.
BH4-12	Located on downgradient end of site and to provide general coverage of 103/105 Norman Street (not drilled during previous Phase II ESA).	Into deep bedrock aquifer for geotechnical purposes and possible future environmental sampling, pending shallow bedrock aquifer results.

Borehole locations are shown on the Test Hole Location Plan appended to the main report.

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

Based on the results of the previous Phase II ESA, it is considered necessary to drill into bedrock in order to intercept the water table. Boreholes will be advanced into bedrock as required using diamond coring equipment. Rock core samples will be retained for review, but not submitted for analysis.

Following borehole drilling, monitoring wells will be installed in selected boreholes (as above) for the measurement of water levels and the collection of groundwater samples.

2.0 ANALYTICAL TESTING PROGRAM

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

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

It is noted that a comprehensive sampling and analysis program of overburden soils, consistent with the above considerations, was conducted during the previous Phase II ESA, which is current within 18 months. It is our opinion that conditions at the subject site have not substantially changed since the completion of the previous Phase II ESA. As such, the soil sampling program has been modified, as outlined in the main report.

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

- Groundwater monitoring wells should be installed in all boreholes with visual or olfactory evidence of soil contamination, in stratigraphic units where soil contamination was encountered, where those stratigraphic units are at or below the water table (i.e. a water sample can be obtained).
- Groundwater monitoring well screens should straddle the water table at sites where the contaminants of concern are suspected to be LNAPLs.

- At least one groundwater monitoring well should be installed in a stratigraphic unit below the suspected contamination, where said stratigraphic unit is water-bearing.
- Parameters analyzed should be consistent with the Contaminants of Concern identified in the Phase I ESA and with the contaminants identified in the soil samples.

3.0 STANDARD OPERATING PROCEDURES

3.1 Environmental Drilling Procedure

Purpose

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

Equipment

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

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

Determining Borehole Locations

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

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

Drilling Procedure

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

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

Spoon Washing Procedure

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

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

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

Screening Procedure

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

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

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

3.2 Monitoring Well Installation Procedure

Equipment

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

Procedure

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

- Backfill remainder of borehole with holeplug or with auger cuttings (if contamination is not suspected).
- Install flushmount casing. Seal space between flushmount and borehole annulus with concrete, cold patch, or holeplug to match surrounding ground surface.

3.3 Monitoring Well Sampling Procedure

Equipment

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

Sampling Procedure

- Locate well and use socket wrench or Allan key to open metal flush mount protector cap. Remove plastic well cap.
- Measure water level, with respect to existing ground surface, using water level meter or interface probe. If using interface probe on suspected NAPL site, measure the thickness of free product.
- Measure total depth of well.
- Clean water level tape or interface probe using methanol and water. Change gloves between wells.
- Calculate volume of standing water within well and record.
- Insert polyethylene tubing into well and attach to peristaltic pump. Turn on peristaltic pump and purge into graduated bucket. Purge at least three well volumes of water from the well. Measure and record field chemistry. Continue to purge, measuring field chemistry after every well volume purged, until appearance or field chemistry stabilizes.

- Note appearance of purge water, including colour, opacity (clear, cloudy, silty), sheen, presence of LNAPL, and odour. Note any other unusual features (particulate matter, effervescence (bubbling) of dissolved gas, etc.).
- Fill required sample bottles. If sampling for metals, attach 75-micron filter to discharge tube and filter metals sample. If sampling for VOCs, use low flow rate to ensure continuous stream of non-turbulent flow into sample bottles. Ensure no headspace is present in VOC vials.
- Replace well cap and flushmount casing cap.

4.0 QUALITY ASSURANCE/QUALITY CONTROL (QA/QC)

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

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

5.0 DATA QUALITY OBJECTIVES

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

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

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

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

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

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

These considerations are discussed in the body of the report.

6.0 PHYSICAL IMPEDIMENTS TO SAMPLING & ANALYSIS PLAN

Physical impediments to the Sampling and Analysis plan may include:

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

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

patersongroup

Consulting Engineers

154 Colonnade Road South, Ottawa, Ontario K2E 7J5

SOIL PROFILE AND TEST DATA

Phase I - II Environmental Site Assessment
95, 97 and 99 Norman Street
Ottawa, Ontario

DATUM

REMARKS

BORINGS BY CME 75 Power Auger **DATE** May 31, 2011

FILE NO. PE2327

HOLE NO. BH 1

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)
GROUND SURFACE						0	
FILL: Sand and gravel		AU	1				
0.30		AU	2				
PEAT		SS	3	100	9	1	
1.27							
Loose to dense, grey **SILTY SAND** with gravel and cobbles		SS	4		50+		
1.60		RC	1	100	74	2	
						3	
		RC	2	100	100		
BEDROCK: Grey limestone						4	
		RC	3	100	90	5	
		RC	4	100	100	6	
6.10							
End of Borehole							
(GWL @ 1.37m-June 6/11)							

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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154 Colonnade Road South, Ottawa, Ontario K2E 7J5

SOIL PROFILE AND TEST DATA

Phase I - II Environmental Site Assessment
95, 97 and 99 Norman Street
Ottawa, Ontario

DATUM

REMARKS

BORINGS BY CME 75 Power Auger **DATE** May 31, 2011

FILE NO. PE2327

HOLE NO. BH 2

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)	Photo Ionization Detector: Volatile Organic Rdg. (ppm) / Lower Explosive Limit %	Monitoring Well Construction
GROUND SURFACE									
Asphaltic concrete 0.15						0			
FILL: Crushed stone 0.30		AU	1						
		AU	2						
FILL: Brown silty sand with gravel		SS	3	42	4	1			
1.45									
Dense, brown **SILTY SAND** with gravel and cobbles 1.70		SS	4	73	50+				
End of Borehole									
Practical refusal to augering @ 1.70m depth									

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

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

▲ Full Gas Resp. △ Methane Elim.

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SOIL PROFILE AND TEST DATA

Phase I - II Environmental Site Assessment
95, 97 and 99 Norman Street
Ottawa, Ontario

DATUM

REMARKS

BORINGS BY CME 75 Power Auger **DATE** May 31, 2011

FILE NO. PE2327

HOLE NO. BH 3

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)
GROUND SURFACE						0	
25mm Asphaltic concrete over crushed stone 0.18		AU	1				
FILL: Brown silty sand with gravel		SS	2	92	6	1	
1.30							
PEAT 1.45							
Brown **SILTY SAND** with peat, trace marl 1.83		SS	3	25	50+	2	
		RC	1	100	43		
						3	
		RC	2	100	93		
BEDROCK: Grey limestone						4	
		RC	3	100		5	
		RC	4	100	100	6	
6.25							
End of Borehole							
(GWL @ 1.74m-June 6/11)							

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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154 Colonnade Road South, Ottawa, Ontario K2E 7J5

SOIL PROFILE AND TEST DATA

Phase I - II Environmental Site Assessment
95, 97 and 99 Norman Street
Ottawa, Ontario

DATUM

REMARKS

BORINGS BY CME 75 Power Auger **DATE** May 31, 2011

FILE NO. PE2327

HOLE NO. BH 4

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)	Photo Ionization Detector: Volatile Organic Rdg. (ppm) / Lower Explosive Limit %	Monitoring Well Construction
GROUND SURFACE									
Asphaltic concrete 0.05		AU	1			0			
FILL: Crushed stone with sand 0.43									
		AU	3						
PEAT/TOPSOIL		SS	2	0	4	1			
1.52		AU	4						
End of Borehole									
Practical refusal to augering @ 1.52m depth									

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

100 200 300 400 500

RKI Eagle Rdg. (ppm)

▲ Full Gas Resp. △ Methane Elim.

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Consulting Engineers

154 Colonnade Road South, Ottawa, Ontario K2E 7J5

SOIL PROFILE AND TEST DATA

Phase II - Environmental Site Assessment
93 - 105 Norman Street
Ottawa, Ontario

DATUM TBM - Top spindle of fire hydrant located on the south side of Norman Street. Assumed elevation = 100.00m.

REMARKS

FILE NO. PE2755

HOLE NO. BH 1-12

BORINGS BY CME 55 Power Auger **DATE** August 29, 2012

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)
GROUND SURFACE						0	99.15
50mm Asphaltic concrete over crushed stone 0.25		AU	1				
		AU	2				
FILL: Brown silty sand with gravel, cobbles, brick		SS	3	42	30	1	98.15
1.45							
Dense, brown **SILTY SAND** with gravel and cobbles, trace clay		SS	4		50+	2	97.15
2.03							
		RC	1	100	83	3	96.15
		RC	2	100	80	4	95.15
BEDROCK: Grey limestone							
		RC	3	100	86	5	94.15
		RC	4	100	76	6	93.15
						7	92.15

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
93 - 105 Norman Street
Ottawa, Ontario

DATUM TBM - Top spindle of fire hydrant located on the south side of Norman Street. Assumed elevation = 100.00m.

REMARKS

FILE NO. PE2755

HOLE NO. BH 1-12

BORINGS BY CME 55 Power Auger **DATE** August 29, 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
						7	92.15		
		RC	5	100	82	8	91.15		
BEDROCK: Grey limestone						9	90.15		
		RC	6	100	100	10	89.15		
		RC	7	100	86	11	88.15		
11.71 End of Borehole									
(GWL @ 2.05m-Sept. 5, 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.

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Consulting Engineers

154 Colonnade Road South, Ottawa, Ontario K2E 7J5

SOIL PROFILE AND TEST DATA

Phase II - Environmental Site Assessment
93 - 105 Norman Street
Ottawa, Ontario

DATUM TBM - Top spindle of fire hydrant located on the south side of Norman Street. Assumed elevation = 100.00m.

REMARKS

FILE NO. PE2755

HOLE NO. BH 2-12

BORINGS BY CME 55 Power Auger **DATE** August 29, 2012

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)
GROUND SURFACE						0	98.98
50mm Asphaltic concrete over crushed stone		AU	1				
0.30							
		AU	2				
FILL: Brown silty sand with gravel, cobbles							
- topsoil with trace wood chips from 1.2 to 1.5m depth		SS	3	42	10	1	97.98
1.58		SS	4	100	50+		
		RC	1	95	64	2	96.98
BEDROCK: Grey limestone		RC	2	100	85	3	95.98
						4	94.98
		RC	3	100	83	5	93.98
5.74							
End of Borehole							
(GWL @ 1.84m-Sept. 5, 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.

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SOIL PROFILE AND TEST DATA

Phase II - Environmental Site Assessment
93 - 105 Norman Street
Ottawa, Ontario

DATUM TBM - Top spindle of fire hydrant located on the south side of Norman Street. Assumed elevation = 100.00m.

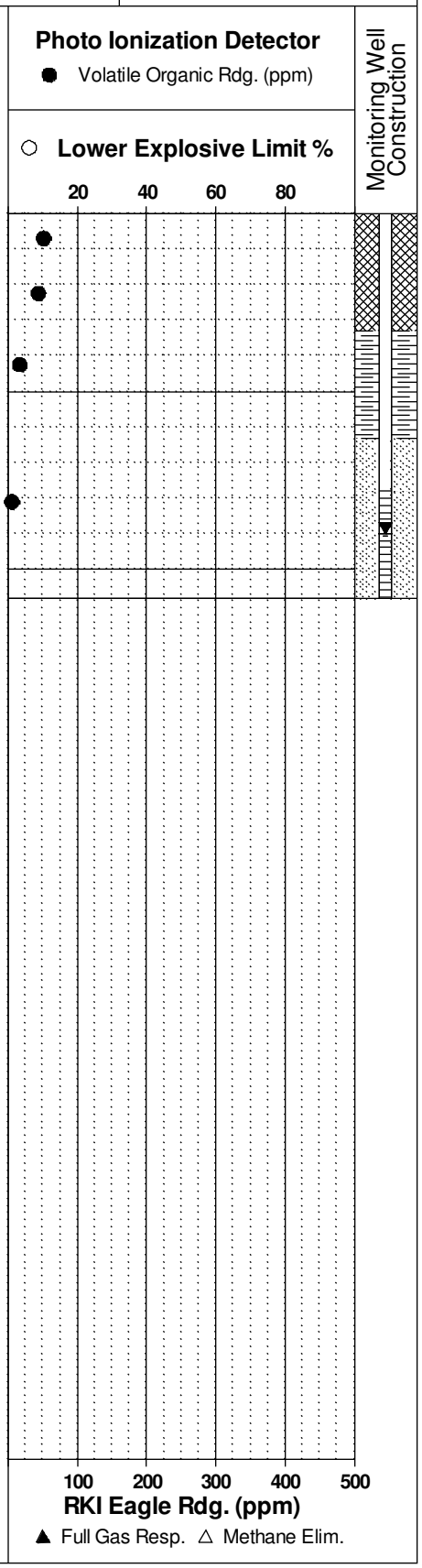
REMARKS

FILE NO. PE2755

HOLE NO. BH 3-12

BORINGS BY CME 55 Power Auger **DATE** August 30, 2012

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)
GROUND SURFACE						0	99.11
25mm Asphaltic concrete over crushed stone		AU	1				
0.25		AU	2				
FILL: Brown silty sand with clay, trace gravel and brick		SS	3	57	50+	1	98.11
1.60		SS	4	63	50+		
Dense, brown **SILTY SAND** with gravel and cobbles, trace clay						2	97.11
2.16							
End of Borehole							
(GWL @ 1.80m-Sept. 5, 2012)							



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SOIL PROFILE AND TEST DATA

Phase II - Environmental Site Assessment
93 - 105 Norman Street
Ottawa, Ontario

DATUM TBM - Top spindle of fire hydrant located on the south side of Norman Street. Assumed elevation = 100.00m.

REMARKS

BORINGS BY CME 55 Power Auger **DATE** August 30, 2012

FILE NO. PE2755

HOLE NO. BH 4-12

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)
GROUND SURFACE						0	99.09
25mm Asphaltic concrete over crushed stone		AU	1				
0.30							
FILL: Brown silty sand, trace gravel		AU	2				
0.69						1	98.09
Compact, brown **SILTY SAND,** trace gravel		SS	3	58	18		
1.07							
Compact to dense, brown **SILTY SAND** with gravel and cobbles, trace clay		SS	4	100	50+		
1.60						2	97.09
		RC	1	91	50		
						3	96.09
		RC	2	100	100		
						4	95.09
BEDROCK: Grey limestone							
		RC	3	100	100	5	94.09
						6	93.09
		RC	4	100	100		
						7	92.09

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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SOIL PROFILE AND TEST DATA

Phase II - Environmental Site Assessment
93 - 105 Norman Street
Ottawa, Ontario

DATUM TBM - Top spindle of fire hydrant located on the south side of Norman Street. Assumed elevation = 100.00m.

REMARKS

FILE NO. PE2755

HOLE NO. BH 4-12

BORINGS BY CME 55 Power Auger **DATE** August 30, 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
						7	92.09		
		RC	5	100	100	8	91.09		
						9	90.09		
BEDROCK: Grey limestone		RC	6	100	100	10	89.09		
		RC	7	100	100	11	88.09		
11.68									
End of Borehole									
(GWL @ 2.53m-Sept. 5, 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

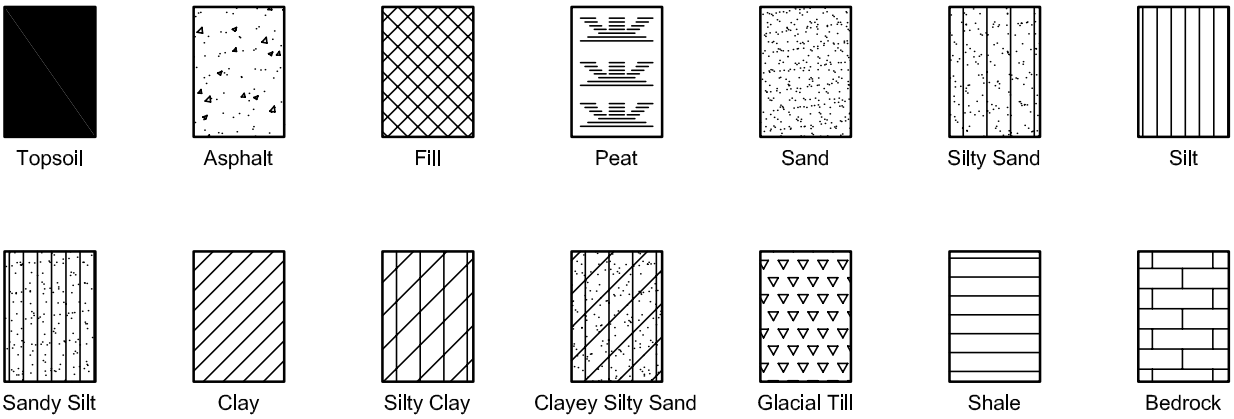
p'_o	-	Present effective overburden pressure at sample depth
p'_c	-	Preconsolidation pressure of (maximum past pressure on) sample
Ccr	-	Recompression index (in effect at pressures below p'_c)
Cc	-	Compression index (in effect at pressures above p'_c)
OC Ratio		Overconsolidaton ratio = p'_c / p'_o
Void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

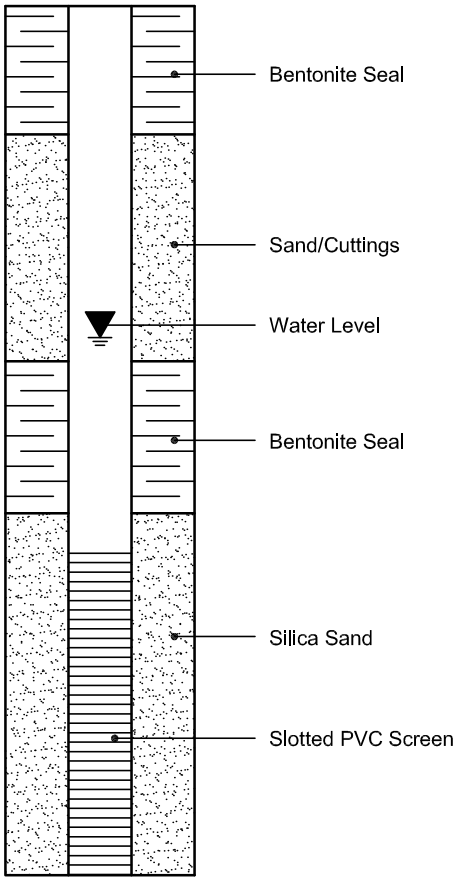
SYMBOLS AND TERMS (continued)

STRATA PLOT

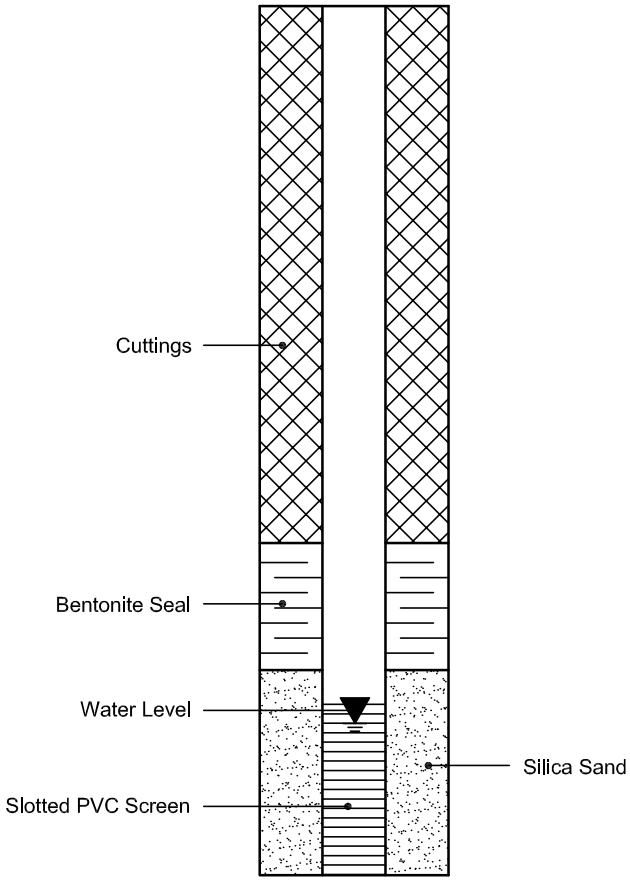


MONITORING WELL AND PIEZOMETER CONSTRUCTION

MONITORING WELL CONSTRUCTION



PIEZOMETER CONSTRUCTION



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Certificate of Analysis

Paterson Group Consulting Engineers
28 Concourse Gate, Unit 1
Nepean, ON K2E 7T7
Attn: Luke Lopers

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

Client PO: 10807
Project: PE2327
Custody: 84791

Report Date: 3-Jun-2011
Order Date: 1-Jun-2011
Order #: 1123178

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

Paracel ID	Client ID
1123178-01	BH2-SS3
1123178-02	BH3-SS2

Approved By: Mark Foto

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

Certificate of Analysis

Report Date: 03-Jun-2011

Client: **Paterson Group Consulting Engineers**

Order Date:1-Jun-2011

Client PO: 10807 Project Description: PE2327

Analysis Summary Table

Analysis	Method Reference/Description	Extraction Date	Analysis Date
Boron, available	MOE (HWE), EPA 200.8 - ICP-MS	2-Jun-11	2-Jun-11
Chromium, hexavalent	MOE E3056 - Extraction, colourimetric	3-Jun-11	3-Jun-11
Mercury	EPA 7471A - CVAA, digestion	2-Jun-11	2-Jun-11
Metals	EPA 6020 - Digestion - ICP-MS	2-Jun-11	3-Jun-11
Solids, %	Gravimetric, calculation	3-Jun-11	3-Jun-11
VOCs	EPA 8260 - P&T GC-MS	2-Jun-11	3-Jun-11

Certificate of Analysis

Report Date: 03-Jun-2011

Client: **Paterson Group Consulting Engineers**

Order Date:1-Jun-2011

Client PO: 10807

Project Description: PE2327

	Client ID:	BH2-SS3	BH3-SS2	-	-
	Sample Date:	31-May-11	31-May-11	-	-
	Sample ID:	1123178-01	1123178-02	-	-
	MDL/Units	Soil	Soil	-	-
Physical Characteristics					
% Solids	0.1 % by Wt.	85.3	63.8	-	-
Metals					
Antimony	1 ug/g dry	-	213	-	-
Arsenic	1 ug/g dry	-	9	-	-
Barium	1 ug/g dry	-	268	-	-
Beryllium	0.5 ug/g dry	-	<0.5	-	-
Boron, available	0.5 ug/g dry	-	4.3	-	-
Cadmium	0.5 ug/g dry	-	<0.5	-	-
Chromium	5 ug/g dry	-	13	-	-
Chromium (VI)	0.4 ug/g dry	-	<12.0 [1]	-	-
Cobalt	1 ug/g dry	-	5	-	-
Copper	5 ug/g dry	-	81	-	-
Lead	1 ug/g dry	-	2480	-	-
Mercury	0.1 ug/g dry	-	0.2	-	-
Molybdenum	1 ug/g dry	-	7	-	-
Nickel	5 ug/g dry	-	14	-	-
Selenium	1 ug/g dry	-	1	-	-
Silver	0.3 ug/g dry	-	<0.3	-	-
Thallium	1 ug/g dry	-	<1	-	-
Vanadium	10 ug/g dry	-	21	-	-
Zinc	20 ug/g dry	-	198	-	-
Volatiles					
Benzene	0.002 ug/g dry	<0.002	-	-	-
Bromodichloromethane	0.002 ug/g dry	<0.002	-	-	-
Bromoform	0.002 ug/g dry	<0.002	-	-	-
Bromomethane	0.003 ug/g dry	<0.003	-	-	-
Carbon Tetrachloride	0.002 ug/g dry	<0.002	-	-	-
Chlorobenzene	0.002 ug/g dry	<0.002	-	-	-
Chloroethane	0.005 ug/g dry	<0.005	-	-	-
Chloroform	0.003 ug/g dry	<0.003	-	-	-
Chloromethane	0.020 ug/g dry	<0.020	-	-	-
Dibromochloromethane	0.002 ug/g dry	<0.002	-	-	-
1,2-Dibromoethane	0.002 ug/g dry	<0.002	-	-	-

Certificate of Analysis

Report Date: 03-Jun-2011

Client: **Paterson Group Consulting Engineers**

Order Date:1-Jun-2011

Client PO: 10807

Project Description: PE2327

	Client ID:	BH2-SS3	BH3-SS2	-	-
	Sample Date:	31-May-11	31-May-11	-	-
	Sample ID:	1123178-01	1123178-02	-	-
	MDL/Units	Soil	Soil	-	-
1,2-Dichlorobenzene	0.002 ug/g dry	<0.002	-	-	-
1,3-Dichlorobenzene	0.002 ug/g dry	<0.002	-	-	-
1,4-Dichlorobenzene	0.002 ug/g dry	<0.002	-	-	-
1,1-Dichloroethane	0.002 ug/g dry	<0.002	-	-	-
1,2-Dichloroethane	0.002 ug/g dry	<0.002	-	-	-
1,1-Dichloroethylene	0.002 ug/g dry	<0.002	-	-	-
cis-1,2-Dichloroethylene	0.002 ug/g dry	<0.002	-	-	-
trans-1,2-Dichloroethylene	0.003 ug/g dry	<0.003	-	-	-
1,2-Dichloroethylene, total	0.003 ug/g dry	<0.003	-	-	-
1,2-Dichloropropane	0.002 ug/g dry	<0.002	-	-	-
cis-1,3-Dichloropropylene	0.002 ug/g dry	<0.002	-	-	-
trans-1,3-Dichloropropylene	0.002 ug/g dry	<0.002	-	-	-
1,3-Dichloropropene, total	0.002 ug/g dry	<0.002	-	-	-
Ethylbenzene	0.002 ug/g dry	<0.002	-	-	-
Methylene Chloride	0.003 ug/g dry	<0.003	-	-	-
Styrene	0.002 ug/g dry	<0.002	-	-	-
1,1,1,2-Tetrachloroethane	0.003 ug/g dry	<0.003	-	-	-
1,1,2,2-Tetrachloroethane	0.003 ug/g dry	<0.003	-	-	-
Tetrachloroethylene	0.002 ug/g dry	<0.002	-	-	-
Toluene	0.002 ug/g dry	<0.002	-	-	-
1,1,1-Trichloroethane	0.002 ug/g dry	<0.002	-	-	-
1,1,2-Trichloroethane	0.002 ug/g dry	<0.002	-	-	-
Trichloroethylene	0.003 ug/g dry	<0.003	-	-	-
Trichlorofluoromethane	0.005 ug/g dry	<0.005	-	-	-
1,3,5-Trimethylbenzene	0.003 ug/g dry	<0.003	-	-	-
Vinyl chloride	0.002 ug/g dry	<0.002	-	-	-
m,p-Xylenes	0.002 ug/g dry	<0.002	-	-	-
o-Xylene	0.002 ug/g dry	<0.002	-	-	-
Xylenes, total	0.002 ug/g dry	<0.002	-	-	-
4-Bromofluorobenzene	Surrogate	126%	-	-	-
Dibromofluoromethane	Surrogate	107%	-	-	-
Toluene-d8	Surrogate	113%	-	-	-

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, available	ND	0.5	ug/g						
Cadmium	ND	0.5	ug/g						
Chromium (VI)	ND	0.4	ug/g						
Chromium	ND	5	ug/g						
Cobalt	ND	1	ug/g						
Copper	ND	5	ug/g						
Lead	ND	1	ug/g						
Mercury	ND	0.1	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						
Vanadium	ND	10	ug/g						
Zinc	ND	20	ug/g						
Volatiles									
Benzene	ND	0.002	ug/g						
Bromodichloromethane	ND	0.002	ug/g						
Bromoform	ND	0.002	ug/g						
Bromomethane	ND	0.003	ug/g						
Carbon Tetrachloride	ND	0.002	ug/g						
Chlorobenzene	ND	0.002	ug/g						
Chloroethane	ND	0.005	ug/g						
Chloroform	ND	0.003	ug/g						
Chloromethane	ND	0.020	ug/g						
Dibromochloromethane	ND	0.002	ug/g						
1,2-Dibromoethane	ND	0.002	ug/g						
1,2-Dichlorobenzene	ND	0.002	ug/g						
1,3-Dichlorobenzene	ND	0.002	ug/g						
1,4-Dichlorobenzene	ND	0.002	ug/g						
1,1-Dichloroethane	ND	0.002	ug/g						
1,2-Dichloroethane	ND	0.002	ug/g						
1,1-Dichloroethylene	ND	0.002	ug/g						
cis-1,2-Dichloroethylene	ND	0.002	ug/g						
trans-1,2-Dichloroethylene	ND	0.003	ug/g						
1,2-Dichloroethylene, total	ND	0.003	ug/g						
1,2-Dichloropropane	ND	0.002	ug/g						
cis-1,3-Dichloropropylene	ND	0.002	ug/g						
trans-1,3-Dichloropropylene	ND	0.002	ug/g						
1,3-Dichloropropene, total	ND	0.002	ug/g						
Ethylbenzene	ND	0.002	ug/g						
Methylene Chloride	ND	0.003	ug/g						
Styrene	ND	0.002	ug/g						
1,1,1,2-Tetrachloroethane	ND	0.003	ug/g						
1,1,2,2-Tetrachloroethane	ND	0.003	ug/g						
Tetrachloroethylene	ND	0.002	ug/g						
Toluene	ND	0.002	ug/g						
1,1,1-Trichloroethane	ND	0.002	ug/g						
1,1,2-Trichloroethane	ND	0.002	ug/g						
Trichloroethylene	ND	0.003	ug/g						
Trichlorofluoromethane	ND	0.005	ug/g						
1,3,5-Trimethylbenzene	ND	0.003	ug/g						
Vinyl chloride	ND	0.002	ug/g						

Certificate of Analysis

Report Date: 03-Jun-2011

Client: **Paterson Group Consulting Engineers**

Order Date:1-Jun-2011

Client PO: 10807

Project Description: PE2327

Method Quality Control: Blank

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
m,p-Xylenes	ND	0.002	ug/g						
o-Xylene	ND	0.002	ug/g						
Xylenes, total	ND	0.002	ug/g						
Surrogate: 4-Bromofluorobenzene	*0.153*		*ug/g*		*113*	*83-134*			
Surrogate: Dibromofluoromethane	*0.127*		*ug/g*		*93.1*	*78-124*			
Surrogate: Toluene-d8	*0.155*		*ug/g*		*114*	*76-118*			

Certificate of Analysis

Report Date: 03-Jun-2011

Client: **Paterson Group Consulting Engineers**

Order Date:1-Jun-2011

Client PO: 10807

Project Description: PE2327

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				26	
Arsenic	5.2	1	ug/g dry	4.8			7.0	35	
Barium	88.2	1	ug/g dry	86.6			1.8	34	
Beryllium	ND	0.5	ug/g dry	ND				25	
Boron, available	1.41	0.5	ug/g dry	1.29			9.1	35	
Cadmium	ND	0.5	ug/g dry	ND				33	
Chromium (VI)	ND	3.0	ug/g dry	ND				35	GEN02
Chromium	13.6	5	ug/g dry	12.7			6.8	32	
Cobalt	4.9	1	ug/g dry	4.6			6.3	32	
Copper	22.6	5	ug/g dry	21.0			7.3	32	
Lead	187	1	ug/g dry	194			3.7	44	
Mercury	0.409	0.1	ug/g dry	0.394			3.7	35	
Molybdenum	1.9	1	ug/g dry	1.9			2.7	29	
Nickel	11.5	5	ug/g dry	10.7			7.4	29	
Selenium	1.6	1	ug/g dry	1.5			5.2	28	
Silver	0.43	0.3	ug/g dry	0.41			5.6	28	
Thallium	ND	1	ug/g dry	ND				27	
Vanadium	19.9	10	ug/g dry	19.0			4.7	27	
Zinc	86.2	20	ug/g dry	80.6			6.7	27	
Physical Characteristics									
% Solids	94.0	0.1	% by Wt.	93.9			0.2	25	
Volatiles									
Benzene	ND	0.002	ug/g wet	ND				50	
Bromodichloromethane	ND	0.002	ug/g wet	ND				50	
Bromoform	ND	0.002	ug/g wet	ND				50	
Bromomethane	ND	0.003	ug/g wet	ND				50	
Carbon Tetrachloride	ND	0.002	ug/g wet	ND				50	
Chlorobenzene	ND	0.002	ug/g wet	ND				50	
Chloroethane	ND	0.005	ug/g wet	ND				50	
Chloroform	ND	0.003	ug/g wet	ND				32	
Chloromethane	ND	0.020	ug/g wet	ND				50	
Dibromochloromethane	ND	0.002	ug/g wet	ND				50	
1,2-Dibromoethane	ND	0.002	ug/g wet	ND				50	
1,2-Dichlorobenzene	ND	0.002	ug/g wet	ND				50	
1,3-Dichlorobenzene	ND	0.002	ug/g wet	ND				50	
1,4-Dichlorobenzene	ND	0.002	ug/g wet	ND				50	
1,1-Dichloroethane	ND	0.002	ug/g wet	ND				27	
1,2-Dichloroethane	ND	0.002	ug/g wet	ND				50	
1,1-Dichloroethylene	ND	0.002	ug/g wet	ND				50	
cis-1,2-Dichloroethylene	ND	0.002	ug/g wet	ND				33	
trans-1,2-Dichloroethylene	ND	0.003	ug/g wet	ND				50	
1,2-Dichloropropane	ND	0.002	ug/g wet	ND				50	
cis-1,3-Dichloropropylene	ND	0.002	ug/g wet	ND				50	
trans-1,3-Dichloropropylene	ND	0.002	ug/g wet	ND				50	
Ethylbenzene	ND	0.002	ug/g wet	ND				34	
Methylene Chloride	ND	0.003	ug/g wet	ND				50	
Styrene	ND	0.002	ug/g wet	ND				50	
1,1,1,2-Tetrachloroethane	ND	0.003	ug/g wet	ND				50	
1,1,2,2-Tetrachloroethane	ND	0.003	ug/g wet	ND				50	
Tetrachloroethylene	ND	0.002	ug/g wet	ND				32	
Toluene	ND	0.002	ug/g wet	ND				32	
1,1,1-Trichloroethane	ND	0.002	ug/g wet	ND				50	
1,1,2-Trichloroethane	ND	0.002	ug/g wet	ND				50	
Trichloroethylene	ND	0.003	ug/g wet	ND				31	
Trichlorofluoromethane	ND	0.005	ug/g wet	ND				50	

Certificate of Analysis

Report Date: 03-Jun-2011

Client: **Paterson Group Consulting Engineers**

Order Date:1-Jun-2011

Client PO: 10807

Project Description: PE2327

Method Quality Control: Duplicate

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
1,3,5-Trimethylbenzene	ND	0.003	ug/g wet	ND				43	
Vinyl chloride	ND	0.002	ug/g wet	ND				50	
m,p-Xylenes	ND	0.002	ug/g wet	ND				35	
o-Xylene	ND	0.002	ug/g wet	ND				50	
Surrogate: 4-Bromofluorobenzene	*0.170*		*ug/g wet*	*ND*	*125*	*83-134*			
Surrogate: Dibromofluoromethane	*0.133*		*ug/g wet*	*ND*	*97.7*	*78-124*			
Surrogate: Toluene-d8	*0.156*		*ug/g wet*	*ND*	*115*	*76-118*			

Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Metals									
Antimony	57.5		ug/L	ND	115	80-120			
Arsenic	52.8		ug/L	ND	106	80-120			
Barium	49.3		ug/L	ND	98.6	80-120			
Beryllium	55.2		ug/L	ND	110	80-120			
Boron, available	4.91	0.5	ug/g	ND	98.2	70-122			
Cadmium	52.3		ug/L	ND	105	80-120			
Chromium (VI)	4.9	0.4	ug/g	ND	98.0	89-123			
Chromium	55.9		ug/L	ND	112	80-120			
Cobalt	56.1		ug/L	ND	112	80-120			
Copper	56.0		ug/L	ND	112	80-120			
Lead	54.5		ug/L	ND	109	80-120			
Mercury	1.54	0.1	ug/g	ND	103	72-128			
Molybdenum	54.1		ug/L	ND	108	80-120			
Nickel	54.8		ug/L	ND	110	80-120			
Selenium	53.3		ug/L	ND	107	80-120			
Silver	49.3		ug/L	ND	98.5	80-120			
Thallium	56.1		ug/L	ND	112	80-120			
Vanadium	55.0		ug/L	ND	110	80-120			
Zinc	50.1		ug/L	ND	100	80-120			
Volatiles									
Benzene	0.0561	0.002	ug/g	ND	82.5	55-141			
Bromodichloromethane	0.0664	0.002	ug/g	ND	97.6	52-139			
Bromoform	0.0788	0.002	ug/g	ND	116	52-170			
Bromomethane	0.0679	0.003	ug/g	ND	99.8	32-138			
Carbon Tetrachloride	0.0671	0.002	ug/g	ND	98.7	49-149			
Chlorobenzene	0.0690	0.002	ug/g	ND	102	64-137			
Chloroethane	0.0517	0.005	ug/g	ND	76.0	39-152			
Chloroform	0.0663	0.003	ug/g	ND	97.5	58-138			
Chloromethane	0.0456	0.020	ug/g	ND	67.0	24-163			
Dibromochloromethane	0.0677	0.002	ug/g	ND	99.6	61-153			
1,2-Dibromoethane	0.0701	0.002	ug/g	ND	103	61-145			
1,2-Dichlorobenzene	0.0735	0.002	ug/g	ND	108	60-150			
1,3-Dichlorobenzene	0.0720	0.002	ug/g	ND	106	62-149			
1,4-Dichlorobenzene	0.0721	0.002	ug/g	ND	106	63-132			
1,1-Dichloroethane	0.0574	0.002	ug/g	ND	84.4	51-156			
1,2-Dichloroethane	0.0620	0.002	ug/g	ND	91.2	50-140			
1,1-Dichloroethylene	0.0727	0.002	ug/g	ND	107	43-153			
cis-1,2-Dichloroethylene	0.0505	0.002	ug/g	ND	74.2	58-145			
trans-1,2-Dichloroethylene	0.0649	0.003	ug/g	ND	95.4	51-145			
1,2-Dichloropropane	0.0549	0.002	ug/g	ND	80.8	56-136			
cis-1,3-Dichloropropylene	0.0573	0.002	ug/g	ND	84.2	54-141			
trans-1,3-Dichloropropylene	0.0653	0.002	ug/g	ND	96.1	61-140			
Ethylbenzene	0.0657	0.002	ug/g	ND	96.6	61-139			
Methylene Chloride	0.0709	0.003	ug/g	ND	104	58-149			
Styrene	0.0706	0.002	ug/g	ND	104	63-143			
1,1,1,2-Tetrachloroethane	0.0730	0.003	ug/g	ND	107	61-148			
1,1,2,2-Tetrachloroethane	0.0842	0.003	ug/g	ND	124	50-157			
Tetrachloroethylene	0.0689	0.002	ug/g	ND	101	51-145			
Toluene	0.0608	0.002	ug/g	ND	89.4	54-136			
1,1,1-Trichloroethane	0.0596	0.002	ug/g	ND	87.7	55-140			
1,1,2-Trichloroethane	0.0632	0.002	ug/g	ND	92.9	63-144			
Trichloroethylene	0.0578	0.003	ug/g	ND	85.1	52-135			
Trichlorofluoromethane	0.0814	0.005	ug/g	ND	120	37-155			

Certificate of Analysis

Report Date: 03-Jun-2011

Client: **Paterson Group Consulting Engineers**

Order Date:1-Jun-2011

Client PO: 10807

Project Description: PE2327

Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
1,3,5-Trimethylbenzene	0.0692	0.003	ug/g	ND	102	61-151			
Vinyl chloride	0.0536	0.002	ug/g	ND	78.9	31-159			
m,p-Xylenes	0.134	0.002	ug/g	ND	98.2	61-139			
o-Xylene	0.0681	0.002	ug/g	ND	100	60-142			
Surrogate: 4-Bromofluorobenzene	*0.145*		*ug/g*		*106*	*83-134*			
Surrogate: Dibromofluoromethane	*0.136*		*ug/g*		*100*	*78-124*			
Surrogate: Toluene-d8	*0.118*		*ug/g*		*86.7*	*76-118*			

Sample and QC Qualifiers Notes

1- GEN02 : Elevated Reporting Limit due to matrix interference.

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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Chain of Custody
(lab use only)

Nº 84791

Reg. Drinking Water

Client Name: Paterson Group	Project Ref: PE2327	Waterworks Name:	Page 1 of 1
Contact Name: Luke Lopers	Quote #	Waterworks Number:	Sample Taken by:
Address: 1-28 Concourse Gate	PO # 10807	Address:	Print Name: Luke Lopers
	E-mail Address: llopers@patersongroup.ca	After hours Contact:	Signature:
Telephone: 226-7381	Fax: 226-6344	Public Health Unit:	TAT: [ ] 1-day [X] 2-day [ ] Reg.

Matrix Types: S–Soil/Sed. GW–Ground Water SW–Surface Water SS–Storm/Sanitary Sewer DW-Drinking Water RDW-Regulated Drinking Water P- Paint A-Air O-Other

Samples submitted under: (Indicate **ONLY** one)
[X] O. Reg 153 (511) Table 1 [ ] O. Reg 170/03 [ ] O. Reg 318/08 [ ] Private well
[ ] CCME [ ] O. Reg 243/07 [ ] O. Reg 319/08 [ ] Other: _____

Type of DW Sample: R = Raw; T = Treated; D = Distribution
Location Types: S = Surface Water; G = Ground Water

Paracel Order Number: 1123178

	Sample ID / Location Name	Matrix	Air Volume	Type of Sample	# of Containers	Sample Taken: Date	Sample Taken: Time	Free / Combined Chlorine Residual mg/L	Required Analyses: Metals (inc)	Required Analyses: VOCs
1	BH2-SS3	S			1	May 31, 2011				X
2	BH3-SS2	S			1	May 31, 2011			X	
3										
4										
5										
6										
7										
8										
9										
10										

Comments: Reg 153 per Luke. SC. Full metals.

Preservation Verification: pH N/A Temperature 25.5°C
Verified by: _____

Relinquished By (Print & Sign):

Date/Time: June 1, 2011

Lab Use Only:

Received By Driver/Depot: M. Beaulé	Received at Lab: [signature]	Verified By: [signature]
Date/Time: 01 June 2011 2:40 p.m.	Date/Time: June 1/11 3:15p Paracel	Date/Time: June 1/11 4:01p

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Certificate of Analysis

Paterson Group Consulting Engineers
28 Concourse Gate, Unit 1
Nepean, ON K2E 7T7
Attn: Luke Lopers

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

Client PO: 10815
Project: PE2327
Custody: 79732

Report Date: 22-Jun-2011
Order Date: 16-Jun-2011
Order #: 1125212

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

Paracel ID	Client ID
1125212-01	BH1-AU1
1125212-02	BH2-AU2

Approved By:

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

Certificate of Analysis

Report Date: 22-Jun-2011

Client: **Paterson Group Consulting Engineers**

Order Date:16-Jun-2011

Client PO: 10815 Project Description: PE2327

Analysis Summary Table

Analysis	Method Reference/Description	Extraction Date	Analysis Date
Metals	EPA 6020 - Digestion - ICP-MS	21-Jun-11	21-Jun-11
Solids, %	Gravimetric, calculation	22-Jun-11	22-Jun-11

Certificate of Analysis

Report Date: 22-Jun-2011

Client: **Paterson Group Consulting Engineers**

Order Date:16-Jun-2011

Client PO: 10815

Project Description: PE2327

	Client ID:	BH1-AU1	BH2-AU2	-	-
	Sample Date:	31-May-11	30-May-11	-	-
	Sample ID:	1125212-01	1125212-02	-	-
	MDL/Units	Soil	Soil	-	-
Physical Characteristics					
% Solids	0.1 % by Wt.	97.9	77.2	-	-
Metals					
Antimony	1 ug/g dry	2	6	-	-
Arsenic	1 ug/g dry	<1	7	-	-
Barium	1 ug/g dry	190	383	-	-
Beryllium	0.5 ug/g dry	<0.5	0.8	-	-
Boron	5.0 ug/g dry	11.4	9.7	-	-
Cadmium	0.5 ug/g dry	0.8	0.9	-	-
Chromium	5 ug/g dry	24	29	-	-
Cobalt	1 ug/g dry	6	11	-	-
Copper	5 ug/g dry	45	65	-	-
Lead	1 ug/g dry	206	701	-	-
Molybdenum	1 ug/g dry	1	3	-	-
Nickel	5 ug/g dry	23	27	-	-
Selenium	1 ug/g dry	1	2	-	-
Silver	0.3 ug/g dry	<0.3	0.4	-	-
Thallium	1 ug/g dry	<1	<1	-	-
Uranium	1 ug/g dry	<1	2	-	-
Vanadium	10 ug/g dry	18	43	-	-
Zinc	20 ug/g dry	156	294	-	-

Certificate of Analysis

Report Date: 22-Jun-2011

Client: **Paterson Group Consulting Engineers**

Order Date:16-Jun-2011

Client PO: 10815 Project Description: PE2327

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: 22-Jun-2011

Client: **Paterson Group Consulting Engineers**

Order Date:16-Jun-2011

Client PO: 10815

Project Description: PE2327

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				26	
Arsenic	2.7	1	ug/g dry	3.5			25.1	35	
Barium	49.0	1	ug/g dry	61.5			22.5	34	
Beryllium	ND	0.5	ug/g dry	ND				25	
Boron	ND	5.0	ug/g dry	5.9			0.0	33	
Cadmium	0.55	0.5	ug/g dry	0.63			13.7	33	
Chromium	9.2	5	ug/g dry	12.1			26.7	32	
Cobalt	4.3	1	ug/g dry	5.2			18.6	32	
Copper	27.1	5	ug/g dry	32.5			18.0	32	
Lead	61.3	1	ug/g dry	74.7			19.8	44	
Molybdenum	ND	1	ug/g dry	1.5			0.0	29	
Nickel	15.8	5	ug/g dry	19.2			19.4	29	
Selenium	ND	1	ug/g dry	ND				28	
Silver	ND	0.3	ug/g dry	ND				28	
Thallium	ND	1	ug/g dry	ND				27	
Uranium	ND	1	ug/g dry	ND				27	
Vanadium	15.6	10	ug/g dry	19.6			22.5	27	
Zinc	128	20	ug/g dry	149			14.7	27	
Physical Characteristics									
% Solids	74.1	0.1	% by Wt.	72.6			2.0	25	

Certificate of Analysis

Report Date: 22-Jun-2011

Client: **Paterson Group Consulting Engineers**

Order Date:16-Jun-2011

Client PO: 10815 Project Description: PE2327

Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Metals									
Antimony	52.4		ug/L	ND	105	80-120			
Arsenic	48.3		ug/L	ND	96.6	80-120			
Barium	44.5		ug/L	ND	89.0	80-120			
Beryllium	48.5		ug/L	ND	97.0	80-120			
Boron	41.9		ug/L	ND	83.8	80-120			
Cadmium	47.9		ug/L	ND	95.9	80-120			
Chromium	46.3		ug/L	ND	92.6	80-120			
Cobalt	49.1		ug/L	ND	98.3	80-120			
Copper	47.8		ug/L	ND	95.5	80-120			
Lead	48.1		ug/L	ND	96.1	80-120			
Molybdenum	49.2		ug/L	ND	98.4	80-120			
Nickel	47.1		ug/L	ND	94.2	80-120			
Selenium	48.8		ug/L	ND	97.6	80-120			
Silver	47.1		ug/L	ND	94.3	80-120			
Thallium	50.5		ug/L	ND	101	80-120			
Uranium	42.8		ug/L	ND	85.6	80-120			
Vanadium	47.2		ug/L	ND	94.4	80-120			
Zinc	47.6		ug/L	ND	95.2	80-120			

Certificate of Analysis

Report Date: 22-Jun-2011

Client: **Paterson Group Consulting Engineers**

Order Date:16-Jun-2011

Client PO: 10815 Project Description: PE2327

Sample and QC Qualifiers 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.
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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Nº 79732

Reg. Drinking Water

Client Name: PATERSON GROUP	Project Ref: PE2327	Waterworks Name:	Page 1 of 1
Contact Name: Luke Lopers	Quote #	Waterworks Number:	Sample Taken by:
Address: 28 CONCOURSE GATE UNIT 1	PO # 10815	Address:	Print Name: Dan Smith
	E-mail Address: llopers@patersongroup.ca	After hours Contact:	Signature:
Telephone: 613 226 7381	Fax:	Public Health Unit:	TAT: [ ] 1-day [ ] 2-day [X] Reg.

Matrix Types: S–Soil/Sed. GW–Ground Water SW–Surface Water SS–Storm/Sanitary Sewer DW-Drinking Water RDW-Regulated Drinking Water P- Paint A-Air O-Other

Samples submitted under: (Indicate **ONLY** one)
[X] O. Reg 153 (511) Table 1 [ ] O. Reg 170/03 [ ] O. Reg 318/08 [ ] Private well
[ ] CCME ____ [ ] O. Reg 243/07 [ ] O. Reg 319/08 [ ] Other: ____

Type of DW Sample: R = Raw; T = Treated; D = Distribution
Location Types: S = Surface Water; G = Ground Water

Paracel Order Number: 1125212

	Sample ID / Location Name	Matrix	Air Volume	Type of Sample	# of Containers	Sample Taken: Date	Sample Taken: Time	Free / Combined Chlorine Residual mg/L	Required Analyses: Metals (ICP only)							
1	BH1 - AU1	S			1				X			250 ml				
2	BH2 - AU2	S			1				X			"				
3																
4																
5																
6																
7																
8																
9																
10																

Comments:

Preservation Verification: pH N/A Temperature 17.2°C
Verified by: MJC

Relinquished By (Print & Sign): Luke Lopers
Date/Time: June 16, 2011

Lab Use Only:

Received By Driver/Depot: M. Beouse	Received at Lab: MJC	Verified By: MJC
Date/Time: 16 JUN 2011 10:40 AM	Date/Time: June 16/11 12:00	Date/Time: June 16/11 2:46

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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: 12832
Project: PE2755
Custody: 95152

Report Date: 6-Sep-2012
Order Date: 31-Aug-2012
Order #: 1235255

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

Paracel ID	Client ID
1235255-01	BH3-SS4

Approved By: Mark Foto

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

Certificate of Analysis

Report Date: 06-Sep-2012
Order Date:31-Aug-2012

Client: **Paterson Group Consulting Engineers**

Client PO: 12832 Project Description: PE2755

Analysis Summary Table

Analysis	Method Reference/Description	Extraction Date	Analysis Date
BTEX	EPA 8260 - P&T GC-MS	4-Sep-12	4-Sep-12
CCME PHC F1	CWS Tier 1 - P&T GC-FID	4-Sep-12	4-Sep-12
CCME PHC F2 - F4	CWS Tier 1 - GC-FID, extraction	4-Sep-12	6-Sep-12
Solids, %	Gravimetric, calculation	4-Sep-12	4-Sep-12

Certificate of Analysis

Report Date: 06-Sep-2012
Order Date:31-Aug-2012

Client: **Paterson Group Consulting Engineers**

Client PO: 12832 Project Description: PE2755

	Client ID:	BH3-SS4	-	-	-
	Sample Date:	30-Aug-12	-	-	-
	Sample ID:	1235255-01	-	-	-
	MDL/Units	Soil	-	-	-
Physical Characteristics					
% Solids	0.1 % by Wt.	92.8	-	-	-
Volatiles					
Benzene	0.02 ug/g dry	<0.02	-	-	-
Ethylbenzene	0.05 ug/g dry	<0.05	-	-	-
Toluene	0.05 ug/g dry	<0.05	-	-	-
m,p-Xylenes	0.05 ug/g dry	<0.05	-	-	-
o-Xylene	0.05 ug/g dry	<0.05	-	-	-
Xylenes, total	0.05 ug/g dry	<0.05	-	-	-
Toluene-d8	Surrogate	115%	-	-	-
Hydrocarbons					
F1 PHCs (C6-C10)	7 ug/g dry	<7	-	-	-
F2 PHCs (C10-C16)	4 ug/g dry	<4	-	-	-
F3 PHCs (C16-C34)	8 ug/g dry	<8	-	-	-
F4 PHCs (C34-C50)	6 ug/g dry	<6	-	-	-

Certificate of Analysis

Report Date: 06-Sep-2012
Order Date:31-Aug-2012

Client: **Paterson Group Consulting Engineers**

Client PO: 12832 Project Description: PE2755

Method Quality Control: Blank

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Hydrocarbons									
F1 PHCs (C6-C10)	ND	7	ug/g						
F2 PHCs (C10-C16)	ND	4	ug/g						
F3 PHCs (C16-C34)	ND	8	ug/g						
F4 PHCs (C34-C50)	ND	6	ug/g						
Volatiles									
Benzene	ND	0.02	ug/g						
Ethylbenzene	ND	0.05	ug/g						
Toluene	ND	0.05	ug/g						
m,p-Xylenes	ND	0.05	ug/g						
o-Xylene	ND	0.05	ug/g						
Xylenes, total	ND	0.05	ug/g						
Surrogate: Toluene-d8	*3.77*		*ug/g*		*118*	*50-140*			

Certificate of Analysis

Report Date: 06-Sep-2012
Order Date:31-Aug-2012

Client: **Paterson Group Consulting Engineers**

Client PO: 12832 Project Description: PE2755

Method Quality Control: Duplicate

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Hydrocarbons									
F1 PHCs (C6-C10)	ND	7	ug/g dry	ND				40	
F2 PHCs (C10-C16)	ND	4	ug/g dry	ND				30	
F3 PHCs (C16-C34)	ND	8	ug/g dry	ND				30	
F4 PHCs (C34-C50)	ND	6	ug/g dry	ND				30	
Physical Characteristics									
% Solids	86.0	0.1	% by Wt.	85.7			0.3	25	
Volatiles									
Benzene	ND	0.02	ug/g dry	ND				50	
Ethylbenzene	ND	0.05	ug/g dry	ND				50	
Toluene	ND	0.05	ug/g dry	ND				50	
m,p-Xylenes	ND	0.05	ug/g dry	ND				50	
o-Xylene	ND	0.05	ug/g dry	ND				50	
Surrogate: Toluene-d8	*2.60*		*ug/g dry*	*ND*	*116*	*50-140*			

Certificate of Analysis

Report Date: 06-Sep-2012
Order Date:31-Aug-2012

Client: **Paterson Group Consulting Engineers**

Client PO: 12832 Project Description: PE2755

Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Hydrocarbons									
F1 PHCs (C6-C10)	182	7	ug/g	ND	90.8	80-120			
F2 PHCs (C10-C16)	56	4	ug/g	ND	60.0	60-140			
F3 PHCs (C16-C34)	191	8	ug/g	ND	82.0	60-140			
F4 PHCs (C34-C50)	131	6	ug/g	ND	93.3	60-140			
Volatiles									
Benzene	0.763	0.02	ug/g	ND	79.6	50-140			
Ethylbenzene	1.71	0.05	ug/g	ND	75.1	50-140			
Toluene	11.3	0.05	ug/g	ND	102	50-140			
m,p-Xylenes	6.66	0.05	ug/g	ND	96.5	50-140			
o-Xylene	2.03	0.05	ug/g	ND	73.3	50-140			
Surrogate: Toluene-d8	*3.72*		*ug/g*		*113*	*50-140*			

Certificate of Analysis

Report Date: 06-Sep-2012
Order Date:31-Aug-2012

Client: **Paterson Group Consulting Engineers**

Client PO: 12832 Project Description: PE2755

Qualifier Notes:

None

Sample Data Revisions

None

Work Order Revisions / Comments:

None

Other Report Notes:

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

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

CCME PHC additional information:

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

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Nº 95152
Page 1 of 1

Client Name: Paterson Group Inc.	Project Reference: PE2755	TAT: [X] Regular [ ] 3 Day
Contact Name: Dan Arnott	Quote #	[ ] 2 Day [ ] 1 Day
Address: 154 Colonnade Rd Ottawa K2E 7J5	PO # 12832	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 [X] 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: 1235255

	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	BH3-SS4	S		2	30 AUG 12		X							- 60 mL + 1 Vial -						✓
2																				
3																				
4																				
5																				
6																				
7																				
8																				
9																				
10																				

Comments:

Method of Delivery: Pick up

Relinquished By (Print & Sign):	Received by Driver/Depot:	Received at Lab:	Verified By:
DAN ARNOTT	T. SOUSE	SUNDEEPORN	M.C.
Date/Time: 31-Aug-12 9:25 AM	Date/Time: 31/08/12 10:05 AM	Date/Time: AUG 31, 2012 10:40	Date/Time: Aug 31/12 11:44
	Temperature: ____ °C	Temperature: 18.9 °C	pH Verified [ ] By: N/A

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Certificate of Analysis

Paterson Group Consulting Engineers
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Nepean, ON K2E 7J5
Attn: Dan Arnott

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

Client PO: 12844
Project: PE2755
Custody: 95576

Report Date: 13-Sep-2012
Order Date: 12-Sep-2012
Order #: 1237150

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

Paracel ID	Client ID
1237150-01	BH1-12-AU2
1237150-02	BH4-12-AU2

Approved By: Mark Foto

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

Certificate of Analysis

Report Date: 13-Sep-2012
Order Date:12-Sep-2012

Client: **Paterson Group Consulting Engineers**

Client PO: 12844 Project Description: PE2755

Analysis Summary Table

Analysis	Method Reference/Description	Extraction Date	Analysis Date
BTEX	EPA 8260 - P&T GC-MS	12-Sep-12	12-Sep-12
CCME PHC F1	CWS Tier 1 - P&T GC-FID	12-Sep-12	12-Sep-12
CCME PHC F2 - F4	CWS Tier 1 - GC-FID, extraction	12-Sep-12	13-Sep-12
Metals	EPA 6020 - Digestion - ICP-MS	13-Sep-12	13-Sep-12
Solids, %	Gravimetric, calculation	12-Sep-12	12-Sep-12

Certificate of Analysis

Report Date: 13-Sep-2012
Order Date:12-Sep-2012

Client: **Paterson Group Consulting Engineers**

Client PO: 12844 Project Description: PE2755

	Client ID:	BH1-12-AU2	BH4-12-AU2	-	-
	Sample Date:	29-Aug-12	30-Aug-12	-	-
	Sample ID:	1237150-01	1237150-02	-	-
	MDL/Units	Soil	Soil	-	-
Physical Characteristics					
% Solids	0.1 % by Wt.	80.7	95.0	-	-
Metals					
Antimony	1 ug/g dry	1	<1	-	-
Arsenic	1 ug/g dry	5	2	-	-
Barium	1 ug/g dry	185	38	-	-
Beryllium	0.5 ug/g dry	<0.5	<0.5	-	-
Boron	5.0 ug/g dry	8.6	<5.0	-	-
Cadmium	0.5 ug/g dry	<0.5	<0.5	-	-
Chromium	5 ug/g dry	22	8	-	-
Cobalt	1 ug/g dry	7	3	-	-
Copper	5 ug/g dry	39	11	-	-
Lead	1 ug/g dry	250	8	-	-
Molybdenum	1 ug/g dry	1	<1	-	-
Nickel	5 ug/g dry	18	5	-	-
Selenium	1 ug/g dry	<1	<1	-	-
Silver	0.3 ug/g dry	<0.3	<0.3	-	-
Thallium	1 ug/g dry	<1	<1	-	-
Uranium	1 ug/g dry	<1	<1	-	-
Vanadium	10 ug/g dry	32	15	-	-
Zinc	20 ug/g dry	121	<20	-	-
Volatiles					
Benzene	0.02 ug/g dry	0.10 [1]	0.09	-	-
Ethylbenzene	0.05 ug/g dry	<0.05 [1]	<0.05	-	-
Toluene	0.05 ug/g dry	<0.05 [1]	<0.05	-	-
m,p-Xylenes	0.05 ug/g dry	<0.05 [1]	<0.05	-	-
o-Xylene	0.05 ug/g dry	<0.05 [1]	<0.05	-	-
Xylenes, total	0.05 ug/g dry	<0.05 [1]	<0.05	-	-
Toluene-d8	Surrogate	89.8% [1]	88.9%	-	-
Hydrocarbons					
F1 PHCs (C6-C10)	7 ug/g dry	<7 [1]	<7	-	-
F2 PHCs (C10-C16)	4 ug/g dry	<4 [1]	<4	-	-
F3 PHCs (C16-C34)	8 ug/g dry	24 [1]	<8	-	-
F4 PHCs (C34-C50)	6 ug/g dry	<6 [1]	<6	-	-

Certificate of Analysis

Client: **Paterson Group Consulting Engineers**

Report Date: 13-Sep-2012
Order Date:12-Sep-2012

Client PO: 12844 Project Description: PE2755

Method Quality Control: Blank

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Hydrocarbons									
F2 PHCs (C10-C16)	ND	4	ug/g						
F3 PHCs (C16-C34)	ND	8	ug/g						
F4 PHCs (C34-C50)	ND	6	ug/g						
Metals									
Antimony	ND	1	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: 13-Sep-2012
Order Date:12-Sep-2012

Client: **Paterson Group Consulting Engineers**

Client PO: 12844 Project Description: PE2755

Method Quality Control: Duplicate

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Hydrocarbons									
F1 PHCs (C6-C10)	12	7	ug/g dry	14			17.1	40	
F2 PHCs (C10-C16)	ND	4	ug/g dry	ND				30	
F3 PHCs (C16-C34)	68	8	ug/g dry	24			94.7	30	QR-01
F4 PHCs (C34-C50)	31	6	ug/g dry	ND			0.0	30	
Metals									
Antimony	1.2	1	ug/g dry	1.2			3.3	30	
Arsenic	3.1	1	ug/g dry	2.9			8.3	30	
Barium	234	1	ug/g dry	227			3.2	30	
Beryllium	ND	0.5	ug/g dry	ND			0.0	30	
Boron	8.7	5.0	ug/g dry	5.7			41.5	30	QR-01
Cadmium	1.26	0.5	ug/g dry	1.29			2.5	30	
Chromium	46.7	5	ug/g dry	45.3			3.2	30	
Cobalt	2.6	1	ug/g dry	2.5			3.5	30	
Copper	351	5	ug/g dry	350			0.1	30	
Lead	32.2	1	ug/g dry	30.9			4.1	30	
Molybdenum	6.0	1	ug/g dry	4.7			25.3	30	
Nickel	13.1	5	ug/g dry	13.3			1.2	30	
Selenium	3.2	1	ug/g dry	2.7			19.6	30	
Silver	5.04	0.3	ug/g dry	4.14			19.7	30	
Thallium	ND	1	ug/g dry	ND			0.0	30	
Uranium	2.0	1	ug/g dry	1.8			10.4	30	
Vanadium	15.1	10	ug/g dry	14.5			4.3	30	
Zinc	502	20	ug/g dry	498			0.9	30	
Physical Characteristics									
% Solids	73.8	0.1	% by Wt.	77.8			5.3	25	
Volatiles									
Benzene	ND	0.02	ug/g dry	ND				50	
Ethylbenzene	ND	0.05	ug/g dry	ND				50	
Toluene	ND	0.05	ug/g dry	ND				50	
m,p-Xylenes	ND	0.05	ug/g dry	ND				50	
o-Xylene	ND	0.05	ug/g dry	ND				50	
Surrogate: Toluene-d8	*1.61*		*ug/g dry*	*ND*	*84.8*	*50-140*			

Certificate of Analysis

Report Date: 13-Sep-2012
Order Date:12-Sep-2012

Client: **Paterson Group Consulting Engineers**

Client PO: 12844 Project Description: PE2755

Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Hydrocarbons									
F1 PHCs (C6-C10)	200	7	ug/g	ND	100	80-120			
F2 PHCs (C10-C16)	94	4	ug/g	ND	95.0	60-140			
F3 PHCs (C16-C34)	324	8	ug/g	24	121	60-140			
F4 PHCs (C34-C50)	173	6	ug/g	ND	117	60-140			
Metals									
Antimony	48.7		ug/L	0.5	96.5	70-130			
Arsenic	45.9		ug/L	1.2	89.4	70-130			
Barium	145		ug/L	90.8	109	70-130			
Beryllium	52.0		ug/L	0.07	104	70-130			
Boron	53.2		ug/L	2.3	102	70-130			
Cadmium	47.3		ug/L	0.52	93.5	70-130			
Chromium	68.3		ug/L	18.1	100	70-130			
Cobalt	51.6		ug/L	1.0	101	70-130			
Copper	195		ug/L	140	109	70-130			
Lead	59.5		ug/L	12.4	94.3	70-130			
Molybdenum	47.8		ug/L	1.9	91.9	70-130			
Nickel	54.7		ug/L	5.3	98.7	70-130			
Selenium	49.3		ug/L	1.1	96.5	70-130			
Silver	45.4		ug/L	1.65	87.5	70-130			
Thallium	47.8		ug/L	ND	95.9	70-130			
Uranium	44.5		ug/L	0.7	87.6	70-130			
Vanadium	54.7		ug/L	5.8	97.7	70-130			
Zinc	248		ug/L	199	97.6	70-130			
Volatiles									
Benzene	4.34	0.02	ug/g	ND	109	60-130			
Ethylbenzene	2.45	0.05	ug/g	ND	61.1	60-130			
Toluene	4.57	0.05	ug/g	ND	114	60-130			
m,p-Xylenes	5.77	0.05	ug/g	ND	72.1	60-130			
o-Xylene	2.46	0.05	ug/g	ND	61.6	60-130			
Surrogate: Toluene-d8	*2.48*		*ug/g*		*77.6*	*50-140*			

Certificate of Analysis

Report Date: 13-Sep-2012
Order Date:12-Sep-2012

Client: **Paterson Group Consulting Engineers**

Client PO: 12844 Project Description: PE2755

Qualifier Notes:

Sample Qualifiers :

1 : Holding time had been exceeded upon sample receipt.

QC Qualifiers :

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

Sample Data Revisions

None

Work Order Revisions / Comments:

None

Other Report Notes:

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

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

CCME PHC additional information:

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

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Chain of Custody
(Lab Use Only)
Nº 95576

Page 1 of 1

Client Name: Paterson Group Inc.	Project Reference: PE 2755
Contact Name: Dan Arnott	Quote #
Address: 154 Colonade Rd. Ottawa, ON K2E 7J5	PO # 12844
Telephone: 613. 226. 7381	Email Address: darnott@patersongroup.ca

TAT: | | Regular | | 3 Day | | 2 Day | X | 1 Day

Date Required: _____

Criteria: [ ] O. Reg. 153/04 Table __ [X] O. Reg. 153/11 (Current) Table 7 [ ] RSC Filing [ ] O. Reg. 558/00 [ ] PWQO [ ] CCME [ ] SUB (Storm) [ ] SUB (Sanitary) Municipality: _____ [ ] Other: _____

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

Required Analyses

Paracel Order Number:
1237150 - soil
1237151 - Water

	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	BH1-12-AU2	S		2	29-Aug-12		X			X				+ 1 X 250 ml		+ 1 vial +				✓
2	BH4-12-AU2	S		2	30-Aug-12		X			X					↓					✓
3	BH1-12-GW2	GW		2	12-Sept-12			X												✓
4																				
5																				
6																				
7																				
8																				
9																				
10																				

Comments:

Method of Delivery: Pick up

Relinquished By (Print & Sign):	Received by Driver/Depot: M. DeLouse	Received at Lab: SUNEEPORN	Verified By: MC
	Date/Time: 12/09/12 11:13AM	Date/Time: SEP 19 2012 11.43	Date/Time: Sept 12/12 11:45
Date/Time:	Temperature: ____ °C	Temperature: 21.5 °C	pH Verified [ ] By: N/A

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Certificate of Analysis

Paterson Group Consulting Engineers
28 Concourse Gate, Unit 1
Nepean, ON K2E 7T7
Attn: Luke Lopers

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

Client PO: 10908
Project: PE2327
Custody: 83384

Report Date: 7-Jun-2011
Order Date: 6-Jun-2011
Order #: 1124034

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

Paracel ID	Client ID
1124034-01	BH1-GW1
1124034-02	BH3-GW1

Approved By:

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

Certificate of Analysis

Report Date: 07-Jun-2011

Client: **Paterson Group Consulting Engineers**

Order Date:6-Jun-2011

Client PO: 10908 Project Description: PE2327

Analysis Summary Table

Analysis	Method Reference/Description	Extraction Date	Analysis Date
CCME PHC F1	CWS Tier 1 - P&T GC-FID	6-Jun-11	6-Jun-11
CCME PHC F2 - F4	CWS Tier 1 - GC-FID, extraction	7-Jun-11	7-Jun-11
VOCs	EPA 624 - P&T GC-MS	6-Jun-11	6-Jun-11

Certificate of Analysis

Report Date: 07-Jun-2011

Client: **Paterson Group Consulting Engineers**

Order Date:6-Jun-2011

Client PO: 10908

Project Description: PE2327

	Client ID:	BH1-GW1	BH3-GW1	-	-
	Sample Date:	06-Jun-11	06-Jun-11	-	-
	Sample ID:	1124034-01	1124034-02	-	-
	MDL/Units	Water	Water	-	-
Volatiles					
Acetone	5.0 ug/L	<5.0	<5.0	-	-
Benzene	0.5 ug/L	<0.5	<0.5	-	-
Bromodichloromethane	0.5 ug/L	<0.5	<0.5	-	-
Bromoform	0.5 ug/L	<0.5	<0.5	-	-
Bromomethane	0.5 ug/L	<0.5	<0.5	-	-
Carbon Tetrachloride	0.2 ug/L	<0.2	<0.2	-	-
Chlorobenzene	0.5 ug/L	<0.5	<0.5	-	-
Chloroethane	1.0 ug/L	<1.0	<1.0	-	-
Chloroform	0.5 ug/L	<0.5	<0.5	-	-
Chloromethane	3.0 ug/L	<3.0	<3.0	-	-
Dibromochloromethane	0.5 ug/L	<0.5	<0.5	-	-
Dichlorodifluoromethane	1.0 ug/L	<1.0	<1.0	-	-
1,2-Dibromoethane	0.2 ug/L	<0.2	<0.2	-	-
1,2-Dichlorobenzene	0.5 ug/L	<0.5	<0.5	-	-
1,3-Dichlorobenzene	0.5 ug/L	<0.5	<0.5	-	-
1,4-Dichlorobenzene	0.5 ug/L	<0.5	<0.5	-	-
1,1-Dichloroethane	0.5 ug/L	<0.5	<0.5	-	-
1,2-Dichloroethane	0.5 ug/L	<0.5	<0.5	-	-
1,1-Dichloroethylene	0.5 ug/L	<0.5	<0.5	-	-
cis-1,2-Dichloroethylene	0.5 ug/L	<0.5	<0.5	-	-
trans-1,2-Dichloroethylene	0.5 ug/L	<0.5	<0.5	-	-
1,2-Dichloroethylene, total	0.5 ug/L	<0.5	<0.5	-	-
1,2-Dichloropropane	0.5 ug/L	<0.5	<0.5	-	-
cis-1,3-Dichloropropylene	0.5 ug/L	<0.5	<0.5	-	-
trans-1,3-Dichloropropylene	0.5 ug/L	<0.5	<0.5	-	-
1,3-Dichloropropene, total	0.5 ug/L	<0.5	<0.5	-	-
Ethylbenzene	0.5 ug/L	<0.5	<0.5	-	-
Hexane	1.0 ug/L	<1.0	<1.0	-	-
Methyl Ethyl Ketone (2-Butanone)	5.0 ug/L	<5.0	<5.0	-	-
Methyl Butyl Ketone (2-Hexanone)	10.0 ug/L	<10.0	<10.0	-	-
Methyl Isobutyl Ketone	5.0 ug/L	<5.0	<5.0	-	-
Methyl tert-butyl ether	2.0 ug/L	<2.0	<2.0	-	-
Methylene Chloride	5.0 ug/L	<5.0	<5.0	-	-

Certificate of Analysis

Report Date: 07-Jun-2011

Client: **Paterson Group Consulting Engineers**

Order Date:6-Jun-2011

Client PO: 10908

Project Description: PE2327

	Client ID:	BH1-GW1	BH3-GW1	-	-
	Sample Date:	06-Jun-11	06-Jun-11	-	-
	Sample ID:	1124034-01	1124034-02	-	-
	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	-	-
1,2,4- Trimethylbenzene	0.5 ug/L	<0.5	<0.5	-	-
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	107%	107%	-	-
Dibromofluoromethane	Surrogate	99.4%	99.6%	-	-
Toluene-d8	Surrogate	107%	108%	-	-
Hydrocarbons					
F1 PHCs (C6-C10)	25 ug/L	<25	<25	-	-
F2 PHCs (C10-C16)	100 ug/L	<100	<100	-	-
F3 PHCs (C16-C34)	100 ug/L	<100	<100	-	-
F4 PHCs (C34-C50)	100 ug/L	<100	<100	-	-
F1 + F2 PHCs	125 ug/L	<125	<125	-	-
F3 + F4 PHCs	200 ug/L	<200	<200	-	-

Method Quality Control: Blank

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Hydrocarbons									
F1 PHCs (C6-C10)	ND	25	ug/L						
F2 PHCs (C10-C16)	ND	100	ug/L						
F3 PHCs (C16-C34)	ND	100	ug/L						
F4 PHCs (C34-C50)	ND	100	ug/L						
Volatiles									
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						
1,2,4- Trimethylbenzene	ND	0.5	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	*80.9*		*ug/L*		*101*	*50-140*			
Surrogate: Dibromofluoromethane	*85.9*		*ug/L*		*107*	*50-140*			
Surrogate: Toluene-d8	*85.8*		*ug/L*		*107*	*50-140*			

Certificate of Analysis

Report Date: 07-Jun-2011

Client: **Paterson Group Consulting Engineers**

Order Date:6-Jun-2011

Client PO: 10908 Project Description: PE2327

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	
1,2,4- Trimethylbenzene	ND	0.5	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	*84.8*		*ug/L*	*ND*	*106*	*50-140*			
Surrogate: Dibromofluoromethane	*77.9*		*ug/L*	*ND*	*97.4*	*50-140*			
Surrogate: Toluene-d8	*84.4*		*ug/L*	*ND*	*105*	*50-140*			

Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Hydrocarbons									
F1 PHCs (C6-C10)	2200	25	ug/L	ND	110	68-117			
F2 PHCs (C10-C16)	1500	100	ug/L	ND	94.0	61-129			
F3 PHCs (C16-C34)	4210	100	ug/L	ND	105	61-129			
F4 PHCs (C34-C50)	2900	100	ug/L	ND	121	61-129			
Volatiles									
Acetone	114	5.0	ug/L	ND	114	50-140			
Benzene	36.8	0.5	ug/L	ND	92.0	60-130			
Bromodichloromethane	40.0	0.5	ug/L	ND	100	60-130			
Bromoform	45.3	0.5	ug/L	ND	113	60-130			
Bromomethane	22.5	0.5	ug/L	ND	56.3	50-140			
Carbon Tetrachloride	43.6	0.2	ug/L	ND	109	60-130			
Chlorobenzene	36.9	0.5	ug/L	ND	92.2	60-130			
Chloroethane	39.0	1.0	ug/L	ND	97.4	50-140			
Chloroform	38.7	0.5	ug/L	ND	96.8	60-130			
Chloromethane	31.4	3.0	ug/L	ND	78.6	50-140			
Dibromochloromethane	39.9	0.5	ug/L	ND	99.8	60-130			
Dichlorodifluoromethane	40.3	1.0	ug/L	ND	101	50-140			
1,2-Dibromoethane	44.2	0.2	ug/L	ND	111	60-130			
1,2-Dichlorobenzene	33.6	0.5	ug/L	ND	83.9	60-130			
1,3-Dichlorobenzene	32.9	0.5	ug/L	ND	82.3	60-130			
1,4-Dichlorobenzene	34.2	0.5	ug/L	ND	85.6	60-130			
1,1-Dichloroethane	39.8	0.5	ug/L	ND	99.4	60-130			
1,2-Dichloroethane	47.0	0.5	ug/L	ND	118	60-130			
1,1-Dichloroethylene	39.3	0.5	ug/L	ND	98.3	60-130			
cis-1,2-Dichloroethylene	37.7	0.5	ug/L	ND	94.2	60-130			
trans-1,2-Dichloroethylene	37.6	0.5	ug/L	ND	94.1	60-130			
1,2-Dichloropropane	40.0	0.5	ug/L	ND	100	60-130			
cis-1,3-Dichloropropylene	42.4	0.5	ug/L	ND	106	60-130			
trans-1,3-Dichloropropylene	46.6	0.5	ug/L	ND	117	60-130			
Ethylbenzene	36.1	0.5	ug/L	ND	90.3	60-130			
Hexane	42.0	1.0	ug/L	ND	105	60-130			
Methyl Ethyl Ketone (2-Butanone)	70.5	5.0	ug/L	ND	70.5	50-140			
Methyl Butyl Ketone (2-Hexanone)	79.2	10.0	ug/L	ND	79.2	50-140			
Methyl Isobutyl Ketone	101	5.0	ug/L	ND	101	50-140			
Methyl tert-butyl ether	89.2	2.0	ug/L	ND	89.2	50-140			
Methylene Chloride	35.0	5.0	ug/L	ND	87.4	60-130			
Styrene	37.7	0.5	ug/L	ND	94.2	60-130			
1,1,1,2-Tetrachloroethane	38.0	0.5	ug/L	ND	95.0	60-130			
1,1,2,2-Tetrachloroethane	48.2	0.5	ug/L	ND	121	60-130			
Tetrachloroethylene	34.9	0.5	ug/L	ND	87.2	60-130			
Toluene	41.8	0.5	ug/L	ND	105	60-130			
1,2,4-Trichlorobenzene	34.5	0.5	ug/L	ND	86.2	60-130			
1,1,1-Trichloroethane	32.8	0.5	ug/L	ND	82.1	60-130			
1,1,2-Trichloroethane	44.7	0.5	ug/L	ND	112	60-130			
Trichloroethylene	41.7	0.5	ug/L	ND	104	60-130			
Trichlorofluoromethane	44.4	1.0	ug/L	ND	111	60-130			
1,2,4- Trimethylbenzene	35.4	0.5	ug/L	ND	88.4	60-130			
1,3,5-Trimethylbenzene	29.2	0.5	ug/L	ND	73.1	60-130			
Vinyl chloride	40.0	0.5	ug/L	ND	100	50-140			
m,p-Xylenes	73.4	0.5	ug/L	ND	91.7	60-130			
o-Xylene	38.8	0.5	ug/L	ND	97.1	60-130			
Surrogate: 4-Bromofluorobenzene	*75.7*		*ug/L*		*94.7*	*50-140*			
Surrogate: Dibromofluoromethane	*73.7*		*ug/L*		*92.1*	*50-140*			

Certificate of Analysis

Report Date: 07-Jun-2011

Client: **Paterson Group Consulting Engineers**

Order Date:6-Jun-2011

Client PO: 10908 Project Description: PE2327

Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Surrogate: Toluene-d8	*78.6*		*ug/L*		*98.3*	*50-140*			

Sample and QC Qualifiers 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 83384

Reg. Drinking Water

Client Name: Paterson Group	Project Ref: PE 2327	Waterworks Name:	Page 1 of 1
Contact Name: Luke Lopers	Quote #	Waterworks Number:	Sample Taken by: Print Name: Dan. Smith
Address: 28 Concourse gate Nepean, ON	PO # 10908	Address:	
	E-mail Address: LLopers@patersongroup.ca	After hours Contact:	Signature:
Telephone: 613 226-7381	Fax:	Public Health Unit:	TAT: ☑ 1-day | | 2-day | | Reg.

Matrix Types: S–Soil/Sed. **GW**–Ground Water **SW**–Surface Water **SS**–Storm/Sanitary Sewer **DW**–Drinking Water **RDW**–Regulated Drinking Water **P**- Paint **A**-Air **O**-Other

Samples submitted under: (Indicate **ONLY** one)
☐ O. Reg 153 (511) Table 1 ☐ O. Reg 170/03 ☐ O. Reg 318/08 ☐ Private well
☐ CCME ____ ☐ O. Reg 243/07 ☐ O. Reg 319/08 ☐ Other: ____

Type of **DW** Sample: **R** = Raw; **T** = Treated; **D** = Distribution
Location Types: **S** = Surface Water; **G** = Ground Water

Paracel Order Number: 1124034

	Sample ID / Location Name	Matrix	Air Volume	Type of Sample	# of Containers	Sample Taken Date	Sample Taken Time	Free / Combined Chlorine Residual mg/L	pH	Electrical Conductivity	Resistivity	Saturates	PHC's F1 - F4	VOC's				
1	BH1 - GW1	GW			3	06/06/11	~~3:00~~ 12:00pm		✓	✓	✓	✓	✓	✓				
2	BH3 GW1	GW			3	06/06/11	~~3:~~ 12:10pm		✓	✓	✓	✓	✓	✓				
3																		
4																		
5																		
6																		
7																		
8																		
9																		
10																		

Comments: 20.4°C

Preservation Verification: pH _____ Temperature _____
Verified by: _____

Relinquished By (Print & Sign): Dan. Smith

Date/Time: June 6, 11

Lab Use Only:

Received By Driver/Depot:	Received at Lab:	Verified By:
Date/Time:	Date/Time: June 6/11 2:56pm	Date/Time: June 6/11 3:03pm

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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: 12834
Project: PE2755
Custody: 95588

Report Date: 12-Sep-2012
Order Date: 5-Sep-2012
Revised Report **Order #: 1236109**

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

Paracel ID	Client ID
1236109-01	BH1-11-GW2
1236109-02	BH3-11-GW2
1236109-03	BH1-12-GW1
1236109-04	BH2-12-GW1
1236109-05	GW1-Dup
1236109-06	Trip Blank

Approved By: Mark Foto

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

Certificate of Analysis

Report Date: 12-Sep-2012

Client: **Paterson Group Consulting Engineers**

Order Date:5-Sep-2012

Client PO: 12834

Project Description: PE2755

Analysis Summary Table

Analysis	Method Reference/Description	Extraction Date	Analysis Date
CCME PHC F1	CWS Tier 1 - P&T GC-FID	5-Sep-12	5-Sep-12
CCME PHC F2 - F4	CWS Tier 1 - GC-FID, extraction	5-Sep-12	6-Sep-12
Metals, low level	EPA 200.8 - ICP-MS	6-Sep-12	6-Sep-12
VOCs	EPA 624 - P&T GC-MS	5-Sep-12	5-Sep-12

PARACEL LABORATORIES LTD.

Order #: 1236109

Certificate of Analysis

Report Date: 12-Sep-2012
Order Date:5-Sep-2012

Client: **Paterson Group Consulting Engineers**
Client PO: 12834

Project Description: PE2755

	Client ID:	BH1-11-GW2	BH3-11-GW2	BH1-12-GW1	BH2-12-GW1
	Sample Date:	05-Sep-12	05-Sep-12	05-Sep-12	05-Sep-12
	Sample ID:	1236109-01	1236109-02	1236109-03	1236109-04
	MDL/Units	Water	Water	Water	Water
Metals					
Antimony	0.5 ug/L	4.5	1.9	1.2	0.6
Arsenic	1 ug/L	7	3	2	2
Barium	1 ug/L	160	322	254	193
Beryllium	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
Boron	10 ug/L	107	91	101	79
Cadmium	0.1 ug/L	<0.1	<0.1	<0.1	<0.1
Chromium	1 ug/L	4	3	2	4
Cobalt	0.5 ug/L	1.4	<0.5	6.1	3.9
Copper	0.5 ug/L	0.6	<0.5	1.6	1.1
Lead	0.1 ug/L	<0.1	<0.1	<0.1	<0.1
Molybdenum	0.5 ug/L	6.1	11.6	337	10.6
Nickel	1 ug/L	8	2	4	6
Selenium	1 ug/L	<1	2	2	1
Silver	0.1 ug/L	<0.1	<0.1	<0.1	<0.1
Sodium	200 ug/L	13000	30000	118000	41500
Thallium	0.1 ug/L	<0.1	<0.1	<0.1	<0.1
Uranium	0.1 ug/L	3.8	0.4	4.9	4.4
Vanadium	0.5 ug/L	14.9	14.6	4.7	16.9
Zinc	5 ug/L	5	7	6	9
Volatiles					
Acetone	5.0 ug/L	<5.0	<5.0	<5.0	<5.0
Benzene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
Bromodichloromethane	0.5 ug/L	<0.5	<0.5	0.8	<0.5
Bromoform	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
Bromomethane	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
Carbon Tetrachloride	0.2 ug/L	<0.2	<0.2	<0.2	<0.2
Chlorobenzene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
Chloroethane	1.0 ug/L	<1.0	<1.0	<1.0	<1.0
Chloroform	0.5 ug/L	<0.5	<0.5	8.8	<0.5
Chloromethane	3.0 ug/L	<3.0	<3.0	<3.0	<3.0
Dibromochloromethane	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
Dichlorodifluoromethane	1.0 ug/L	<1.0	<1.0	<1.0	<1.0
1,2-Dibromoethane	0.2 ug/L	<0.2	<0.2	<0.2	<0.2
1,2-Dichlorobenzene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
1,3-Dichlorobenzene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5

Certificate of Analysis

Report Date: 12-Sep-2012
Order Date:5-Sep-2012

Client: **Paterson Group Consulting Engineers**
Client PO: 12834

Project Description: PE2755

	Client ID:	BH1-11-GW2	BH3-11-GW2	BH1-12-GW1	BH2-12-GW1
	Sample Date:	05-Sep-12	05-Sep-12	05-Sep-12	05-Sep-12
	Sample ID:	1236109-01	1236109-02	1236109-03	1236109-04
	MDL/Units	Water	Water	Water	Water
Volatiles (continued)					
1,4-Dichlorobenzene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
1,1-Dichloroethane	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
1,2-Dichloroethane	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
1,1-Dichloroethylene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
cis-1,2-Dichloroethylene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
trans-1,2-Dichloroethylene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
1,2-Dichloroethylene, total	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
1,2-Dichloropropane	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
cis-1,3-Dichloropropylene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
trans-1,3-Dichloropropylene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
1,3-Dichloropropene, total	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	0.5 ug/L	<0.5	<0.5	2.2	<0.5
Hexane	1.0 ug/L	<1.0	<1.0	3.1	<1.0
Methyl Ethyl Ketone (2-Butanone)	5.0 ug/L	<5.0	<5.0	<5.0	<5.0
Methyl Butyl Ketone (2-Hexanone)	10.0 ug/L	<10.0	<10.0	<10.0	<10.0
Methyl Isobutyl Ketone	5.0 ug/L	<5.0	<5.0	<5.0	<5.0
Methyl tert-butyl ether	2.0 ug/L	<2.0	<2.0	<2.0	<2.0
Methylene Chloride	5.0 ug/L	<5.0	<5.0	<5.0	<5.0
Styrene	0.5 ug/L	<0.5	<0.5	0.6	<0.5
1,1,1,2-Tetrachloroethane	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
1,1,2,2-Tetrachloroethane	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
Tetrachloroethylene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
Toluene	0.5 ug/L	<0.5	<0.5	6.3	<0.5
1,2,4-Trichlorobenzene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
1,1,1-Trichloroethane	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
1,1,2-Trichloroethane	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
Trichloroethylene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
Trichlorofluoromethane	1.0 ug/L	<1.0	<1.0	<1.0	<1.0
1,3,5-Trimethylbenzene	0.5 ug/L	<0.5	<0.5	0.8	<0.5
Vinyl chloride	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
m,p-Xylenes	0.5 ug/L	<0.5	<0.5	9.8	<0.5
o-Xylene	0.5 ug/L	<0.5	<0.5	18.5	<0.5
Xylenes, total	0.5 ug/L	<0.5	<0.5	28.3	<0.5
4-Bromofluorobenzene	Surrogate	130%	135%	107%	137%

Certificate of Analysis

Report Date: 12-Sep-2012
Order Date:5-Sep-2012

Client: **Paterson Group Consulting Engineers**
Client PO: 12834
Project Description: PE2755

	Client ID:	BH1-11-GW2	BH3-11-GW2	BH1-12-GW1	BH2-12-GW1
	Sample Date:	05-Sep-12	05-Sep-12	05-Sep-12	05-Sep-12
	Sample ID:	1236109-01	1236109-02	1236109-03	1236109-04
	MDL/Units	Water	Water	Water	Water
Volatiles (continued)					
Dibromofluoromethane	Surrogate	114%	113%	107%	108%
Toluene-d8	Surrogate	98.2%	99.4%	101%	104%
Hydrocarbons					
F1 PHCs (C6-C10)	25 ug/L	<25	<25	34	<25
F2 PHCs (C10-C16)	100 ug/L	<100	<100	<100	<100
F3 PHCs (C16-C34)	100 ug/L	<100	<100	<100	<100
F4 PHCs (C34-C50)	100 ug/L	<100	<100	<100	<100

Certificate of Analysis

Report Date: 12-Sep-2012
Order Date:5-Sep-2012

Client: **Paterson Group Consulting Engineers**
Client PO: 12834

Project Description: PE2755

	Client ID:	GW1-Dup	Trip Blank	-	-
	Sample Date:	05-Sep-12	04-Sep-12	-	-
	Sample ID:	1236109-05	1236109-06	-	-
	MDL/Units	Water	Water	-	-
Metals					
Antimony	0.5 ug/L	1.7	-	-	-
Arsenic	1 ug/L	2	-	-	-
Barium	1 ug/L	315	-	-	-
Beryllium	0.5 ug/L	<0.5	-	-	-
Boron	10 ug/L	91	-	-	-
Cadmium	0.1 ug/L	<0.1	-	-	-
Chromium	1 ug/L	3	-	-	-
Cobalt	0.5 ug/L	2.3	-	-	-
Copper	0.5 ug/L	<0.5	-	-	-
Lead	0.1 ug/L	<0.1	-	-	-
Molybdenum	0.5 ug/L	10.4	-	-	-
Nickel	1 ug/L	2	-	-	-
Selenium	1 ug/L	2	-	-	-
Silver	0.1 ug/L	<0.1	-	-	-
Sodium	200 ug/L	30100	-	-	-
Thallium	0.1 ug/L	<0.1	-	-	-
Uranium	0.1 ug/L	0.4	-	-	-
Vanadium	0.5 ug/L	14.3	-	-	-
Zinc	5 ug/L	<5	-	-	-
Volatiles					
Acetone	5.0 ug/L	<5.0	<5.0	-	-
Benzene	0.5 ug/L	<0.5	<0.5	-	-
Bromodichloromethane	0.5 ug/L	<0.5	<0.5	-	-
Bromoform	0.5 ug/L	<0.5	<0.5	-	-
Bromomethane	0.5 ug/L	<0.5	<0.5	-	-
Carbon Tetrachloride	0.2 ug/L	<0.2	<0.2	-	-
Chlorobenzene	0.5 ug/L	<0.5	<0.5	-	-
Chloroethane	1.0 ug/L	<1.0	<1.0	-	-
Chloroform	0.5 ug/L	<0.5	<0.5	-	-
Chloromethane	3.0 ug/L	<3.0	<3.0	-	-
Dibromochloromethane	0.5 ug/L	<0.5	<0.5	-	-
Dichlorodifluoromethane	1.0 ug/L	<1.0	<1.0	-	-
1,2-Dibromoethane	0.2 ug/L	<0.2	<0.2	-	-
1,2-Dichlorobenzene	0.5 ug/L	<0.5	<0.5	-	-

Certificate of Analysis

Report Date: 12-Sep-2012
Order Date:5-Sep-2012

Client: **Paterson Group Consulting Engineers**
Client PO: 12834
Project Description: PE2755

	Client ID:	GW1-Dup	Trip Blank	-	-
	Sample Date:	05-Sep-12	04-Sep-12	-	-
	Sample ID:	1236109-05	1236109-06	-	-
	MDL/Units	Water	Water	-	-
Volatiles (continued)					
1,3-Dichlorobenzene	0.5 ug/L	<0.5	<0.5	-	-
1,4-Dichlorobenzene	0.5 ug/L	<0.5	<0.5	-	-
1,1-Dichloroethane	0.5 ug/L	<0.5	<0.5	-	-
1,2-Dichloroethane	0.5 ug/L	<0.5	<0.5	-	-
1,1-Dichloroethylene	0.5 ug/L	<0.5	<0.5	-	-
cis-1,2-Dichloroethylene	0.5 ug/L	<0.5	<0.5	-	-
trans-1,2-Dichloroethylene	0.5 ug/L	<0.5	<0.5	-	-
1,2-Dichloroethylene, total	0.5 ug/L	<0.5	<0.5	-	-
1,2-Dichloropropane	0.5 ug/L	<0.5	<0.5	-	-
cis-1,3-Dichloropropylene	0.5 ug/L	<0.5	<0.5	-	-
trans-1,3-Dichloropropylene	0.5 ug/L	<0.5	<0.5	-	-
1,3-Dichloropropene, total	0.5 ug/L	<0.5	<0.5	-	-
Ethylbenzene	0.5 ug/L	<0.5	<0.5	-	-
Hexane	1.0 ug/L	<1.0	<1.0	-	-
Methyl Ethyl Ketone (2-Butanone)	5.0 ug/L	<5.0	<5.0	-	-
Methyl Butyl Ketone (2-Hexanone)	10.0 ug/L	<10.0	<10.0	-	-
Methyl Isobutyl Ketone	5.0 ug/L	<5.0	<5.0	-	-
Methyl tert-butyl ether	2.0 ug/L	<2.0	<2.0	-	-
Methylene Chloride	5.0 ug/L	<5.0	<5.0	-	-
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	-	-

Certificate of Analysis

Report Date: 12-Sep-2012
Order Date:5-Sep-2012

Client: **Paterson Group Consulting Engineers**
Client PO: 12834
Project Description: PE2755

	Client ID:	GW1-Dup	Trip Blank	-	-
	Sample Date:	05-Sep-12	04-Sep-12	-	-
	Sample ID:	1236109-05	1236109-06	-	-
	MDL/Units	Water	Water	-	-
Volatiles (continued)					
4-Bromofluorobenzene	Surrogate	136%	128%	-	-
Dibromofluoromethane	Surrogate	107%	109%	-	-
Toluene-d8	Surrogate	107%	94.8%	-	-
Hydrocarbons					
F1 PHCs (C6-C10)	25 ug/L	<25	-	-	-
F2 PHCs (C10-C16)	100 ug/L	<100	-	-	-
F3 PHCs (C16-C34)	100 ug/L	<100	-	-	-
F4 PHCs (C34-C50)	100 ug/L	<100	-	-	-

Certificate of Analysis

Report Date: 12-Sep-2012

Client: **Paterson Group Consulting Engineers**

Order Date:5-Sep-2012

Client PO: 12834

Project Description: PE2755

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						
Metals									
Antimony	ND	0.5	ug/L						
Arsenic	ND	1	ug/L						
Barium	ND	1	ug/L						
Beryllium	ND	0.5	ug/L						
Boron	ND	10	ug/L						
Cadmium	ND	0.1	ug/L						
Chromium	ND	1	ug/L						
Cobalt	ND	0.5	ug/L						
Copper	ND	0.5	ug/L						
Lead	ND	0.1	ug/L						
Molybdenum	ND	0.5	ug/L						
Nickel	ND	1	ug/L						
Selenium	ND	1	ug/L						
Silver	ND	0.1	ug/L						
Sodium	ND	200	ug/L						
Thallium	ND	0.1	ug/L						
Uranium	ND	0.1	ug/L						
Vanadium	ND	0.5	ug/L						
Zinc	ND	5	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						

Certificate of Analysis

Report Date: 12-Sep-2012

Client: **Paterson Group Consulting Engineers**

Order Date:5-Sep-2012

Client PO: 12834

Project Description: PE2755

Method Quality Control: Blank

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
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	*77.4*		*ug/L*		*96.7*	*50-140*			
Surrogate: Dibromofluoromethane	*84.9*		*ug/L*		*106*	*50-140*			
Surrogate: Toluene-d8	*82.7*		*ug/L*		*103*	*50-140*			

Certificate of Analysis

Report Date: 12-Sep-2012
Order Date:5-Sep-2012

Client: **Paterson Group Consulting Engineers**
Client PO: 12834 Project Description: PE2755

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	
Metals									
Antimony	ND	0.5	ug/L	ND			0.0	20	
Arsenic	1.3	1	ug/L	1.1			12.9	20	
Barium	21.0	1	ug/L	20.6			2.1	20	
Beryllium	ND	0.5	ug/L	ND			0.0	20	
Boron	24	10	ug/L	26			5.7	20	
Cadmium	ND	0.1	ug/L	ND			0.0	20	
Chromium	7.8	1	ug/L	6.7			14.6	20	
Cobalt	ND	0.5	ug/L	ND			0.0	20	
Copper	1.32	0.5	ug/L	1.12			17.1	20	
Lead	ND	0.1	ug/L	ND			0.0	20	
Molybdenum	1.48	0.5	ug/L	1.43			3.0	20	
Nickel	ND	1	ug/L	ND			0.0	20	
Selenium	1.9	1	ug/L	1.9			1.8	20	
Silver	ND	0.1	ug/L	ND			0.0	20	
Sodium	15800	200	ug/L	17500			10.3	20	
Thallium	ND	0.1	ug/L	ND			0.0	20	
Uranium	ND	0.1	ug/L	ND			0.0	20	
Vanadium	2.28	0.5	ug/L	2.05			10.8	20	
Zinc	5	5	ug/L	ND			0.0	20	
Volatiles									
Acetone	ND	5.0	ug/L	ND				30	
Benzene	ND	0.5	ug/L	ND				30	
Bromodichloromethane	10.3	0.5	ug/L	3.76			92.9	30	QR-05
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	16.4	0.5	ug/L	6.82			82.7	30	QR-05
Chloromethane	ND	3.0	ug/L	ND				30	
Dibromochloromethane	11.8	0.5	ug/L	4.24			94.1	30	QR-05
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	

Certificate of Analysis

Report Date: 12-Sep-2012
Order Date:5-Sep-2012

Client: **Paterson Group Consulting Engineers**
Client PO: 12834 Project Description: PE2755

Method Quality Control: Duplicate

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
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	*96.2*		*ug/L*	*ND*	*120*	*50-140*			
Surrogate: Dibromofluoromethane	*81.5*		*ug/L*	*ND*	*102*	*50-140*			
Surrogate: Toluene-d8	*93.8*		*ug/L*	*ND*	*117*	*50-140*			

Certificate of Analysis

Report Date: 12-Sep-2012
Order Date:5-Sep-2012

Client: **Paterson Group Consulting Engineers**
Client PO: 12834 Project Description: PE2755

Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Hydrocarbons									
F1 PHCs (C6-C10)	2300	25	ug/L	ND	115	68-117			
F2 PHCs (C10-C16)	1240	100	ug/L	ND	77.5	60-140			
F3 PHCs (C16-C34)	3100	100	ug/L	ND	77.5	60-140			
F4 PHCs (C34-C50)	2150	100	ug/L	ND	89.8	60-140			
Metals									
Antimony	50.6		ug/L	0.19	101	80-120			
Arsenic	54.6		ug/L	1.1	107	80-120			
Barium	68.4		ug/L	20.6	95.6	80-120			
Beryllium	50.5		ug/L	0.03	101	80-120			
Boron	66		ug/L	26	81.0	80-120			
Cadmium	45.1		ug/L	ND	90.5	80-120			
Chromium	53.4		ug/L	6.7	93.4	80-120			
Cobalt	48.2		ug/L	0.04	96.4	80-120			
Copper	47.0		ug/L	1.12	91.8	80-120			
Lead	44.6		ug/L	ND	90.1	80-120			
Molybdenum	46.6		ug/L	1.43	90.3	80-120			
Nickel	48.8		ug/L	0.9	95.8	80-120			
Selenium	57.9		ug/L	1.9	112	80-120			
Silver	43.9		ug/L	ND	87.9	80-120			
Sodium	881		ug/L	ND	88.1	80-120			
Thallium	47.3		ug/L	ND	94.8	80-120			
Uranium	46.5		ug/L	0.02	93.0	80-120			
Vanadium	49.6		ug/L	2.05	95.2	80-120			
Zinc	49		ug/L	5	88.8	80-120			
Volatiles									
Acetone	91.5	5.0	ug/L	ND	91.5	50-140			
Benzene	26.3	0.5	ug/L	ND	65.7	60-130			
Bromodichloromethane	30.2	0.5	ug/L	ND	75.5	60-130			
Bromoform	35.0	0.5	ug/L	ND	87.5	60-130			
Bromomethane	33.9	0.5	ug/L	ND	84.8	50-140			
Carbon Tetrachloride	31.0	0.2	ug/L	ND	77.4	60-130			
Chlorobenzene	31.9	0.5	ug/L	ND	79.8	60-130			
Chloroethane	31.6	1.0	ug/L	ND	79.0	50-140			
Chloroform	30.3	0.5	ug/L	ND	75.7	60-130			
Chloromethane	31.6	3.0	ug/L	ND	79.1	50-140			
Dibromochloromethane	34.3	0.5	ug/L	ND	85.7	60-130			
Dichlorodifluoromethane	27.4	1.0	ug/L	ND	68.6	50-140			
1,2-Dibromoethane	30.5	0.2	ug/L	ND	76.3	60-130			
1,2-Dichlorobenzene	39.0	0.5	ug/L	ND	97.6	60-130			
1,3-Dichlorobenzene	41.8	0.5	ug/L	ND	104	60-130			
1,4-Dichlorobenzene	36.7	0.5	ug/L	ND	91.8	60-130			
1,1-Dichloroethane	28.1	0.5	ug/L	ND	70.3	60-130			
1,2-Dichloroethane	29.8	0.5	ug/L	ND	74.6	60-130			
1,1-Dichloroethylene	34.2	0.5	ug/L	ND	85.4	60-130			
cis-1,2-Dichloroethylene	26.3	0.5	ug/L	ND	65.7	60-130			
trans-1,2-Dichloroethylene	28.2	0.5	ug/L	ND	70.4	60-130			
1,2-Dichloropropane	36.0	0.5	ug/L	ND	90.0	60-130			

Certificate of Analysis

Report Date: 12-Sep-2012
Order Date:5-Sep-2012

Client: **Paterson Group Consulting Engineers**
Client PO: 12834 Project Description: PE2755

Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
cis-1,3-Dichloropropylene	26.1	0.5	ug/L	ND	65.3	60-130			
trans-1,3-Dichloropropylene	31.3	0.5	ug/L	ND	78.3	60-130			
Ethylbenzene	30.0	0.5	ug/L	ND	75.1	60-130			
Hexane	27.2	1.0	ug/L	ND	68.0	60-130			
Methyl Ethyl Ketone (2-Butanone)	71.3	5.0	ug/L	ND	71.3	50-140			
Methyl Butyl Ketone (2-Hexanone)	59.7	10.0	ug/L	ND	59.7	50-140			
Methyl Isobutyl Ketone	63.1	5.0	ug/L	ND	63.1	50-140			
Methyl tert-butyl ether	76.0	2.0	ug/L	ND	76.0	50-140			
Methylene Chloride	33.1	5.0	ug/L	ND	82.7	60-130			
Styrene	31.5	0.5	ug/L	ND	78.7	60-130			
1,1,1,2-Tetrachloroethane	34.0	0.5	ug/L	ND	85.0	60-130			
1,1,2,2-Tetrachloroethane	32.8	0.5	ug/L	ND	81.9	60-130			
Tetrachloroethylene	29.0	0.5	ug/L	ND	72.6	60-130			
Toluene	28.5	0.5	ug/L	ND	71.3	60-130			
1,2,4-Trichlorobenzene	29.3	0.5	ug/L	ND	73.2	60-130			
1,1,1-Trichloroethane	28.5	0.5	ug/L	ND	71.3	60-130			
1,1,2-Trichloroethane	29.3	0.5	ug/L	ND	73.2	60-130			
Trichloroethylene	28.2	0.5	ug/L	ND	70.5	60-130			
Trichlorofluoromethane	32.5	1.0	ug/L	ND	81.2	60-130			
1,3,5-Trimethylbenzene	37.5	0.5	ug/L	ND	93.8	60-130			
Vinyl chloride	31.2	0.5	ug/L	ND	78.0	50-140			
m,p-Xylenes	62.8	0.5	ug/L	ND	78.5	60-130			
o-Xylene	32.0	0.5	ug/L	ND	80.0	60-130			
Surrogate: 4-Bromofluorobenzene	*69.4*		*ug/L*		*86.8*	*50-140*			

Certificate of Analysis

Report Date: 12-Sep-2012
Client: **Paterson Group Consulting Engineers** Order Date:5-Sep-2012
Client PO: 12834 Project Description: PE2755

Qualifier Notes:

QC Qualifiers :

QR-05 : Duplicate RPDs higher than normally accepted. Remaing batch QA\QC was acceptable. May be sample effect.

Sample Data Revisions:

None

Work Order Revisions / Comments:

Revision 1 - This report includes updated client Sample ID's.

Other Report Notes:

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

CCME PHC additional information:

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

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Chain of Custody
(Lab Use Only)
Nº 95588

Page 1 of 1

Client Name: Paterson Group Inc.	Project Reference: PE 2755
Contact Name: Dan Arnott	Quote #
Address: 154 Colonade Rd Ottawa, ON K2E 7J5	PO # 12834
Telephone: PE 2755	Email Address: darnott@patersongroup.ca

TAT: [ ] Regular [ ] 3 Day [ ] 2 Day [X] 1 Day
Date Required: 6-Sept-12

Criteria: [ ] O. Reg. 153/04 Table __ [X] O. Reg. 153/11 (Current) Table 1 [X] 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: 1236109

Required Analyses

	Sample ID/Location Name	Matrix	Air Volume	# of Containers	Sample Taken Date	Sample Taken Time	PHCs F1-F4+BTEX	VOCs	PAHs	Metals by ICP/MS	Hg	CrVI	B (HWS)							
1	BH1-11-GW1	GW		4	5-Sept-12		X	X		X										/
2	BH3-11-GW1	↓		↓	↓		X	X		X										/
3	BH1-12-GW1						X	X		X										/
4	BH2-12-GW1						X	X		X										/
5	GW1-Dup			↓	↓		X	X		X										/
6	Trip Blank	↓		2	4-Sept-12			X												/
7																				
8																				
9																				
10																				

Comments: • Metals Field-Filtered.
Please by 5pm 6-Sept-12?

Method of Delivery: Walk-in

Relinquished By (Print & Sign):	Received by Driver/Depot:	Received at Lab:	Verified By:
DAN ARNOTT			
Date/Time: 12:03 pm 5-SEPT-12	Date/Time:	Date/Time: Sept 5/12 12:08p	Date/Time: Sept 5/12 1:42
	Temperature: ____ °C	Temperature: 21.1 °C	pH Verified [ ] By:

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Certificate of Analysis

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

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

Client PO: 12844
Project: PE2755
Custody: 95576

Report Date: 12-Sep-2012
Order Date: 12-Sep-2012
Order #: 1237151

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

Paracel ID	Client ID
1237151-01	BH1-12-GW2

Approved By: Mark Foto

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

Certificate of Analysis

Report Date: 12-Sep-2012
Order Date:12-Sep-2012

Client: **Paterson Group Consulting Engineers**

Client PO: 12844 Project Description: PE2755

Analysis Summary Table

Analysis	Method Reference/Description	Extraction Date	Analysis Date
VOCs	EPA 624 - P&T GC-MS	12-Sep-12	12-Sep-12

Certificate of Analysis

Report Date: 12-Sep-2012
Order Date:12-Sep-2012

Client: **Paterson Group Consulting Engineers**

Client PO: 12844 Project Description: PE2755

	Client ID:	BH1-12-GW2	-	-	-
	Sample Date:	12-Sep-12	-	-	-
	Sample ID:	1237151-01	-	-	-
	MDL/Units	Water	-	-	-
Volatiles					
Acetone	5.0 ug/L	<5.0	-	-	-
Benzene	0.5 ug/L	<0.5	-	-	-
Bromodichloromethane	0.5 ug/L	<0.5	-	-	-
Bromoform	0.5 ug/L	<0.5	-	-	-
Bromomethane	0.5 ug/L	<0.5	-	-	-
Carbon Tetrachloride	0.2 ug/L	<0.2	-	-	-
Chlorobenzene	0.5 ug/L	<0.5	-	-	-
Chloroethane	1.0 ug/L	<1.0	-	-	-
Chloroform	0.5 ug/L	1.5	-	-	-
Chloromethane	3.0 ug/L	<3.0	-	-	-
Dibromochloromethane	0.5 ug/L	<0.5	-	-	-
Dichlorodifluoromethane	1.0 ug/L	<1.0	-	-	-
1,2-Dibromoethane	0.2 ug/L	<0.2	-	-	-
1,2-Dichlorobenzene	0.5 ug/L	<0.5	-	-	-
1,3-Dichlorobenzene	0.5 ug/L	<0.5	-	-	-
1,4-Dichlorobenzene	0.5 ug/L	<0.5	-	-	-
1,1-Dichloroethane	0.5 ug/L	<0.5	-	-	-
1,2-Dichloroethane	0.5 ug/L	<0.5	-	-	-
1,1-Dichloroethylene	0.5 ug/L	<0.5	-	-	-
cis-1,2-Dichloroethylene	0.5 ug/L	<0.5	-	-	-
trans-1,2-Dichloroethylene	0.5 ug/L	<0.5	-	-	-
1,2-Dichloroethylene, total	0.5 ug/L	<0.5	-	-	-
1,2-Dichloropropane	0.5 ug/L	<0.5	-	-	-
cis-1,3-Dichloropropylene	0.5 ug/L	<0.5	-	-	-
trans-1,3-Dichloropropylene	0.5 ug/L	<0.5	-	-	-
1,3-Dichloropropene, total	0.5 ug/L	<0.5	-	-	-
Ethylbenzene	0.5 ug/L	<0.5	-	-	-
Hexane	1.0 ug/L	<1.0	-	-	-
Methyl Ethyl Ketone (2-Butanone)	5.0 ug/L	<5.0	-	-	-
Methyl Butyl Ketone (2-Hexanone)	10.0 ug/L	<10.0	-	-	-
Methyl Isobutyl Ketone	5.0 ug/L	<5.0	-	-	-
Methyl tert-butyl ether	2.0 ug/L	<2.0	-	-	-
Methylene Chloride	5.0 ug/L	<5.0	-	-	-

Certificate of Analysis

Report Date: 12-Sep-2012
Order Date:12-Sep-2012

Client: **Paterson Group Consulting Engineers**

Client PO: 12844 Project Description: PE2755

	Client ID:	BH1-12-GW2	-	-	-
	Sample Date:	12-Sep-12	-	-	-
	Sample ID:	1237151-01	-	-	-
	MDL/Units	Water	-	-	-
Styrene	0.5 ug/L	<0.5	-	-	-
1,1,1,2-Tetrachloroethane	0.5 ug/L	<0.5	-	-	-
1,1,2,2-Tetrachloroethane	0.5 ug/L	<0.5	-	-	-
Tetrachloroethylene	0.5 ug/L	<0.5	-	-	-
Toluene	0.5 ug/L	<0.5	-	-	-
1,2,4-Trichlorobenzene	0.5 ug/L	<0.5	-	-	-
1,1,1-Trichloroethane	0.5 ug/L	<0.5	-	-	-
1,1,2-Trichloroethane	0.5 ug/L	<0.5	-	-	-
Trichloroethylene	0.5 ug/L	<0.5	-	-	-
Trichlorofluoromethane	1.0 ug/L	<1.0	-	-	-
1,3,5-Trimethylbenzene	0.5 ug/L	<0.5	-	-	-
Vinyl chloride	0.5 ug/L	<0.5	-	-	-
m,p-Xylenes	0.5 ug/L	<0.5	-	-	-
o-Xylene	0.5 ug/L	<0.5	-	-	-
Xylenes, total	0.5 ug/L	<0.5	-	-	-
4-Bromofluorobenzene	Surrogate	110%	-	-	-
Dibromofluoromethane	Surrogate	100%	-	-	-
Toluene-d8	Surrogate	96.8%	-	-	-

Certificate of Analysis

Report Date: 12-Sep-2012
Order Date:12-Sep-2012

Client: **Paterson Group Consulting Engineers**

Client PO: 12844 Project Description: PE2755

Method Quality Control: Blank

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
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	*35.2*		*ug/L*		*110*	*50-140*			
Surrogate: Dibromofluoromethane	*30.5*		*ug/L*		*95.3*	*50-140*			
Surrogate: Toluene-d8	*37.7*		*ug/L*		*118*	*50-140*			

Certificate of Analysis

Client: **Paterson Group Consulting Engineers**

Report Date: 12-Sep-2012
Order Date:12-Sep-2012

Client PO: 12844 Project Description: PE2755

Method Quality Control: Duplicate

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Volatiles									
Acetone	15.4	5.0	ug/L	14.5			6.2	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	11.3	0.5	ug/L	12.6			10.7	30	
1,2-Dichloroethane	ND	0.5	ug/L	ND				30	
1,1-Dichloroethylene	7.17	0.5	ug/L	7.93			10.1	30	
cis-1,2-Dichloroethylene	1.68	0.5	ug/L	1.78			5.8	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)	5.43	5.0	ug/L	ND			0.0	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	8.51	5.0	ug/L	ND			0.0	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	1.05	0.5	ug/L	1.29			20.5	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	*36.5*		*ug/L*	*ND*	*114*	*50-140*			
Surrogate: Toluene-d8	*37.0*		*ug/L*	*ND*	*116*	*50-140*			

Certificate of Analysis

Report Date: 12-Sep-2012
Order Date:12-Sep-2012

Client: **Paterson Group Consulting Engineers**

Client PO: 12844 Project Description: PE2755

Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Volatiles									
Acetone	59.4	5.0	ug/L	ND	59.4	50-140			
Benzene	42.9	0.5	ug/L	ND	107	60-130			
Bromodichloromethane	45.9	0.5	ug/L	ND	115	60-130			
Bromoform	39.0	0.5	ug/L	ND	97.4	60-130			
Bromomethane	24.3	0.5	ug/L	ND	60.7	50-140			
Carbon Tetrachloride	49.3	0.2	ug/L	ND	123	60-130			
Chlorobenzene	38.8	0.5	ug/L	ND	97.0	60-130			
Chloroethane	50.9	1.0	ug/L	ND	127	50-140			
Chloroform	45.2	0.5	ug/L	ND	113	60-130			
Chloromethane	36.9	3.0	ug/L	ND	92.2	50-140			
Dibromochloromethane	42.9	0.5	ug/L	ND	107	60-130			
Dichlorodifluoromethane	36.9	1.0	ug/L	ND	92.3	50-140			
1,2-Dibromoethane	38.6	0.2	ug/L	ND	96.6	60-130			
1,2-Dichlorobenzene	38.1	0.5	ug/L	ND	95.2	60-130			
1,3-Dichlorobenzene	37.8	0.5	ug/L	ND	94.4	60-130			
1,4-Dichlorobenzene	37.2	0.5	ug/L	ND	93.0	60-130			
1,1-Dichloroethane	45.8	0.5	ug/L	ND	115	60-130			
1,2-Dichloroethane	44.4	0.5	ug/L	ND	111	60-130			
1,1-Dichloroethylene	40.0	0.5	ug/L	ND	100	60-130			
cis-1,2-Dichloroethylene	43.8	0.5	ug/L	ND	109	60-130			
trans-1,2-Dichloroethylene	40.7	0.5	ug/L	ND	102	60-130			
1,2-Dichloropropane	44.6	0.5	ug/L	ND	111	60-130			
cis-1,3-Dichloropropylene	49.6	0.5	ug/L	ND	124	60-130			
trans-1,3-Dichloropropylene	49.4	0.5	ug/L	ND	123	60-130			
Ethylbenzene	46.7	0.5	ug/L	ND	117	60-130			
Hexane	40.9	1.0	ug/L	ND	102	60-130			
Methyl Ethyl Ketone (2-Butanone)	67.8	5.0	ug/L	ND	67.8	50-140			
Methyl Butyl Ketone (2-Hexanone)	69.2	10.0	ug/L	ND	69.2	50-140			
Methyl Isobutyl Ketone	76.7	5.0	ug/L	ND	76.7	50-140			
Methyl tert-butyl ether	91.0	2.0	ug/L	ND	91.0	50-140			
Methylene Chloride	41.9	5.0	ug/L	ND	105	60-130			
Styrene	42.4	0.5	ug/L	ND	106	60-130			
1,1,1,2-Tetrachloroethane	40.3	0.5	ug/L	ND	101	60-130			
1,1,2,2-Tetrachloroethane	39.7	0.5	ug/L	ND	99.4	60-130			
Tetrachloroethylene	39.0	0.5	ug/L	ND	97.6	60-130			
Toluene	43.7	0.5	ug/L	ND	109	60-130			
1,2,4-Trichlorobenzene	39.6	0.5	ug/L	ND	98.9	60-130			
1,1,1-Trichloroethane	48.4	0.5	ug/L	ND	121	60-130			
1,1,2-Trichloroethane	44.0	0.5	ug/L	ND	110	60-130			
Trichloroethylene	41.6	0.5	ug/L	ND	104	60-130			
Trichlorofluoromethane	37.7	1.0	ug/L	ND	94.2	60-130			
1,3,5-Trimethylbenzene	38.4	0.5	ug/L	ND	96.0	60-130			
Vinyl chloride	24.7	0.5	ug/L	ND	61.7	50-140			
m,p-Xylenes	86.8	0.5	ug/L	ND	108	60-130			
o-Xylene	43.3	0.5	ug/L	ND	108	60-130			
Surrogate: 4-Bromofluorobenzene	*31.3*		*ug/L*		*97.9*	*50-140*			

Certificate of Analysis

Report Date: 12-Sep-2012
Order Date:12-Sep-2012

Client: **Paterson Group Consulting Engineers**

Client PO: 12844 Project Description: PE2755

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.

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Nº 95576
Page 1 of 1

Client Name: Paterson Group Inc.
Contact Name: Dan Arnott
Address: 154 Colonade Rd. Ottawa, ON K2E 7J5
Telephone: 613.226.7381

Project Reference: PE 2755
Quote #
PO # 12844
Email Address: darnott@patersongroup.ca

TAT: [ ] Regular [ ] 3 Day [ ] 2 Day [X] 1 Day
Date Required:

Criteria: [ ] O. Reg. 153/04 Table [X] O. Reg. 153/11 (Current) Table 7 [ ] RSC Filing [ ] O. Reg. 558/00 [ ] PWQO [ ] CCME [ ] SUB (Storm) [ ] SUB (Sanitary) Municipality: [ ] Other:

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

Required Analyses

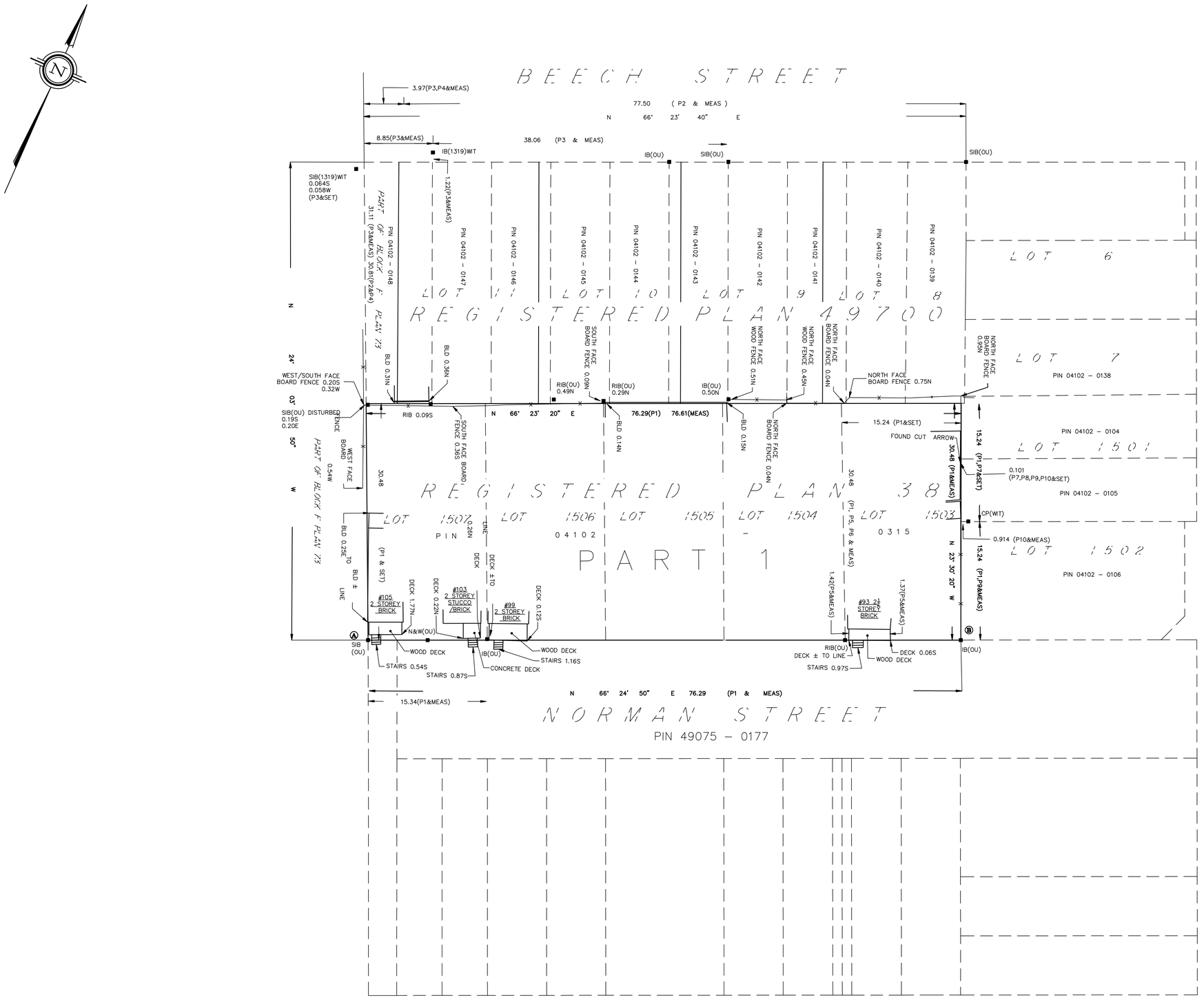
Paracel Order Number:
1237150 - soil
1237151 - water

	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	BH1-12-AU2	S		2	29-Aug-12		X			X				1 X 250 mL			+ 1	vial	-	✓
2	BH4-12-AU2	S		2	30-Aug-12		X			X				↓						✓
3	BH1-12-GW2	GW		2	12-Sept-12			X												✓
4																				
5																				
6																				
7																				
8																				
9																				
10																				

Comments:

Method of Delivery: Pick up

Relinquished By (Print & Sign):	Received by Driver/Depot: M. Dewe	Received at Lab: SUNEEP ORN	Verified By: MC
Date/Time:	Date/Time: 12/09/12 11:13am	Date/Time: SEP 13 2012 11:43	Date/Time: Sept 12/12 11:45
	Temperature: / °C	Temperature: 21.5 °C	pH Verified [ ] By: N/A



, 2012

BRIAN J. WEBSTER
ONTARIO LAND SURVEYOR

DATE

REPRESENTATIVE FOR THE
LAND REGISTRAR FOR THE
LAND TITLES DIVISION OF

SCHEDULE OTTAWA-CARLETON NO. 4

PART	DESCRIPTION	PIN	AREA (m²)
1	LOTS 1503-1507 RBG. PLAN 38	04102-0315	2330.5

DRAFT PLAN OF SURVEY of

LOTS 1503, 1504, 1505, 1506, 1507
REGISTERED PLAN 38
CITY OF OTTAWA
MUNICIPALITY OF OTTAWA-CARLETON

Stantec Geomatics Ltd.

METRIC CONVERSION

DISTANCES AND COORDINATES SHOWN ON THIS PLAN ARE IN METRES AND CAN BE CONVERTED TO FEET BY DIVIDING BY 0.3048

GRID SCALE CONVERSION

DISTANCES ARE GROUND AND CAN BE CONVERTED TO GRID BY MULTIPLYING BY THE COMBINED SCALE FACTOR OF 0.99999.

BEARING NOTE

ALL BEARINGS ARE GRID AND ARE DERIVED USING THE CAN-NET VIRTUAL REFERENCE STATION NETWORK, REFERRING TO MTM ZONE 9, NAD(83)(CSRS)(1997.0)(ORIGINAL)

OBSERVED REFERENCE POINTS (ORPs) DERIVED FROM GPS OBSERVATIONS USING THE CAN-NET VIRTUAL REFERENCE STATION NETWORK: MTM ZONE 9, NAD83 (CSRS) (1997.0) (ORIGINAL). COORDINATES TO URBAN ACCURACY PER SEC 14(2) OF O.REG. 216/10

POINT ID	NORTHING	EASTING
(A)	5029155.25	366607.89
(B)	5029186.81	366677.81

COORDINATES CANNOT, IN THEMSELVES, BE USED TO RE-ESTABLISH CORNERS OR BOUNDARIES SHOWN ON THIS PLAN.

SURVEYOR'S CERTIFICATE

I CERTIFY THAT :

1. **THIS SURVEY AND PLAN ARE CORRECT AND IN ACCORDANCE WITH THE SURVEYS ACT, THE SURVEYORS ACT AND THE LAND TITLES ACT AND THE REGULATIONS MADE UNDER THEM.**
2. **THE SURVEY WAS COMPLETED ON THE 30 DAY OF AUGUST , 2012**

DATE

BRIAN J. WEBSTER
ONTARIO LAND SURVEYOR

LEGEND

■	DENOTES	FOUND MONUMENTS
□	"	SET MONUMENTS
IB	"	IRON BAR
IBG	"	ROUND IRON BAR
SIB	"	STANDARD IRON BAR
SSIB	"	SHORT STANDARD IRON BAR
CC	"	CUT CROSS
CP	"	CONCRETE PIN
WIT	"	WITNESS
PIN	"	PROPERTY IDENTIFICATION NUMBER
MEAS	"	MEASURED
PROP	"	PROPORTIONED
OU	"	ORIGIN UNKNOWN
SG	"	STANTEC GEOMATICS LTD.
P1	"	REGISTERED PLAN 38
P2	"	REGISTERED PLAN 49700
P3	"	W&S DATED MAY 15, 1990
P4	"	SR-5472
P5	"	AOV DATED FEBRUARY 15, 1984
P6	"	AOG DATED NOVEMBER 5, 1975
P7	"	IOP DATED JULY 17, 1972
P8	"	W&S DATED SEPTEMBER 19, 1988
P9	"	W&S DATED OCTOBER 25, 1988
P10	"	PSD DATED OCTOBER 20, 2009

Stantec Geomatics Ltd.
Ontario Land Surveyors
1505 LAPERRIERE AVENUE, OTTAWA, ONTARIO K1Z 7T1
PHONE (613)722-4420 FAX (613)722-0789
stantec.com

DRAWN BY: CM	CHECKED BY: CM	PM: KP	FIELD: CM/CA	PROJECT No.:

DRAWING: 161612812 114 F1.dwg

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